

Introduction to Intrinsic Valuation of listed companies

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I. Let's lay the foundations

- **The essence of company valuation**
 - **The price of risk**
 - **Nothing but risk adjusted cash flows**
 - **Five misconceptions about valuation**
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The essence of company valuation

Intrinsic Valuation discounts expected cash flows

Using multiples like
- PE-Ratio
- Enterprise Value /EBITDA

is about "pricing",
not about "valuation".

Using a multiple answers, how much you could pay for an asset, relative to how much other market participants are currently willing to pay for a similar asset.

This is relative valuation, not intrinsic valuation.

- In Finance, a company is valued based on future cashflows which are expected the company shall generate.
 - Relevant are those cashflows which are attributable
 - a) to the shareholders of the company (Equity Approach), or alternatively
 - b) to the shareholders and the debtholders (Entity Approach).
 - The most common and widely accepted methodology is the Entity Approach: We calculate what is left over after all conceivable cash-in and cash-out of the firm, but before interest payments and reimbursements (to banks or bond holders) and before dividends or share buybacks (to shareholders).
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- Receiving USD 100 tomorrow is more valuable than receiving 100 USD in 10 years from now. Reasoning: You could invest 100 USD today (let's say for 1% risk free) and wait 10 years to receive $USD\ 100 * (1+1\%)^{10} = USD\ 110,46$
 - The time value of money is the reason why we discount future cash flows to a present value, and we call it a Discounted Cash Flow Model (DCF-Model)
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- Think of a (listed) stock like a commercial paper from a bank that you buy with a portion of your own money and a portion of borrowed money
...see next slide

The price of risk

Invest 100,00 for a period of 10 years and receive a return of 5% risk free

Future cash flows discounted by 5% result a present value of 100,00

Future cash flows discounted by 3% result a present value of 117,06

For taking risk, you demand a risk premium (10%), you cover for your risk

Risk adjusted you pay 56,59 for given cash flows (present value at 13%)

Commercial Paper	Future in years										
risk-free	t ₀	1	2	3	4	5	6	7	8	9	10
Investment	-100,00										
Interest p.a.		5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%
Cashflow end of year		5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	5,00	105,00
Present Value	100,00	4,76	4,54	4,32	4,11	3,92	3,73	3,55	3,38	3,22	64,46
				$= 4,32 * (1+5\%)^3 = 5,00$				$= 5,00 / (1+5\%)^7 = 3,55$			

- The cash flows have no risk. How much would you pay for receiving those cash flows?
- Happy receiving 3,0% risk free over a period of 10 years? (I would these days!)
-> You discount with 3% to see how much you can pay for those cash flows:

Interest p.a.		3,0%	3,0%	3,0%	3,0%	3,0%	3,0%	3,0%	3,0%	3,0%	3,0%	
Present Value	117,06	4,85	4,71	4,58	4,44	4,31	4,19	4,07	3,95	3,83	78,13	
		<i>you can pay 117,06 or 17,06 more than 100</i>							$= 5,00 / (1+3\%)^7 = 4,07$			

- Let's now assume the cash flows of 5 p.a. and payback of 100 (t₁₀) are not risk free. Let's say you are only entitled to receive the cash if it is not raining that day.
- Question: How much would you pay now?
a)100 ? b)117 ? c) less than 100 ? d) more than 117 ? e) something inbetween ?
- Answer: Now, with risk involved, you would pay less than 100.
Let's say the likelihood/risk of rain is 10%; you would demand a return of 3% + 10% = 13%:

Interest p.a.		13,0%	13,0%	13,0%	13,0%	13,0%	13,0%	13,0%	13,0%	13,0%	13,0%
Present Value	56,59	4,42	3,92	3,47	3,07	2,71	2,40	2,13	1,88	1,66	30,93

Nothing but risk adjusted cash flows

For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows

The value for a company
- with uncertain cash flows
- being a risky asset

... can be estimated by discounting the expected cash flows over its life at a risk-adjusted discount rate

This paper does focus on valuing listed companies, whereby valuing private companies follows same principles, but with different risk involved

- Hence, to value a company we only need two things:
 - a) expected future cash flows and
 - b) a rate to discount those cash flows
- According to this approach, nothing else matters!
- What about the value of machines, personnel, reputation, experiences, brand name, inventories, vehicle fleets, properties, customer relations?
 - > All this is necessary to generate the cash flows and may not be added separately
 - > Exception: If a company can sell assets without any impact on cash flows or risk, maybe unused real estate or an expensive painting.
- What about the risk that things turn bad (unexpected losses, a crisis)?
 - > Risk is reflected in the discount rate, do not start adjusting expected cash flows for risk!
- Cash flows can be negative (young growth companies) but must become positive over time. Valuing a company which is losing money forever is possible, but what for?
- Early cash flows are more valuable than later ones, though future cash flows may add to the value the most (growth companies like Tesla).
- A company value has a valuation date (like a balance sheet). Value changes the moment you change your assumptions on future cash flows or the moment you change the discount rate (technically every day).

