Access the Rest of the Fundamentals Course

Financial Modeling Fundamentals, Module 1: Financial Modeling Overview and Core Concepts

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Overview & Key Rules of Thumb

This guide introduces you to the **key technical topics** that will come up repeatedly in interviews and on the job.

You will probably **NOT** receive direct interview questions on these topics – however, you need to understand these concepts to answer other technical questions successfully.

For example, if you don't understand the time value of money, you will never understand the Discounted Cash Flow (DCF) analysis and DCF-related questions.

Key Rule #1: What Does "Financial Modeling" Mean?

Imagine that you get into an argument with a friend over a company's stock price.

Right now, the company is trading at $150 per share. You think it's worth $200 per share, but your friend thinks it's worth $100 per share.

You recommend investing in the company, but your friend recommends "shorting" (betting against) the company.

How do you tell who's correct?

You create a "financial model" to estimate the company's value.

A "financial model" is like an outline for a long essay or a blueprint for a building: It doesn't give you *all the details*, but it **gives you enough details to make a decision**.

For example, if you create a blueprint for a building, you may not know the color of each wall.

But if there's a big problem with the building, such as a foundation that's too small, the blueprint will clue you in.

A financial model works the same way: it doesn't tell you everything a company does, but it lets you detect opportunities and major problems.

Going back to that example above, let's say that you create a model to estimate how much cash flow this company will generate in the future.

You're doing this to convince your friend that the company is worth $200 per share.

The company has grown its sales at 10% per year over the past few years, but for the company to be worth $200 per share, your model says that its sales must grow at 30% per year.

Your friend goes through the same exercise and creates his estimates for the company's future sales, profits, and cash flows as well.

According to his model, for the company to be worth $100 per share, its sales must grow at 5% per year.

So, who's right?

The answer is that no one is "right," but your friend is MORE LIKELY to be correct.

That's because companies tend to grow at slower rates as they get bigger, so a decline from 10% to 5% growth is more plausible than an increase from 10% to 30% growth.

However, both your analysis and your friend's analysis rely on **predicting the future**, which is why no one is "correct."

Financial modeling lets you **quantify** your views of a company and back up your arguments with actual numbers.

Here are a few examples of how you might use it:

- **Stock Investing:** A pharmaceutical company's stock price just fell by 50%. Was that decline justified, or did the market overreact? Should you *buy* the stock now because it's set to rise again?

- **Advising on Mergers and Acquisitions:** A large retailer wants to acquire a smaller retailer. Will the acquisition improve its financial metrics and make investors happy?

- **Acquiring Companies in Leveraged Buyouts:** Investors want to acquire a food & beverage company, improve its operations, and sell it again in 5 years. Is this plan a good idea? Can they earn the annual returns they're targeting?

If you're an **investor**, you use financial modeling to earn money for yourself by making the correct investment decisions.

If you're an **adviser**, such as an investment banker, you use financial modeling to advise clients on what *they* should do.

For example, should a client buy another company? Sell a division? Go public? Raise debt?

You never make decisions based SOLELY on a financial model.

It's just a part of the process, like DNA evidence or witnesses in a courtroom trial: It might *inform* your decision, but it won't *dictate* your decision.

And just like in a courtroom trial, the process of making an investment decision or advising a client is a combination of story-telling, data gathering, and *some* calculations and evidence.

The Steps in the Financial Modeling Process

There are many types of financial models, but the overall process for building a model looks like this:

- **Step 1:** Decide on the Purpose of Your Analysis.
- **Step 2:** Do Some Background Research.
- **Step 3:** Identify the Key Drivers.
- **Step 4:** Gather Data for Other Companies (If Applicable).
- **Step 5:** Build Your Analysis.
- **Step 6:** Present Your Conclusions.

This topic will **NOT** come up in interviews; it's here "for your own information," so we won't devote much space to it.

Step 1: Decide on the Purpose of Your Analysis

For example, are you arguing with your friend over whether a company is worth $100 per share or $200 per share?

If so, **valuation** will be most important. You'll forecast the company's sales, profits, and cash flow in the future, and you'll use those to estimate its value today.

On the other hand, if you're advising a client on an acquisition, then a **merger model** – combining one company with another and assessing the financial impact – will be most important.

And if you're at a private equity firm thinking about buying a company and then selling it in the future, a **leveraged buyout analysis**, where you calculate how much you'll earn each year by doing that, is most important.

Regardless of the analysis, you'll always need to estimate **the company's future revenue, expenses, and cash flows**.

Time Required: 5 minutes to decide on the model(s) to build.

Step 2: Do Some Background Research

You start by reading the company's interim and annual reports: How much money is it making? Is it profitable? Has it become more or less profitable over time?

Then, you look at the "investor presentations" the company issues, industry research, and reports from banks that cover this company.

If you're an investor, you might also speak with management, or interview customers or suppliers to get a better idea of what's happening on the ground.

Time Required: Varies widely; it could be 1 hour, or it could be days or weeks.

Step 3: Identify the Key Drivers

Next, you identify the **key drivers** for a company based on your research.

For example, for a retailer, the number of stores it owns, how much it sells in each store, and the costs per product sold will be key drivers.

For a food & beverage company, the key drivers might be units sold, average selling price, and cost per unit.

For an airline company, they might be the number of flights, passengers per flight, average revenue per passenger, and cost per flight.

For a subscription-based service, they might be the average monthly fee, the number of customers, the cancellation rate, and the growth in new customers.

And for a pharmaceutical company, the key drivers might be the number of patients, the price per patient, and the company's spending on sales & marketing and research & development.

Time Required: 30-60 minutes. Do **NOT** overthink this part.

Step 4: Gather Data for Other Companies (If Applicable)

If you're **valuing** a company, you'll need to gather data on other, similar companies ("peer companies") in the market.

It's similar to buying a house or car: You have to check what *similar items* cost to see if you're getting a good deal or not.

In other situations, such as advising a client on an acquisition, you'll need to gather data on similar acquisitions.

In many cases, you won't spend much time on this step because you just need "rough numbers" from similar companies.

It's far more time-consuming to review those numbers, sift through hundreds of pages, and make tiny adjustments – but you only do that in a handful of cases (such as for a "Fairness Opinion" in investment banking).

Time Required: Varies widely; it could be 1 hour for a quick analysis, or it could take days or weeks if you need perfect numbers.

Step 5: Build Your Analysis

You'll **always** estimate the company's future revenue, expenses, and cash flow.

You have to do this because investment decisions are **forward-looking:** You decide whether or not to invest, expand, or acquire based on what might happen *in the future*.

Even when you're advising a client on an acquisition or fundraising, you still need estimates for the company's future revenue, expenses, and cash flow to present to lenders or investors.