Five Misconceptions about Valuation

My personal confession:

I am doing valuations of listed companies for one reason and one reason alone:

I want to act on my valuations!

If price < value I buy until price > value,

It makes me a "value investor"

Knowing that:

a) it might take years until markets correct valuation mistakes or

b) I might be wrong with my assumptions

The future is uncertain, let us be thankful, precisely this opens the door to make money with stocks

Myth I: A valuation is an objective search for "true" value

- > All valuations are biased, the only question is how much and in which direction
- > You can not make bias go away, you need to accept and manage it
- > In Banking, the direction and magnitude of the bias is driven by who is paying

Myth II: A good valuation provides a precise estimate of value

- > There are no precise valuations
- > Assumptions are all "best guesses"; a CEO is looking into an unknown future as well

Myth III: The more quantitative a model, the better the valuation

- > One's understanding of a valuation model is inversely proportional to the number of inputs
- > Simpler valuation models do much better than complex ones

Myth IV: Deciding on financial assumptions is too much of uncertainty

- > The future is always uncertain, true for any aspect of life, not acting is the wrong answer
- > We are using higher than risk-free discount rates, making the valuation a fair bet

Myth V: I am not good enough to execute valuations, "they must know something that I don't"

- > Valuation is not a science, it is not an art, it is a handcraft which you can learn by doing
- > Not much intellect is required to understand intrinsic valuation

II. Calculation of Free Cash Flows

- **Calculation of expected FCFF**
 - **How to get Revenue**
 - **How to get EBIT**
 - **How to get Tax**
 - **How to get Reinvestments**
 - **If you don't have/trust a Reinvestment-Rate**
 - **Terminal Value**
-

Calculation of expected FCFF

Not the profit that you see in the income statement of a company is relevant.

Profit is not cash flow !

Relevant is the cash flow of operating earnings (EBIT) deducted by

- tax payments
- net reinvestments

EBIT = Earnings before Interest & Tax

EBIT = Operating Income

- There is a standard model to calculate free cash flows of the firm (FCFF). FCFF is the cash left over before financing activities (before interest payments, repayment of debt, dividend payments, share buybacks).

Total Revenue	
minus	Operating expenses
=	EBIT
minus	Reoccurring Non-Operating Expenses if applicable
=	Adjusted EBIT
minus	Tax
=	EBIT minus Tax (EBIT-T)
minus	Reinvestments (Net Capex + net change in working capital)
=	Free Cash Flow to the firm (FCFF)

- Whereas we best calculate...
 - future Total Revenue by using Growth Rates from one year to the next
 - EBIT by using EBIT-Margins (Ratio: EBIT / Total Revenue)
 - Tax by using effective Tax Rates but develop to a Marginal Tax Rate over time
 - Reinvestments by using a Reinvestment-Rate (Ratio: Reinvestments / EBIT-T),
 - > Investments into Fixed and Current Assets net of Depreciation & Amortization

How to get Revenue

For a financial model, we need a forecast for the next (10) years.

We need assumptions:

1. Revenue Growth Rates
2. EBIT-Margins
3. Non-Operational items
4. Tax Rates (Tax / EBIT)
5. Reinvestment-Rates

How would you know?

-> Do your Research!

Sources:

- Look to the past
- Read articles and news
- Check Investor Relation
- Listen to Analysts
- Compare with Peers
- Use industrial averages

- > Develop your opinion
- > We call it Equity Story

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10
<i>Input Growth Rate</i>		12,0%	5,4%	5,9%	5,5%	4,3%	3,9%	3,5%	3,1%	2,7%	2,3%
Total Revenue	33.433	37.461	39.501	41.849	44.130	46.012	47.796	49.462	50.993	52.372	53.576

1. Total Revenue

- You need a starting point which should be the most updated number possible
- Total Revenue of the last annual report might be too far in the past
- Use the trailing months approach (LTM): Add Total Revenues of the last 4 quarterly reports
- Calculate expected Total Revenue by using annual Growth Rates
- Check how much the company is growing (or shrinking, negative Growth Rates possible)
- Think in nominal terms (including inflation), real terms possible but a bit more complex
- Look what your assumptions mean for Total Revenue in LTM+10
- Answer with yes: Is this possible? Is it plausible? Is it probable?
- Alternatively, create a picture of Total Revenue in 10 years from now and go backwards