Beyond that, the work varies widely based on the type of analysis.

For example, if you're **valuing** a company, you'll spend a lot of time gathering and processing data for peer companies.

But if you're advising a client on a deal, you'll spend more time looking at **different scenarios** for the deal and different prices the client might pay.

You rarely need a full set of "financial statements"; many analyses include only cash flow projections, which are based on *parts* of the financial statements.

Time Required: Varies widely; it could be 30 minutes for a quick analysis or 3 months for a complex one. The "average case" is probably a few days to a week, and in our courses, we focus on models that might take several hours up to a week to complete.

Step 6: Present Your Conclusions

This part is like **the closing statement** in a courtroom trial.

You tie together everything – the numbers, the market analysis, and the "story" – and make a single recommendation.

For example:

- "You should buy this company for $1 billion using your entire cash balance."
- "This company's stock is worth $100. It's trading at $50 now, so we should invest in the company."
- "We should acquire this company in a leveraged buyout, pay $500 million for it, and plan to sell it again in 4 years."

You might make this recommendation in PowerPoint, Word, or verbally, and your audience might be the Partners at your firm, senior bankers, your client, or interviewers.

Time Required: Varies widely; it could be 5 minutes in an interview, 3-4 hours in a take-home case study, or a week on the job.

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Key Rule #2: The Time Value of Money

Now that you know what "financial modeling" means, it's time to jump into the numbers.

The most important concept is that **money today is worth MORE than money tomorrow**.

In other words, $100 today is worth more than $100 in 5 years.

That's because you could invest that $100 today and end up with more than $100 in 5 years.

Many people misunderstand this point and think that future money is less valuable because of inflation.

While inflation also makes future money less valuable today, the **REAL** reason is that you could invest money today and earn more in the future.

I saw this point firsthand when I lived in South Korea, which has a "unique" real estate system.

When you rent an apartment there, there are two options: 전세 (Jeon-se) and 월세 (Wol-se).

We'll label these choices Options #1 and #2.

With Option #1, you pay an upfront deposit for 50-80% of the apartment's value, but you pay no monthly rent, and you get the deposit back at the end.

With Option #2, you pay an upfront deposit for 5-10% of the apartment's value, but **you pay monthly rent**, and you still get that deposit back at the end.

Let's use some specific numbers and say that the apartment is worth **$200,000** ($200K).

Here's what **Option #1** looks like:

- Deposit of $150K (75% of apartment's value).
- **No monthly rent**.
- Get back $150K deposit after 2 years.

And here's what **Option #2** looks like:

- Deposit of $10K (5% of apartment's value).
- **Monthly rent of $1K.**
- Get back $10K deposit after 2 years.

Nearly 99% of people in the country advised me to go with Option #1.

They argued that "I wouldn't lose any money" and "I would get everything back at the end."

In their minds, the options looked like this:

Option #1 - Large Upfront Deposit	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ -	$ -
Deposit (Paid) / Received Back:	(150)	-	150
Net Cash Flow:	**$ (150)**	**$ -**	**$ 150**
"Money Lost":			**$ -**

Option #2 - Smaller Deposit + Rent	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ (12)	$ (12)
Deposit (Paid) / Received Back:	(10)	-	10
Net Cash Flow:	**$ (10)**	**$ (12)**	**$ (2)**
"Money Lost":			**$ (24)**

But they were all wrong! Or at least, not correct in all cases.

Why?

1) Because $150K received back in 2 years is worth **LESS** than $150K today. Even if we receive back "the same amount" in the future, **it's worth less than it is today**.

2) Paying **$140K more** for the deposit means that you **CANNOT** invest that $140K elsewhere and earn something with it. So, there's an **opportunity cost** associated with a higher deposit.

With Option #2, we pay $12,000 in rent per year.

And with Option #1, we pay no rent, but we do pay an *extra* $140,000 upfront.

So, is Option #1 or Option #2 better?

It depends on how much you could EARN with that extra $140,000.

For example, if your best idea is to put that $140,000 in a savings account at the bank and earn 1% interest on it, Option #1 is clearly better.

At a 1% interest rate, you'd earn $1,400 in interest each year. You would *lose money* because you would pay $12,000 in rent to earn $1,400 in interest, which is a loss of $10,600 per year.

The diagram below illustrates this: **Over 2 years, you lose far less with Option #1.**

Option #1 - Large Upfront Deposit	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ -	$ -
Deposit (Paid) / Received Back:	(150)	-	150
Net Cash Flow:	**$ (150)**	**$ -**	**$ 150**
"Money Lost":			**$ -**
Lost Earnings:		(1)	(1)
"Money Lost" + Opportunity Cost Factored In:			**$ (3)**

Option #2 - Smaller Deposit + Rent	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ (12)	$ (12)
Deposit (Paid) / Received Back:	(10)	-	10
Net Cash Flow:	**$ (10)**	**$ (12)**	**$ (2)**
"Money Lost":			**$ (24)**

On the other hand, if you invest that $140,000 into something with a higher yield, such as 10%, then Option #2 is better:

Option #1 - Large Upfront Deposit	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ -	$ -
Deposit (Paid) / Received Back:	(150)	-	150
Net Cash Flow:	**$ (150)**	**$ -**	**$ 150**
"Money Lost":			**$ -**
Lost Earnings:		(14)	(15)
"Money Lost" + Opportunity Cost Factored In:			**$ (29)**

Option #2 - Smaller Deposit + Rent	Sign-Up:	Year 1	Year 2
Annual Rent:	$ -	$ (12)	$ (12)
Deposit (Paid) / Received Back:	(10)	-	10
Net Cash Flow:	**$ (10)**	**$ (12)**	**$ (2)**
"Money Lost":			**$ (24)**

At a 10% yield, you'd earn $14,000 in interest each year, which exceeds the $12,000 in annual rent you'd pay with Option #2, for a net gain of $2,000 per year.

So, in this case, you'd *earn* money by paying for monthly rent and investing the extra $140,000 elsewhere.

All investment decisions boil down to this analysis: Would you earn MORE with this investment than you could earn on similar investments elsewhere? Or would you earn LESS?

For example, if you could invest money and earn 5% on it, something that yields 8% for the same amount of risk is an improvement.

But if an investment with a similar risk profile yields only 3%, that's worse because you could earn 5% on your money elsewhere.

And since money today is worth more than money tomorrow, **you must discount future money to its value today, or its "Present Value," when you're analyzing it.**

For example, what is that $150K deposit I receive back in 2 years worth **TODAY?**

It depends on my opportunity cost: What I could earn in similar investments elsewhere.

If I could earn 10% annually, $150K in 2 years is worth $150K / ((1 + 10%)^2), or $124K, today.

That's because $124K * (1 + 10%) = $136K, and $136K * (1 + 10%) = $150K.

So, if I had $124K today and earned 10% on it each year, I'd end up with $150K in 2 years.

On the other hand, if I earned only 1% on it each year, it would be worth $150K / ((1 + 1%)^2), or $147K, today.

That's because $147K * (1 + 10%) = $149K, and $149K * (1 + 10%) = $150K.

This concept is called the **Present Value**, and it's linked to **how much you earn on an investment** and your **opportunity cost**.

So, going back to my housing situation in South Korea, what was the correct decision? It depends on how much I could have earned with the extra $140,000.

The "breakeven point" was **8.2%**.

If I could have earned exactly 8.2%, "Money Lost + Opportunity Cost Factored In" would have been $24,000 – the same as my total rent over 2 years.

I might have reviewed my investment ideas and decided like this:

- **Realistic Chance of Earning More Than 8.2% Elsewhere:** It would make more sense to choose Option #2 and pay $12,000 in rent per year. I could earn more than $12,000 per year by investing the extra $140,000.

- **No Realistic Chance of Earning More Than 8.2% Elsewhere:** It would make more sense to choose Option #1. I could **not** earn more than $12,000 per year with the extra $140,000.

Key Takeaways: Money today is worth **MORE** than money tomorrow. That's not because of inflation, but because you could **invest** that money today and **earn** something with it.

The difference between the value of money today and money tomorrow depends on your **opportunity cost**: How much you could earn with other, similar investments.

If this opportunity cost is low, money today won't be worth *that* much more. But if the opportunity cost is high, money today will be worth a lot more.

To make investment decisions, you assess **the potential returns** – how much you could earn with THIS investment – and your **opportunity cost** – how much you could earn elsewhere with OTHER, similar investments.

If the potential returns exceed your opportunity cost, you invest; if not, you don't.

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Key Rule #3: Present Value (PV), Internal Rate of Return (IRR), and Weighted Average Cost of Capital (WACC)

In the section above, we referred to the key terms informally: "Potential returns," "Opportunity cost," and "Yields."

It's time to **define them more formally** so you can use them to analyze companies.

Before delving in, remember the main ways to make investment decisions:

1) You invest when an asset's **Asking Price is below its Intrinsic Value**.

2) And you also invest when an asset's **Potential Returns exceed your Opportunity Cost**.

These methods are *equivalent*, which you'll understand by the end of this section.

If you know these concepts, you'll understand every other concept in financial modeling:

1) **Hedge Fund Stock Pitches** – Should you buy a stock? Only if its Asking Price is below its Intrinsic Value. For example, its share price is $100, but it's worth $200 per share.

2) **Investment Banking Client Recommendations** – If you recommend that a client sell itself in an M&A process, you might suggest a targeted price of $400 – $450 million. You *believe* the company is worth $500 million, but you set the price lower than that to make it more attractive to acquirers (and to make yourself look good if it sells for more).

3) **Private Equity Investment Recommendations** – Should your firm acquire a company in a leveraged buyout? It depends on the potential returns vs. the firm's targeted returns. If the deal might produce an average annual return of 25%, and your target is 20%, the answer might be "yes."

The list goes on.

In finance, the "opportunity cost" is called the **Discount Rate**, and it depends on your other, similar investment options.

The Discount Rate matters because it lets you calculate the **Present Value** of an asset or company – what its future cash flows are worth *today*.

We refer to this Present Value of future cash flows as the "Intrinsic Value" or "Implied Value" of the company or asset as well.

So, if you know the Discount Rate and the future cash flows, you can calculate the Intrinsic Value of an asset and compare it to the Asking Price to make an investment decision.

A higher Discount Rate means that the risk and *potential* returns are both higher, and a lower Discount Rate means that the risk and *potential* returns are both lower.

For example, if you invest mostly in the stock market, your Discount Rate will be high because the average annual return has been 10-11% for the past 100 years.

But your risk is also quite high.

In a given year, the market might fall by 30% or 50%, even if the *long-term average* is a 10-11% annual gain.

By contrast, if you invest mostly in U.S. government bonds, your Discount Rate will be much lower: Perhaps 2-3% in a low-interest-rate environment.

But your risk is also much lower because the U.S. government has a very low chance of defaulting on its debt obligations.

In real life, no investor invests in just one asset class, and no company uses just one source of funding.

So, you need to look at the **weighted average** of these Discount Rates across *all* the asset classes or funding sources.

For companies, this "weighted average" is called the **Weighted Average Cost of Capital**, or WACC, and it's one of the most important metrics for valuing companies.

You can use an analogy to your personal finances to understand WACC: What percentages of your money do you put in a checking account, savings account, bonds, and the stock market?

Your "Opportunity Cost" in each category might look like this:

Method:	Opportunity Cost (Discount Rate):	
Do Nothing, Leave It in a Checking Account:	0.1%	Or maybe just 0.0%?
High-Yield Savings Account:	1.0%	Depends greatly on interest rates.
Bonds / Loans to Friends, Companies, etc.:	5.0%	Depends greatly on interest rates.
Stock Market Investments:	10.0%	~11% average in US over ~100 years.

So, what is your "personal WACC"?

It depends on the percentage you allocate into each category. Here's an example:

Method:	Discount Rate:	Allocation:
Do Nothing, Leave It in a Checking Account:	0.1%	35.0%
High-Yield Savings Account:	1.0%	30.0%
Bonds / Loans to Friends, Companies, etc.:	5.0%	20.0%
Stock Market Investments:	10.0%	15.0%
Your Personal "WACC":	**2.8%**	

In this case, your "personal WACC" is 2.8% because 0.1% * 35.0% + 1.0% * 30.0% + 5.0% * 20.0% + 10.0% * 15.0% = 2.8%.

Why not just put everything into the stock market? **Because the risk is much higher**!

If you do that, and there's a market crash, you might lose 50% of everything you own in a year.

The market may recover in the future, but that might take a very long time.

Also, even if there's no market crash, you'll need to keep some cash available to pay for living expenses such as rent and food, so it isn't feasible to put all your money into stocks.

The concepts are similar for companies, but the **options** are different, and they relate more to *outside funding sources*.

From the perspective of an investor, the question is: "Where should I allocate my money?"

But from the perspective of a company, the question is: "How should we *raise money* to fund operations and expand the business?"

The two main funding options for companies are **Equity** and **Debt**.

Equity means that the company will raise money by selling stock to investors. In exchange, each investor will own a small percentage of the company.

Debt means that the company will raise money by borrowing it from lenders. The lenders do not own any portion of the business, but they receive interest payments, and they get their entire principal back in the future.