Notice

- In perpetuity, no Company will grow faster than the economy, if so, it takes over the world
- The best assumption for the terminal Growth Rate (LTM+10) is the risk-free Rate
- The traded yield on a long-term risk-free investment is the best proxy for **real growth plus expected inflation!**

How to get EBIT

1. Revenue Growth Rates
2. EBIT-Margins
3. Non-Operational items
4. Tax Rates (Tax / EBIT)
5. Reinvestment-Rates

Sources:

- Look to the past
- Read articles and news
- Check Investor Relation
- Listen to Analysts
- Compare with Peers
- Use industrial averages

-> Develop your story

2. EBIT

- To value a listed company, we look from outside with no access to detailed company data
- It is meaningless to calculate Cost of material, Payroll, Admin-expenses, etc. individually
- Instead, we ask how much EBIT-Margin is possible, plausible and probable
- Check the volatility of the past, calculate averages
- Take care of operating leases in the past, not anymore part of the income statement
- Check the industry and what a company in the sector typically makes
- Are there good reasons for higher or lower margins? If yes, go ahead
- High Margins are often competed away over time

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10
<i>Input EBIT / Total Revenue</i>		29,3%	30,5%	30,2%	29,8%	29,4%	29,0%	28,6%	28,2%	27,7%	27,3%
EBIT		10.987	12.037	12.650	13.157	13.527	13.852	14.129	14.355	14.526	14.637

3. Non-operational items

- Companies report extraordinary items and/or one-off items below the EBIT line
- Some companies report such "unusual" items every year, you may want to consider this
- This is also the place to include extraordinary capex or an acquisition if applicable

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10
<i>Input non-operational items</i>		-853	-872	-892	-913	-934	-956	-978	-1.001	-1.024	-1.048
EBIT adjusted		10.135	11.165	11.758	12.243	12.592	12.896	13.151	13.354	13.502	13.589

How to get Tax

1. Revenue Growth Rates
2. EBIT-Margins
3. Non-Operational items
4. Tax Rates (Tax / EBIT)
5. Reinvestment-Rates

Sources:

- Look to the past
- Check the Tax Rates
- Compare with Peers
- Google "corporate tax rates table KPMG"

4. Tax

- Calculate Tax payments by using a Tax-Rate
- Look how much Tax the Company has paid in recent years (effective tax)
- Check the marginal (Company) Tax Rate of the jurisdiction (Country) -> KPMG
- Many companies avoid paying taxes because of smart lawyers and global legal structures
- If the company makes no profit, there should be no taxes (crisis) but tax benefits
- Start by using effective Tax Rates but develop to the Marginal Tax Rate of the Country
- Assume that a company can not avoid paying the marginal Tax rate in the long run

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10
<i>Input Tax/EBIT</i>		19,1%	19,7%	20,4%	21,1%	21,7%	22,4%	23,0%	23,7%	24,3%	25,0%
Tax payments		-1.934	-2.204	-2.398	-2.578	-2.734	-2.885	-3.028	-3.163	-3.287	-3.397
EBIT-T		8.201	8.961	9.360	9.666	9.858	10.011	10.123	10.191	10.215	10.192

Notice

- The model calculates tax payments by using a Rate on (adjusted) EBIT
- It looks like a mistake as interest payments (included in EBIT) are tax deductible as well
- Do not worry, this is taken care of in the Discount Rate
 - > When calculating the Cost of Debt (part of Discount Rate) we deduct a so-called tax shield

How to get Reinvestments

1. Revenue Growth Rates
2. EBIT-Margins
3. Non-Operational items
4. Tax Rates (Tax / EBIT)
5. Reinvestment-Rates

Sources:

- Check historical numbers of the company
- Download a table of Reinvestment-Rates of different industries:

<https://www.youcanvalue.de/wp-content/uploads/2021/03/Reinvestitionsquoten-YCV-zum-Download.xlsx>

- > Reinvestments are part of your Equity Story

5. Reinvestments

- This is the tricky part where even practitioners easily fail
- For beginners: Use Reinvestment-Rates to calculate Reinvestments
- The Reinvestment-Rate is a percentage that you calculate on EBIT-T
- Choose the number of the industry in which the company that you value is operating in
- In case your company is diversified in different industries, use a weighted average
- It won't work if EBIT-T is negative or for growth companies (choose absolute numbers)