For **the investor**, investing in the stock market is the riskiest method but also produces the highest potential returns over the long term.

And **for the company**, raising **Equity** is almost always the most expensive way to fund its operations.

Just as investing in bonds results in lower potential returns for you, raising Debt is also less expensive for a company.

Here's a simple example of the WACC calculation for a company:

Source of Funding:	After-Tax Discount Rate:	% Total Funding:
Equity (Selling stock in the company to investors):	10.0%	60.0%
Debt (Borrowing money from others):	5.0%	40.0%
Company WACC:	**8.0%**	

The exact figures depend on the company's industry, size, and business risk.

For example, companies in "risky" industries, like biotech, tend to have a higher Cost of Equity than similarly-sized companies in mature industries, like manufacturing.

The risk is higher in biotech, but so are the potential returns.

Similarly, if the company is less creditworthy, its Cost of Debt will be higher.

Lenders take on more risk by lending the company money, so they demand a higher interest rate in exchange for that risk.

We cover the calculations for Cost of Equity, Cost of Debt, and WACC in detail in the Valuation/DCF lessons and guides, but you often approximate the Cost of Equity by looking at the past stock-market performance of the company you're valuing.

For example, if its historical returns were 8-10% per year, you might assume something similar in the future.

To approximate the Cost of Debt, you might look at the interest rate the company is paying on its Debt or the rates that similar companies are paying on their Debt.

Apartments in Korea, WACC, and Present Value

So, now that you know about Discount Rates, WACC, and measuring returns, how can you decide whether or not to invest in an asset or company?

You can estimate **the Potential Returns** and compare them to your Discount Rate, or you can estimate the **Present Value** and compare it to the Asking Price.

For example, let's go back to that apartment in Korea and say that it's up for sale. The owner wants $200K for it, and he expects the tenant to pay $12K in rent per year.

We plan to hold the apartment for 5 years, collect $12K in rent per year, and then sell it for $200K at the end of the period.

To make a decision, we can project the **cash flows** from the investment, discount them to their **Present Value**, and then compare the Present Value to the Asking Price.

We also need to know our opportunity cost, or Discount Rate, which we'll assume is 2.8% – the same as our "personal WACC" above.

Here's what it looks like in Excel:

66											
67		"Asking Price" (Initial Investment):						$ 200			
68		Annual Cash Flow from Rent Extracted from Poor Tenants:						12			
69		Apartment Sale Value:						200			
70		Our Opportunity Cost ("Discount Rate"):						2.8%			
71											
72		**Cash Flows:**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**			
73		Rental Income:		$ 12	$ 12	$ 12	$ 12	$ 12			
74		Property Sale:		-	-	-	-	200			
75		**Net Cash Flows:**		**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**			
76											
77		**Present Value (PV):**	**=NPV(H70,G75:K75)**								

In this case, we've used the **NPV** function in Excel to calculate the Present Value.

We could have also calculated the PV with: $12 / (1 + 2.8%) + $12 / ((1 + 2.8%)^2) + $12 / ((1 + 2.8%)^3) + $12 / ((1 + 2.8%)^4) + $212 / ((1 + 2.8%)^5).

That formula produces the same result in this simple case:

66											
67		"Asking Price" (Initial Investment):						$ 200			
68		Annual Cash Flow from Rent Extracted from Poor Tenants:						12			
69		Apartment Sale Value:						200			
70		Our Opportunity Cost ("Discount Rate"):						2.8%			
71											
72		**Cash Flows:**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**			
73		Rental Income:		$ 12	$ 12	$ 12	$ 12	$ 12			
74		Property Sale:		-	-	-	-	200			
75		**Net Cash Flows:**		**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**			
76											
77		**Present Value (PV):**	**$ 229**								
78											
79		**Should We Invest?**	**Yes**								

Since the **Present Value** of these cash flows exceeds the apartment's Asking Price, we should buy the apartment.

But several factors could change our decision:

1) **The Apartment Sale Value Falls** – If the housing market crashes and the apartment is worth only $150K at the end, this decision turns into a "No."

2) **The Apartment Stays Vacant for Some Time** – If it takes too long to find tenants, we might not earn $12K in rent each year, which could also make the decision a "No."

3) **Our Opportunity Cost Changes** – If we find some incredible new opportunity, this apartment might not be worth it.

4) **The Asking Price Changes** – If the current owner suddenly decides to ask for $250K, this would turn into a "No" decision.

The same factors could change our decision to invest in a company: Its future selling price might fall, its cash flows might decline, our opportunity cost might change, or the owner of the company might want more for it.

But the rules of thumb are simple:

- **Asking Price < Intrinsic Value:** Invest!
- **Asking Price > Intrinsic Value:** Don't invest!

Method #2 for Making Investment Decisions: The Internal Rate of Return (IRR)

In addition to comparing an investment's Present Value and its Asking Price, you can also estimate its **Potential Returns** and compare them to your Opportunity Cost.

You estimate these "Potential Returns" by calculating the **Internal Rate of Return (IRR)**, which is a *type* of Discount Rate.

The difference is that you **solve for this Discount Rate** – you don't know it in advance.

If you have a series of cash flows and a Discount Rate, you can solve for the Present Value.

And if you have an upfront investment ("Asking Price") and a series of cash flows, you can solve for the IRR.

You can use Excel's built-in IRR function to calculate the IRR in this apartment scenario:

	A	B	C	D	E	F	G	H	I	J	K
104											
105			"Asking Price" (Initial Investment):					$ 200			
106			Annual Cash Flow from Rent Extracted from Poor Tenants:					12			
107			Apartment Sale Value:					200			
108			Our Opportunity Cost ("Discount Rate"):					2.8%			
109											
110			**Cash Flows:**			**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
111			Rental Income:				$ 12	$ 12	$ 12	$ 12	$ 12
112			Property (Purchase) / Sale:			(200)	-	-	-	-	200
113			**Net Cash Flows:**			**$ (200)**	**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**
114											
115			**Internal Rate of Return**			**=IRR(F113:K113)**					

With IRR, you must show that upfront investment of $200K as a negative in Year 0, or the function won't work properly.

The IRR here is 6.0%, which means that we **should** buy this property since it exceeds our opportunity cost of 2.8%:

"Asking Price" (Initial Investment):	$ 200
Annual Cash Flow from Rent Extracted from Poor Tenants:	12
Apartment Sale Value:	200
Our Opportunity Cost ("Discount Rate"):	2.8%

Cash Flows:	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Rental Income:		$ 12	$ 12	$ 12	$ 12	$ 12
Property (Purchase) / Sale:	(200)	-	-	-	-	200
Net Cash Flows:	**$ (200)**	**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**

Internal Rate of Return (IRR):	**6.0%**
Should We Invest?	**Yes**

There are several ways to interpret the IRR:

Interpretation #1: If we invested $200K and earned 6% on it each year, compounded annually, we'd earn the equivalent of the positive cash flows shown above.

The IRR is "the effective, compounded interest rate on an investment."

Interpretation #2: IRR is also a way to evaluate the "yields" of different investments.

Specifically, will you earn more with this company, project, or investment than you will with other, similar opportunities?

Interpretation #3: The IRR is the Discount Rate at which the *Net Present Value (NPV)* equals $0.

To calculate the NPV, you take the Present Value and then **subtract the upfront investment** (the "Asking Price").

THE "NPV" FUNCTION IN EXCEL DOES NOT ACTUALLY CALCULATE THE NET PRESENT VALUE.

THE EXCEL "NPV" FUNCTION CALCULATES THE PRESENT VALUE – SO, BE CAREFUL!

The confusing name means that people often use "NPV" and "PV" interchangeably – so you need to look at the calculations to tell what's going on.

Here's how the concept works in this example:

	A	B	C	D	E	F	G	H	I	J	K
126											
127			**Cash Flows:**			**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
128			Rental Income:				$ 12	$ 12	$ 12	$ 12	$ 12
129			Property Sale:				-	-	-	-	200
130			**Net Cash Flows:**				**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**
131											
132			**Net Present Value (NPV):**			=NPV(F115,G130:K130)-H105					

This is the 6.0% IRR we calculated.

These are the cash flows in Years 1 - 5.

This is the $200K initial investment that we're subtracting out.

The NPV is $0 when we discount the cash flows *using* the IRR for the Discount Rate:

Cash Flows:	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Rental Income:		$ 12	$ 12	$ 12	$ 12	$ 12
Property Sale:		-	-	-	-	200
Net Cash Flows:		**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 212**
Net Present Value (NPV):	**($0.00)**					

Why Both Investment Evaluation Methods Are the Same

We've presented these two methods of evaluating investments as different, but they are equivalent to each other.

In other words, if the Asking Price < Present Value, then IRR > WACC; and if Asking Price > Present Value, IRR < WACC.

To understand why, start with the definition of Net Present Value:

NPV = Present Value of Cash Flows Discounted @ WACC – Asking Price

If NPV is positive, then we invest because PV of Cash Flows @ WACC > Asking Price.

You also know that the IRR is the Discount Rate at which the NPV = 0.

0 = NPV = Present Value of Cash Flows @ IRR – Asking Price

Then, using algebra:

PV of Cash Flows @ IRR = Asking Price

We can then line up both formulas as follows:

x = Present Value of Cash Flows @ WACC – Asking Price

And x > 0 since we're assuming the NPV is positive.

0 = Present Value of Cash Flows @ IRR – Asking Price

If x > 0, PV of Cash Flows @ WACC > PV of Cash Flows @ IRR.

The Asking Price and Cash Flows are constant in both formulas, so the different Discount Rates must explain the different values.

A **lower** Discount Rate produces **higher** Present Values, so WACC < IRR if x > 0.

Therefore, if the NPV is positive, then IRR > WACC.

And if the NPV is negative, then IRR < WACC.

Using These Concepts in Real Life

Companies often make decisions based on **WACC and IRR at a divisional level**.

For example, let's say that Sir Richard Branson wants to expand Virgin, his multinational conglomerate. He's considering doing this by launching a shuttle service to **Jupiter**, or by starting a new low-cost airline in **Asia**.

WACC for the entire company is 10%, but WACC for Virgin Galactic is 15%, and WACC for Virgin Asia is 8%.

These figures represent reality: This scheme to go to Jupiter is much riskier, but may also offer higher potential returns.

Starting a low-cost airline in Asia is much less risky since it's already a proven business model, but the potential returns are also lower.

The Jupiter Fleet will cost £1,000 in upfront investment, produce £100 in annual cash flows, and provide a £1,200 long-term/resale value at the end of 5 years.

The Virgin Asia Fleet will cost £400 in upfront investment, produce £30 in annual cash flows, and provide £450 long-term/resale value at the end of 5 years.

Based on this information, you calculate the IRR for both opportunities:

Virgin - Assumptions and WACC by Division:	WACC:
Virgin - Entire Company:	10.0%
Virgin Galactic:	15.0%
Virgin Asia:	8.0%
Initial Investment Required for Jupiter Fleet:	£ 1,000
Annual Cash Flows Earned from Trips to Jupiter:	100
Resale / Long-Term Value of Fleet Beyond Year 5:	1,200

Cash Flows from Jupiter Fleet:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows from Jupiter Trips:	£ -	£ 100	£ 100	£ 100	£ 100	£ 100
Fleet (Purchase) / Sale:	(1,000)	-	-	-	-	1,200
Net Cash Flows:	**-£ 1,000**	**£ 100**	**£ 100**	**£ 100**	**£ 100**	**£ 1,300**
Internal Rate of Return (IRR):	**13.1%**					

Initial Investment Required for Virgin Asia Aircraft:	£ 400
Annual Cash Flows Earned from Virgin Asia:	30
Resale / Long-Term Value of Aircraft Beyond Year 5:	450

Cash Flows from Virgin Asia:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash Flows from Virgin Asia:	£ -	£ 30	£ 30	£ 30	£ 30	£ 30
Aircraft (Purchase) / Sale:	(400)	-	-	-	-	450
Net Cash Flows:	**-£ 400**	**£ 30**	**£ 30**	**£ 30**	**£ 30**	**£ 480**
Internal Rate of Return (IRR):	**9.6%**					

The Virgin Galactic option produces a higher IRR and beats the WACC for the company as a whole, but you should **not** pursue it because it does **not** beat the WACC for just Virgin Galactic.

But since the IRR for Virgin Asia beats the WACC for Virgin Asia, you **should** pursue that opportunity – even though the IRR is less than WACC for the company as a whole!

You always compare the **project-specific IRR** to the **project-specific WACC**.

The figures for the company as a whole don't matter unless the project relates to the entire company.

Key Takeaways: It makes sense to invest in a company or asset when:

1) Its Asking Price is below its Intrinsic Value; or
2) The Potential Returns exceed your Opportunity Cost.

In finance, the "Opportunity Cost" is called the **Discount Rate**, and it depends on your other, similar investment options and how you're allocating your money.

A higher Discount Rate means that the risk and potential returns are both higher, and a lower Discount Rate means that the risk and potential returns are both lower.

The Discount Rate for companies is called the Weighted Average Cost of Capital, or WACC,

It is based on the percentage of Equity the company is using times the "cost" of that Equity, plus the percentage of Debt the company is using times the "cost" of that Debt (plus the same items for any other capital sources).