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10
<i>Input Reinvestment Rate</i>		6,3%	8,6%	9,1%	9,7%	10,4%	10,9%	11,4%	11,9%	12,4%	12,8%
Reinvestments		-518	-774	-850	-940	-1.026	-1.095	-1.157	-1.213	-1.262	-1.302
Free Cash Flows to firm (FCF)	7.683	8.187	8.510	8.726	8.832	8.917	8.966	8.978	8.953	8.890	

- The concept of Reinvestments
 - The Reinvestment-Rate covers all net investments
 - It includes change in Net Working Capital plus Net Capital Expenditures (Net Capex)
 - Why Net Capex? -> Depreciation and Amortization are part of EBIT but are not cash-out
 - Why Change in Net Working Capital? -> Increase/Decrease has an impact on cashflow
- Classical items of change in Net Working Capital
 - > If receivables increase you have revenue but no cash-in, it reduces your cash flow
 - > If payables increase you have expenditures but no cash-out, it increases cash flow
 - > If stock increases you have cash out, but this is as well not included in EBIT

If you don't have/trust a Reinvestment-Rate

You can only grow if you invest !

If you assume growth, capex must be higher than depreciation over time, as you can only depreciate what you have invested

Reinvestments shall be cash-out,

... unless a business is shrinking

If you do not feel comfortable using a Reinvestment-Rate, I give you three ways of calculating Reinvestments on your own (A,B,C)

Three ways to calculate Reinvestments, making Reinvestment-Rate a result rather than an assumptions.

- A. Use the relationship of Revenue and Reinvestments
 - Check how much Capital Employed the company invested in the past
 - > Capital Employed = Equity plus interest bearing liabilities (debt) minus cash
 - Build a ratio: "Revenue/Capital" for the last 5 years and calculate an average
 - As Total Revenue is already forecasted, calculate expected Capital until LTM+10
 - It is the change of Capital from year to year that gives you Reinvestments
 - You could also assess how much units (EUR) you need to invest to achieve 1 EUR Revenue
- B. Use a formular based on Growth and Return (on Capital Employed)
 - Companies make EBIT-T because they achieve a return on Capital Employed (ROCE)
 - If Growth Rate and ROCE are given, you may calculate Reinvestments as follows:
$$\text{Reinvestments} = \text{EBIT-T} * \text{Growth Rate} / \text{ROCE}$$
(do it best over time and allocate)
 - This approach only works if you have positive EBIT and positive ROCE
- C. Go the hard way
 - Calculate Net Capex (Capital Expenditure minus depreciation) of the past
 - Do the same for investments in intangibles (Capex minus amortization)
 - Forecast the Net Working Capital by using a ratio of the past (NWC/Revenue)
 - It is the change in Net Working capital from year to year that is cash flow relevant
 - Respective numbers can be taken from the Statement of Cash Flow

Terminal Value

After 10 years of expected cash flows, we need to add the value of the company in 10 years from now

You could estimate a final cash flow if you would liquidate the company

... but DCF-Models typically assume that a company shall live for ever

What may sound "stretching" turns out being a fair assumption if you understand the concept of present value

Do not worry, the formulas of our Model will take care, you should nevertheless understand what is happening

- What happens after LTM+10?
DCF Valuation Models typically assume that a company has an infinite life.
- Since we cannot estimate cash flows forever, we estimate cash flows for a "terminal" period and assume that it shall grow forever, it buys you an infinitive stream of cash flows.
- Problems believing that a company shall live forever?
 - You can live with this assumption once you understand the power of discounting
 - A far away cash flow, let us say in 100 years from now, does not contribute to value
 - The present value of EUR 1.000.000 in 100 years, discounted with 8%, is EUR 455
- The terminal period is the basis to calculate a "Terminal Value":
When a company's cash flows grow at a constant rate forever, the present value of those cash flows can be written as:
$$\text{Terminal Value} = \text{terminal FCFF} / (\text{Discount Rate} - \text{Expected Growth Rate})$$
- What we need is the "Expected Growth Rate" forever.
Sounds difficult to answer but we simply take the risk-free Rate which typically is, as you will see, the actual yield of a 10 years government bond.
Reasoning: While companies can maintain high growth rates for extended periods, they will approach "stable growth" at some point in time.
The risk-free Rate expresses expected inflation plus expected real Interest Rate, it is the best proxy for the Nominal (Expected) Growth Rate of the economy.