Equity tends to be more expensive than Debt for the same reason that stock-market investments have a higher yield than bond investments over the long term: **The risk and potential returns are both higher**.

The Net Present Value equals the Present Value of a series of cash flows minus the upfront investment or "Asking Price."

You can evaluate the potential returns of an investment by using the Internal Rate of Return, or IRR, function in Excel.

The IRR is the "the effective compounded interest rate on an investment"; if the IRR exceeds the Discount Rate, it makes sense to invest.

The IRR is also the Discount Rate at which the NPV of an investment equals $0. If you discount all the cash flows *using* the IRR as the Discount Rate and add them up, the total will equal the Asking Price, making the NPV $0.

Finally, both methods of evaluating investments are equivalent. If Asking Price < Present Value, IRR > WACC; and if Asking Price > Present Value, IRR < WACC.

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Key Rule #4: How to Value Any Company: The Most Important Formula in Finance

So, how much is a company worth? What is its "Intrinsic Value"?

It's worth the sum of its **discounted cash flows**, from now into eternity, discounted at a rate that's appropriate for the company's size, industry, and mix of Equity and Debt.

That "appropriate rate" is the **Discount Rate** or **the yield you're targeting**.

If a company generates $100 in cash flow each year, how much would you pay for it?

It depends on your targeted yield.

For example, if your targeted yield is 10%, you would pay $100 / 10%, or $1,000, for it.

By paying $1,000 upfront, you earn $100 per year, which is a 10% yield on that investment:

How Much a Company is Worth - Scenario 1 - No Growth:

Discount Rate:	10.0%
Cash Flow Growth Rate:	0.0%
Initial Cash Flow:	$ 100
Present Value of Cash Flows:	**$ 1,000**
And as Calculated by Excel…	**$ 1,000**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Annual Cash Flow:	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100

On the other hand, if the Discount Rate – your targeted yield – is 20%, then this company is worth only $500 to you:

How Much a Company is Worth - Scenario 1 - No Growth:

Discount Rate:	20.0%
Cash Flow Growth Rate:	0.0%
Initial Cash Flow:	$ 100
Present Value of Cash Flows:	**$ 500**
And as Calculated by Excel…	**$ 500**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Annual Cash Flow:	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100

It's worth less because you have better options.

You could invest your money in similar opportunities elsewhere and earn 20% per year with it, so you'd only be willing to pay a price that represents that same 20% yield here.

If a company generates higher cash flow, you'd also be willing to pay more for it:

How Much a Company is Worth - Scenario 1 - No Growth:

Discount Rate:	10.0%
Cash Flow Growth Rate:	0.0%
Initial Cash Flow:	$ 150
Present Value of Cash Flows:	**$ 1,500**
And as Calculated by Excel...	**$ 1,500**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Annual Cash Flow:	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150

At this same targeted yield of 10%, you'd be willing to pay $1,500 rather than $1,000 if the company's annual cash flow is $150 rather than $100.

But in real life, no company generates exactly $100 or $150 of cash flow every single year into eternity.

Most companies **grow**.

And if there's growth, you can afford to pay more upfront and still earn that same 10% yield you're targeting.

Here's what it looks like if the company's cash flows are growing at 3% per year:

Discount Rate:	10.0%
Cash Flow Growth Rate:	3.0%
Initial Cash Flow:	$ 100
Present Value of Cash Flows:	**$ 1,429**
And as Calculated by Excel...	**$ 1,427**

Since there's growth, you can now pay MORE than $1,000 and still get that same 10% yield.

Yield on Cash Flow in **THIS YEAR**:	7.0%	7.2%	7.4%	7.6%	7.9%	8.1%	8.4%	8.6%	8.9%

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Annual Cash Flow:	$ 100	$ 103	$ 106	$ 109	$ 113	$ 116	$ 119	$ 123	$ 127

Since the company's cash flows are now growing, the annual yield keeps getting higher and higher over time. The LONG-TERM AVERAGE comes out to exactly 10%, which is why you can afford to pay $1,429 rather than $1,000.

With growth factored in, the formula for a company's value is:

Company Value = Cash Flow / (Discount Rate – Cash Flow Growth Rate)

And the Cash Flow Growth Rate **must** be less than the Discount Rate.

The intuition is simple:

- If the company's **Cash Flow is higher**, it's **worth more**.
- If the company's **Cash Flow is lower**, it's **worth less**.

- If the **Discount Rate is higher**, the company is **worth less** (you have better options elsewhere!).
- If the **Discount Rate is lower**, the company is **worth more** (your other options aren't so good!).

- If the company's **Cash Flow is growing more quickly**, it's **worth more** (you're willing to pay more for higher growth!).
- If the company's **Cash Flow is growing more slowly**, it's **worth less**.

This formula is useful for thinking about valuation at a high level, but it doesn't quite hold up in real life.

For one thing, companies' growth rates change over time. A company's cash flows might be growing at 10% today, but that rate might drop to 3% in 5-10 years.

Also, the Discount Rate might change over time, especially for high-growth companies that mature and become less risky in the future.

So, in real life, you typically make "custom" projections for a company's cash flows for the first 5-10 years, and then you use the "Company Value" formula for the far-future period after those first 5-10 years.

You then discount all those cash flows to their Present Value and add them up to determine what the company is worth *today*.

For a simple example, imagine a company with $100 in initial annual cash flow, growing at 10.0% at first and declining to 2.5% growth by the end of 10 years.

In that initial 10-year period, the company's Discount Rate is 10.0%, but after that, its Discount Rate declines to 9.0% to reflect lower risk and lower potential returns.

Also, its cash flows grow at only 2.0% in this period beyond the end of Year 10.

With those parameters, we might value the company in the following way:

Forecast Period Discount Rate:	10.0%
Initial Cash Flow in Forecast:	$ 100
PV of Cash Flows, Years 1 - 10:	819
Terminal Period Discount Rate:	9.0%
Terminal Cash Flow Growth Rate:	2.0%
PV of Cash Flows, Beyond Year 10:	2,467
Discounted to Present Value Today:	951
Implied Company Value:	**$ 1,770**

We take the PV of these cash flows at a 10% Discount Rate.

Past the end of Year 10, we use Cash Flow in Year 11 / (9.0% - 2.0%) to calculate the Present Value *as of the end of Year 10*. We can do that since the Discount Rate and Cash Flow Growth Rate stabilize in that period. But since it's as of the end of Year 10, we must discount it to its Present Value *today*.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Annual Cash Flow:	$ 100	$ 110	$ 120	$ 129	$ 139	$ 147	$ 154	$ 160	$ 165	$ 169
Cash Flow Growth Rate:		10.0%	9.0%	8.0%	7.0%	6.0%	5.0%	4.0%	3.0%	2.5%

Then, the company's "Implied Value" or "Intrinsic Value" equals the PV of the cash flows in Years 1 - 10, plus the PV of the cash flows from Year 11 into infinity (discounted once to the end of Year 10, and then discounted again to today).