III. Calculation of Discount Rate

- **Introduction to Discount Rate**
 - **Risk-free Rate**
 - **Equity Risk Premium**
 - **Country Risk**
 - **Relative Risk of the company**
 - **Bottom-Up Beta**
 - **Last word on Relative Risk**
 - **Cost of Debt**
-

Introduction to Discount Rate

What we need next,
is a Discount Rate

Academics & practitioners
spend much time on
calculating and justifying
"right" discount rates

What follows is a practical
approach to calculate a
discount rate that can be
used for intrinsic valuation

It is a building process on
numbers flowing into
"weighted average cost of
capital"
-> WACC

Notice: in more advanced
DCF-models WACC might
change over time

- We developed expected free cash flows of the company that we want to value (FCFF). We now need a Discount Rate to discount those FCFF.
- FCFF is used to pay interest and reimburse debt, what is left is owned by shareholders.
- The Discount Rate must include both: the Cost of Debt and the Cost of Equity, together, call it "Cost of Capital".
- Debt Investors (banks) claim their cashback based on fixed contracts and before payments to equity investors can be made. The risk of Debt is lower than the risk of Equity.
-> Cost of Debt is lower than Cost of Equity
- Depending on how much Equity and on how much Debt is involved, we calculate the Weighted Average Cost of Capital (WACC)
- Let us assume we have 100 units of Equity and 60 units of debt, together 160 units
 $WACC = \text{Cost of Equity} * 100/160 + \text{After Tax Cost of Debt} * 60/160$
- To buy the stock we must pay the Market Price
-> To calculate WACC we need "Market Values" (no one will sell for book value)
-> The Market Value of Equity is the Market Capitalization (Stock price * number of stocks)
-> The Market Value of Debt is something we must take from somewhere or calculate
- Calculating the Market Value of Debt is not difficult and the correct way.
You would discount future debt payments of the company (notes of annual report).
For "a first shot" you may take the Book Value of Debt (balance sheet).

Risk-free Rate

Let us first calculate the Cost of Equity of a firm

Before doing so, you must decide which currency you want to use

... typically, the currency of the financial reports

The currency determines your risk-free Rate

Let us assume a sample Risk-free Rate of 1%:

risk-free Rate
1,00%

1. Risk-free Rate to start with

- Instead of buying risky stocks you could invest risk-free
- This is the minimum return that you want to earn
- Take the actual yield of a governmental bond with 10 years maturity as your risk-free Rate
- Relevant is the currency of your valuation not the country where the company is registered
- Those are the currencies where you can easily find risk-free Rates:
EUR, USD, CAD, JPY, GBP, CHF, SEK, DKK, HKD, SGD, SKW, AUD
Sample USD: "yield on a 10 years treasury bond USA"
Sample EUR: "Rendite 10-jährige deutsche Staatsanleihe"
- Not all government securities are risk-free, some face default risk
- If you value an Italian company in EUR do not use an Italian government bond
- If you would value a company in Brazilian Real, a risk-free Rate must be calculated

Notice

- Markets have turned somewhat crazy with negative interest rates
- The yield of a Swiss governmental bond with 10 years maturity is still negative
- No need to freak out, just start with a negative number in case of CHF, it is perfectly ok

Equity Risk Premium

The risk premium for stocks is one of the most analyzed and challenged numbers in Finance

Ask yourself how much you want to earn for taking the risk of investing in the stock market



2. Equity Risk Premium (ERP)

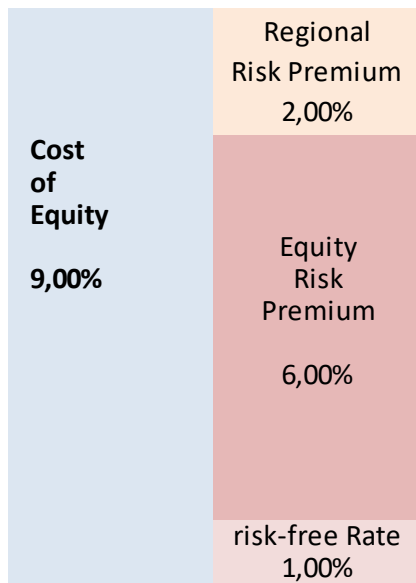
- On top of the risk-free Rate you want to earn a premium for taking the risk of stocks
- Add the premium that stocks have historically earned over riskless securities
- The most quoted historical ERP is what the index S&P 500 made in excess to US T-Bonds
- Since the end of the great depression, the arithmetic number is slightly above 6% p.a.
- This ERP is what you need to make, alternatively choose your own "hurdle rate"
- If you choose a premium too high (measure of safety), you will not find undervalued stocks
- If you choose a number too low, you disrespect the risk of equities, stocks will look cheap
- For German stocks, a premium between 6% and 8% is currently recommended (FAUB)
- For US-stocks, the ERP tends to be lower (lower risk perceived and higher dividends)

Notice

- Many bankers and analyst quote a historical ERP to build-up and justify their Discount Rates
- In modern valuation practice, a so-called **Implied Equity Risk Premium (IERP)** is used
- The IERP backs out what a market is pricing as a premium for stocks at current expectations
- IERP expresses the internal rate of return of a market index based on expected cash flows
- Expected cash flows are usually based on professional estimates (Consensus)
- The IRR of the market minus the risk-free Rate equals the IERP, a forward-looking number
- There are different sources available, it is more than fair to build on an IERP if you want to
- Source: <http://www.xn--marktrisikoprmi-7nb.de/marktrisikopraemien.html>

ERP – Country Risk

Bring Country Risk into the equation if you want to



- Country Risk
 - The ERP (6%) is based on a mature market (S&P 500)
 - A company selling its products in Latin America for instance, is exposed to more risk
 - The simplest way of dealing with it, is to adjust the ERP for Country Risk
 - A good measure of Country Risk are "Credit Default Swaps" (CDS) with 10 years maturity
 - CDS are insurances against the default of a country, they are traded and have a yield
 - If a company sells its products in Brazil, you may add the Credit Default Spread for Brazil

- Sample:

CDS Germany:	2% (200 basis points)
CDS Brazil:	6% (600 basis points)
Delta:	4%

- If the company makes half of its revenues in Europe and half of it in Brazil, you can adjust.
Country Risk Premium: $4\% * 50\% \text{ revenue share} = 2\%$

- - If you can't get a traded 10 yrs CDS of a country, you can use a sovereign rating (Moody's)
 - Take the CDS of a country with the same rating and you're home free
 - A break-down of sales regions you should find in the annual reports of your company
 - If your company sells products in many different countries, calculate a weighted average
 - Source: <https://www.youcanvalue.de/wp-content/uploads/2021/03/Regionale-Risikopraemien-zum-Download.xlsx>

Relative Risk of the company

Let's assume Beta is 1,25
 Cost of Equity =
 $1\% + 1,25 * 9\% = 11\%$

Cost of Equity 11,00%	Premium for relative Risk 2,00%
	Regional Risk Premium 2,00%
	Equity Risk Premium 6,00%
	risk-free Rate 1,00%

3. Relative Risk

- The Equity Risk Premium reflects the risk of investing in stocks (regional adjustments if so)
- Now we adjust for the specific risk of the company (relative risk)
- In Finance, the approach is quite simple:
 - > You ask if the company is riskier or less risky than the market (average company)
 - > You multiply your ERP with a relative risk factor, call it "Beta"
 - ~ if the company is equally risky than the entire stock market, Beta is 1
 - ~ if the company is riskier than the entire stock market, Beta is greater than 1
 - ~ if the company is less risky than the entire stock market, Beta is below 1
- This gives us a formula: **Cost of Equity = risk-free Rate + Beta * ERP**
- How to measure Beta?
 - In Finance risk is measured by how much actual returns differ from expected returns
 - The expected return is the market return (the return of the S&P 500)
 - If the stock of the company exactly moves with the S&P 500, Beta equals 1
 - How much the stock moves with the market can be measured (correlation coefficients)
 - The standard for estimating betas is to regress stock returns against market returns
 - If the market moves up and down, but the stock does not, Beta is below 1, risk is low
 - If the stock is more volatile than the market, Beta is greater than 1, risk is high
 - If you read a Beta for a stock, the number is most likely based on historical regression

Bottom-Up Beta

A regression Beta may not represent a good measure of relative risk and it can easily be misused

Bankers go to the Bloomberg Terminal, close the door, try and test different inputs, ... and come out with a result of their choice

Better: Bottom-up Beta

The standard error in a Bottom-up Beta will be significantly lower than the standard error in a single regression Beta

... and you can adjust over time if you think your company will enter new businesses