The company's Implied Value or Intrinsic Value here is $1,770, which means that we might invest if its Asking Price were below $1,770.

And if its Asking Price were above $1,770, we would lean against investing.

The screenshot above is an example of a "mini" Discounted Cash Flow (DCF) analysis, and we cover it in a lot more detail in the DCF-related guides and lessons.

However, we wanted to present this formula and these concepts early on because they will come up repeatedly in this course.

Key Takeaways: A company is worth the sum of its discounted cash flows from now into eternity; you discount those cash flows at a rate appropriate for the company's size, industry, and business risk.

Company Value = Cash Flow / (Discount Rate – Cash Flow Growth Rate)

And the Cash Flow Growth Rate **must** be less than the Discount Rate.

The Discount Rate represents your "targeted yield" or opportunity cost.

If your targeted yield is higher, you're not willing to pay as much for the company; if it's lower, you're willing to pay more.

If a company's cash flows are growing more quickly, you're willing to pay more for it; if the company's cash flows are growing more slowly, you will pay less for it.

If a company's cash flows are higher, you will pay more for it; if they're lower, you will pay less.

For example, if a company generates $100 of cash flow per year and never grows, and your targeted yield is 10%, then you'd pay $100 / 10%, or $1,000, for it.

But if the company generates $100 of cash flow per year and grows at 3% per year, and your targeted yield is 10%, then you'd pay $100 / (10% – 3%), or $1,429, for it.

In real life, this formula doesn't hold up because companies **change** over time.

So, you usually assume that a company's Discount Rate and Cash Flow Growth Rate change over the first 5-10 years and then stabilize after that.

You discount the company's cash flows in the first 5-10 years to Present Value, use the "Company Value" formula for the period beyond that, and then discount that "Company Value" to Present Value.

Then, you add them up to determine the company's Intrinsic Value, which you can compare to its Asking Price.

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Key Rule #5: What Makes Financial Modeling Hard

If financial modeling consists of picking the right Discount Rate, estimating a company's Cash Flow Growth Rate, and then using a simple formula, why are there huge textbooks and courses on the topic?

Because it's difficult to come up with reasonable numbers for everything in that formula:

Company Value = Cash Flow / (Discount Rate – Cash Flow Growth Rate), where Cash Flow Growth Rate < Discount Rate.

Also, this formula only works if a company has stabilized, and its Discount Rate and Cash Flow Growth Rate are no longer changing.

If they *are* still changing, then you need to create custom projections for the company's cash flows based on your research and analysis.

Here are a few specific problems that make financial modeling challenging and that explain everything else in this course:

1) There are different types of "Cash Flow," and not everyone agrees on how to calculate it. There are also different ways to estimate the Discount Rate and different Discount Rates.

2) In real life, you can't just "assign" a growth rate of 3% or 5% to a company's cash flows. You have to forecast its revenue, expenses, and other items, see what growth rates they produce, and then extrapolate from there.

3) Companies do not disclose their "Cash Flow" in their filings. You have to **calculate it** by looking at their annual and interim reports, making adjustments, including some items, and excluding other items.

4) There are different ways to measure "Company Value" because a company is worth different amounts depending on *which parts* of the company you're including and *which investors* you're including. Equity Value and Enterprise Value are two common ways to measure a company's value, and they both require significant explanation.

5) Sometimes, you care about *other factors* not represented in this formula. For example, in a leveraged buyout, you care less about the "Company Value" and more about the **average annualized return** you could earn by acquiring the company and then selling it in the future. If you're evaluating a company's possible Debt issuance, you care more about its ability to repay that Debt than its value.

These factors explain everything else in this course.

For example, the **Accounting and 3-Statement Projection Lessons** explain how you "translate" a company's financial statements and accounting metrics into its cash flow.

The **Valuation and DCF** lessons also cover that process, as well as how to estimate the Discount Rate and a company's long-term potential.

The lessons on **Equity Value, Enterprise Value, and Multiples** explain "Company Value" and the different ways to view it.

Finally, the lessons on other topics, such as M&A deals, leveraged buyouts, and equity and debt deals, relate to the "other factors" that are not represented in this formula.

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Interview Questions

You are **not** likely to receive direct interview questions on these topics.

However, they do come up occasionally, which is why we wanted to cover a few sample questions here.

Also, many of the concepts here relate to other technical questions, especially the ones on DCF and LBO analysis.

The Time Value of Money

1. Why is money worth more today than it is next year?

Because you could invest that money today and earn something with it by next year.

2. If there were no inflation, would money today still be worth more than money next year?

Yes, because even with no inflation, you could still invest money today and earn more by next year.

3. You're considering renting an apartment by paying a very high deposit, but no monthly rent, or paying a much lower deposit and paying monthly rent.

How can you decide which option is better?

You have to look at your **opportunity cost:** How much could you earn with the extra money you save by paying a lower deposit?

If you have ideas for high-yielding investments, and you believe you can earn more from them than you'd pay in rent, then it makes sense to choose a lower deposit and monthly rent.

On the other hand, if your best idea is putting the money in a checking account at the bank, you're better off paying the high deposit and skipping monthly rent.

But to tell for sure, you'd have to run the numbers and compare your estimated investment income to the rental expense.

4. Your friend has a new real estate investment idea. He pitches it to you and claims it will generate 10% interest per year.

Should you invest in it?

It depends on what your other options are and how the risk of this investment compares to the risk of those other options.

For example, if you could earn 12% elsewhere with the same amount of risk, this opportunity makes no sense.

On the other hand, if you could earn only 7% elsewhere with the same amount of risk, this opportunity makes a lot more sense.

People tend to make the wrong investment decisions because they focus on the potential returns without also considering **the risk.**

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PV, NPV, IRR, and WACC

1. What does the "Discount Rate" mean?

The Discount Rate represents your **opportunity cost** or your "targeted yield." In other words, if you don't invest in *this* company or asset, how much could you earn with your money elsewhere, in similar companies or assets?

The Discount Rate represents both the **potential returns** and the **risk** of other, similar opportunities.

If the Discount Rate is higher, both the potential returns and the risk are higher; the opposite is true if the Discount Rate is lower.

2. Why is the Discount Rate higher for stock-market investments than it is for debt investments, such as government bonds?

Because the risk and potential returns of stock-market investments are higher.

Over the long term, you might earn an average of 10-11% per year in the stock market. But in a *single year*, the market might fall by 30% or rise by 40%, so the return *each year* varies tremendously.