- The regression Beta for a stock has problems and is often misused
 - It can have high standard errors
 - It reflects the firm's business mix over the period of the regression, not current status
 - It reflects the firm's historical financial leverage, not the actual one
 - It is subject to "game playing" as a Beta changes depending on
 - a) the underlying index
 - b) the time horizon of the regression and
 - c) the frequency of data points (daily, weekly, monthly)
- Using a bottom-up Beta is recommended:
 - Find the business or businesses that your company operates in
 - Find listed stocks in each of these businesses and obtain their Regression Betas
 - Those Betas come with the risk of leverage of the companies (Levered Betas)
 - "Unlever" those Betas: $\text{Unlevered Beta} = \text{Levered Beta} / (1 + (1 - \text{tax rate}) (\text{Debt}/\text{Equity}))$
 - Take the average of unlevered Betas of your peers, it is a bottom-up industry Beta
 - Calculate a weighted average by using the unlevered Betas if you have more businesses
 - "Relever" this weighted average with the Debt/Equity ratio of your company
 - > $\text{Levered bottom-up Beta} = \text{Unlevered Beta} (1 + (1 - \text{tax rate}) (\text{Debt}/\text{Equity}))$
 - Source: <https://www.youcanvalue.de/wp-content/uploads/2021/03/Industriebeta-YCV-zum-Download.xlsx> (Column D)

Last word on Relative Risk

If you do not like Beta as a measure of risk, you may have other ways to compensate for relative risk

Just do not fail to put something into the equation, do not skip relative risk altogether

When using a Beta based on regression, you implicitly assume being a diversified investor

This is a key difference when buying/valuing private companies, Beta must also include non-systemic risk and should be higher

- Relative Risk
 - Remember: The Discount Rate should include the company specific risk
 - Using Beta as a measurement of risk is often disputed
 - Some Market Participants do not use Beta at all but fail to use alternatives
 - Whatever you do, think of the individual risk of the company and bring it in
- Individual / Relative Risk driver:
 - Cyclical companies have higher risks and deserve higher Betas than non-cyclical companies
 - Luxury goods companies should have higher Betas than basic good companies
 - High priced goods companies should have higher Betas than low priced good companies
 - Growth companies should have higher Betas than companies in already steady state
 - Companies with high fixed costs should have higher Betas than flexible companies
 - Smaller companies should have higher Betas than larger firms
 - Younger companies should have higher Betas than mature companies
 - Highly levered companies should have higher Betas than companies with less debt
- Systematic versus non-systematic risk
 - When using a regression Beta you adjust for the risk of price volatility (systematic risk)
 - Relative risk does also come from the company (non-systematic risk, not included in Beta)
 - Non-systematic risk can be diversified away if you are a diversified investor (portfolio)
 - > one portion of your portfolio companies will perform well, some not, it is averaging out

Cost of Debt

Cost of Debt is the interest rate a company must pay when taking a long-term loan today

Do not take the interest rate from financial reports of the company, those are historical numbers; what we need is a market number as of today

Deduct the market number by the marginal Tax Rate:
Cost Debt after Tax =
Cost of Debt \times (1-Tax Rate)
This is the "tax shield"

Use Cost of Debt after Tax to compute WACC:

WACC=
Cost of Equity \times E/(E+D) +
Cos of Debt after Tax \times D/(E+D)

E = Market Value of Equity
D = (Market) Value of Debt

- The concept
 - The Cost of Debt is the interest rate at which the company can borrow long-term today
 - The Cost of Debt must
 - a) reflect the default risk of the company and
 - b) the market level of interest rates
 - Ask: Which interest rate would a bank require for an unsecured loan with 10 years maturity
 - A bank shall require the risk-free rate plus a premium for taking the risk of lending

Those are the choices you have:

1. Look-up the yield to maturity on a traded straight bond outstanding of the company
Problem: very few companies do have such bonds and they must be liquid and unsecured
2. Look-up the rating for the company (S&P, Moodys) and estimate a default spread
Default spreads for different ratings are publicly available, attach the relevant one
3. If you do not have a rating, estimate your own rating (synthetic rating)
Act like being the banker: calculate the risk by using the "Interest Cover Ratio"
Interest Cover Ratio = EBIT / Interest Expenses, attach a rating to it
4. You are invited to use the following table:

<https://www.youcanvalue.de/wp-content/uploads/2021/03/Fremdkapitalkosten-anhand-von-Ratingklassen-zum-Download.xlsx>

IV. Closure

- **Assistance**
 - **Equity Bridge and full DCF-Model**
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Assistance

Develop your view on future cash flows of the company that you value

Think through all five assumptions

For each line-item www.youcanvalue.de is happy to assist

And for the Discount Rate:

- a) Go to youcanvalue.de and trust the WACC which is given
- b) do your own calculation by using the building process as described

1. Total Revenue
 - I will show the Median Consensus for the next five years
 - Growth Rate LTM+10 should equal the risk-free Rate (governmental bond yield 10yrs)
 - I suggest to develop linear until then (LTM+6 until LTM+10)
2. EBIT-Margin
 - I will show the Median Consensus for the next three years
 - EBIT-Margin LTM+10 should reflect what is usual in the industry or the story that you tell
 - I suggest to develop linear until then (LTM+4 until LTM+10)
3. Non-operational items
 - Go and check annual reports what they report below the EBIT line item
 - Leave it open if you can not find anything that you want to assume for the future
4. Tax-Rates
 - Start with an average of effective Tax Rates according to the past
 - For LTM+10 use the Marginal Corporate Tax Rate (Corporate Tax) of the respective country
 - You can check the number by using the table of KPMG
5. Reinvestment-Rate
 - Check the industry of the company, check how much revenue in which industries
 - Choose a number by using the table provided by www.youcanvalue.de
 - Calculate a weighted average of Reinvestment-Rate or go your own way A, B or C

DCF-Model including Equity Bridge

FCFF are discounted to a present value

The discounting process typically is done separately for the yearly FCFF and the Terminal Value:

- > Present Value of FCFF
- > Present Value of TV

Add both numbers and you end up having the Enterprise Value (cash & debt free basis)

As a final step you must deduct the debt and add the cash, you should also deduct for minorities and add (the value) of not consolidated Holdings

The result is the market value of Equity which you may divide by the number of shares, it gives you the **intrinsic value per share**

USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10	terminal
<i>Input Growth Rate</i>		12,0%	5,4%	5,9%	5,5%	4,3%	3,9%	3,5%	3,1%	2,7%	2,3%	2,3%
Total Revenue	33.433	37.461	39.501	41.849	44.130	46.012	47.796	49.462	50.993	52.372	53.576	54.807
USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10	terminal
<i>Input EBIT / Total Revenue</i>		29,3%	30,5%	30,2%	29,8%	29,4%	29,0%	28,6%	28,2%	27,7%	27,3%	27,3%
EBIT		10.987	12.037	12.650	13.157	13.527	13.852	14.129	14.355	14.526	14.637	14.973
USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10	terminal
<i>Input non-operational items</i>		-853	-872	-892	-913	-934	-956	-978	-1.001	-1.024	-1.048	-1.072
EBIT adjusted		10.135	11.165	11.758	12.243	12.592	12.896	13.151	13.354	13.502	13.589	13.901
USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10	terminal
<i>Input Tax/EBIT</i>		19,1%	19,7%	20,4%	21,1%	21,7%	22,4%	23,0%	23,7%	24,3%	25,0%	25,0%
Tax payments		-1.934	-2.204	-2.398	-2.578	-2.734	-2.885	-3.028	-3.163	-3.287	-3.397	-3.475
EBIT-T		8.201	8.961	9.360	9.666	9.858	10.011	10.123	10.191	10.215	10.192	10.426
USD mln.	LTM	LTM + 1	LTM + 2	LTM + 3	LTM + 4	LTM + 5	LTM + 6	LTM + 7	LTM + 8	LTM + 9	LTM + 10	terminal
<i>Input Reinvestment Rate</i>		6,3%	8,6%	9,1%	9,7%	10,4%	10,9%	11,4%	11,9%	12,4%	12,8%	15,4%
Reinvestments		-518	-774	-850	-940	-1.026	-1.095	-1.157	-1.213	-1.262	-1.302	-1.610
FCFF		7.683	8.187	8.510	8.726	8.832	8.917	8.966	8.978	8.953	8.890	8.816
<i>Discount rate (WACC)</i>		7,5%	7,5%	7,5%	7,5%	7,5%	7,5%	7,5%	7,5%	7,5%	7,5%	7,5%
PV terminal	82.048	88.234	94.885	102.037	109.727	117.996	126.888	136.449	146.730	157.784	169.669	
PV FCFF	58.870	7.144	7.080	6.843	6.525	6.142	5.766	5.392	5.021	4.657	4.300	
Enterprise Value	140.918											
Net Debt		-32.635										
Minorities		-1977										
Other debt		-775										
Holdings		22.011										
Equity Value	127.542											

market value of debt if applicable

book value (balance sheet)

Book Value unfunded Project Benefit Obligation

Value of Cross Holdings & LT Investm. market value if available

Equity Bridge

-> divide by number of shares (shares outstanding)

Take those numbers from the most recent balance sheet

Present Value of FCFF LTM+8 = $8.978 / (1 + 7,5\%)^8$

Terminal Value = $8.816 / (7,5\% - 2,3\%)$

Thanks for listening !

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