With debt, by contrast, you'll earn a fixed amount of interest every single year with a *very high* certainty. But it's also highly unlikely that you'll earn anything close to 10-11% each year over the long term.

3. What is WACC?

WACC stands for "Weighted Average Cost of Capital," and it's the most common Discount Rate used to value companies.

To calculate it, you multiply the % Equity in a company's capital structure by the "Cost" of that Equity, multiply the % Debt in the company's capital structure by the "Cost" of that Debt, and add them up (and factor in any other sources of capital).

For example, if a company is using 60% Equity and 40% Debt, its Cost of Equity is 10%, and its Cost of Debt is 5%, then its WACC is 60% * 10% + 40% * 5% = 8%.

WACC represents the average annual return you'd expect to earn if you invested in the Debt *AND* Equity of a company proportionally and held both of them for the long term.

NOTE: This is a simplified explanation. There's a whole lot more to WACC – please see the sections and lessons on DCF analysis and valuation for more.

4. You estimate that a company's WACC is 8.0%. What does that mean?

It means that if you invested proportionally in both the company's Equity AND its Debt, you'd expect to earn 8.0% per year from the investment, on average, if you hold it for the long term.

In a *specific year*, your returns will vary because the stock market can swing around wildly. But WACC represents your *long-term*, average expected return.

5. How much would you pay for a company that generates $100 of cash flow every single year into eternity?

It depends on your Discount Rate, or "targeted yield."

For example, if your targeted yield is 10%, you'd pay $100 / 10%, or $1,000, for this company.

But if your targeted yield is 20%, you'd pay only $100 / 20%, or $500, for this company.

If there's no growth, the formula is Company Value = Cash Flow / Discount Rate.

6. A company generates $200 of cash flow today, and its cash flow is expected to grow at 4% per year for the long term.

You could earn 10% per year by investing in other, similar companies. How much would you pay for this company?

Company Value = Cash Flow / (Discount Rate – Cash Flow Growth Rate), where Cash Flow Growth Rate < Discount Rate.

So, this one becomes: $200 / (10% – 4%) = $3,333.

Remember that a **higher Discount Rate** makes a company **less valuable**, and a **higher cash flow growth rate** makes a company **more valuable**.

7. What might cause a company's Present Value (PV) to increase or decrease?

A company's Present Value might **increase** if:

- Its expected future cash flows **increase**.
- Its future cash flows are expected to grow at a **faster rate**.
- Our "opportunity cost," or Discount Rate, **decreases** because we lose access to certain investments.

A company's Present Value might **decrease** if:

- Its expected future cash flows **decrease**.
- Its future cash flows are expected to grow at a **slower rate**.
- Our "opportunity cost," or Discount Rate, **increases** because we gain access to better investment opportunities.

8. How do you decide whether or not to invest in a company or asset?

It makes sense to invest when:

1) Its Asking Price is below its Intrinsic Value.
2) The Potential Returns exceed your Opportunity Cost.

Of course, you don't decide based *solely* on the numbers. These are just rules of thumb for thinking through the decision.

You would also review the qualitative and market factors and make sure that all of those support your decision as well.

9. What does the internal rate of return (IRR) mean?

The IRR is the "the effective compounded interest rate on an investment."

For example, if you invest $1,000 today and end up with $2,000 after 5 years, the IRR represents the interest rate you'd have to earn on that $1,000, compounded each year, to get $2,000 in 5 years.

It's 14.87% in that case, which you can verify with some simple math:

$1,000 * (1 + 14.87%) = $1,148.7, and then $1,148.7 * (1 + 14.87%) = $1,319.5.

And then $1,319.5 * (1 + 14.87%) = $1,515.7, and $1,515.7 * (1 + 14.87%) = $1,741.1.

Finally, $1,741.1 * (1 + 14.87%) = $2,000.

The IRR also represents the Discount Rate at which the Net Present Value of an investment equals 0.

10. Wait, what's "Net Present Value"?

Net Present Value equals the Present Value of an investment, i.e., the sum of its discounted cash flows, minus the "Asking Price" – what you pay upfront for the investment.

For example, if the Present Value of an investment is $1,000 and the Asking Price is $800, then its Net Present Value is $200.

11. So, how do you use IRR?

Normally, you calculate IRR and then compare it to the Discount Rate, or WACC, of a project, investment, or company.

If IRR exceeds WACC, it makes sense to invest; if it does not, you should not invest.

For example, you estimate that a project's IRR is 12%.

You could invest in other, similar projects and earn 10%.

Therefore, it makes sense to invest in *this* project because the IRR exceeds your opportunity cost – what you could earn elsewhere.

12. What impacts the IRR of a project, investment, or company?

Most of the same factors that impact Present Value: The expected future cash flow and cash flow growth rate, for example.

Your Discount Rate, or opportunity cost, does **NOT** impact the IRR because *you are solving for the Discount Rate when you calculate IRR*.

Other factors that influence IRR include the Asking Price of a company or investment and the expected selling price of that company or investment.

13. What would make the IRR increase or decrease?

An investment's IRR might **increase** if:

- Its expected future cash flows **increase**.
- Its future cash flows are expected to grow at a **faster rate**.
- Its expected selling price in the future **increases**.
- Its "Asking Price" **decreases**.

An investment's IRR might **decrease** if:

- Its expected future cash flows **decrease**.
- Its future cash flows are expected to grow at a **slower rate**.
- Its expected selling price in the future **decreases**.
- Its "Asking Price" **increases**.

14. A company is considering expanding by launching a low-cost airline service in Southeast Asia.

The company's overall WACC is 11%, but its WACC in this region and industry is 8%. It believes the IRR from this expansion project will be ~10%.

Should it expand into Southeast Asia?

Yes, because you must compare IRR to WACC on a project or department-specific basis.

The WACC of the company as a whole doesn't matter – what matters is that the IRR in *this specific region and division* exceeds WACC for this same region and division.

As always, in real life, you don't decide *just* based on the numbers. This question is just a simplified example to illustrate the concept.

15. Why is valuation more complex than looking at a company's cash flows, cash flow growth rate, and an appropriate Discount Rate?

First off, there are many different types of "cash flow," and no one can agree on exactly how to calculate it. It also takes quite a bit of effort to move from a company's financial statements to its cash flow.

Also, the Discount Rate is tricky to estimate, it might change over time, and you might use a different Discount Rate depending on the type of cash flow.

It also takes time and effort to estimate a company's cash flow growth; to do that, you often have to build a more complex financial model.

Finally, "company value" is not so simple because it depends on which investors and which parts of the company you're including.

These factors make valuation and financial modeling tricky and time-consuming, and they explain everything else in this course.

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