

in this video we'll introduce the concept of valuation in biotech we'll discuss why evaluation matters and then give a brief overview of different valuation techniques so this will set the stage for subsequent videos where we'll talk about more specifics around dcf and comp space evaluation techniques so in previous videos we talked about value which is uh the value of a company is the present value of the cash it generates in the future and valuation is just a way of estimating what the present value of those future cash flows are right because these happen in the future you can't know what they are you can only do your best to estimate them and that's what evaluation is in large part about so we're going to start off with an example here of a hypothetical company aptly named hypothetical therapeutics and this is going to help illustrate why valuation matters and how you can use it in biotech to make better investments so this is a hypothetical oncology company their lead asset is in a phase 2 study their market cap is 100 million 70 million in cash no debt and they recently traded down 80 percent from a prior market cap of 500 million because a competitor targeting the same pathway as hypothetical therapeutics had an unacceptable safety signal in their phase two the drug seemed to be effective in uh reducing tumor volume but there were unacceptable side effects so competitors stock traded down and because hypothetical therapeutics targets the same pathway their stock traded down as well so this is something that you'll see fairly uh fairly often in biotech so in previous videos we talked about how a stock might move due to the company releasing clinical data but a lot of times if there's clinical data that comes out for another drug that's in a similar class or targets the same target or has a similar mechanism of action you will often see read through from one company's data to another's uh data in in stock price as well because they have similar products from a scientific or clinical perspective so we'll quickly walk through this super high level um you know hypothetical mechanism

of action here so we can better understand how um [Music] how scientific insight why scientific insight matters and how you can use valuation to support your your scientific insight in your decision making around investing so this competitor drug inhibits the target and then that leads to tumor shrinkage which is good but there are also safety issues which are not so good however you happen to do research in your phd study research of this pathway and you happen to know a little bit more than the market does about how this particular protein functions and specifically you know that there are two main downstream proteins that mediate the effects of this this target protein so there's downstream protein one uh that is increased by this protein and then higher levels of this protein lead to tumor growth and then we have downstream protein two which is involved in healthy function and levels of this protein are also increased by um by the target protein so the competitor drug inhibits the target here which reduces downstream levels of both of these proteins in this case of downstream protein 1 reducing levels is good because that shrinks tumor but in the case of downstream protein 2 is not good to reduce the levels of this protein because it's either for healthy function so it causes safety issues so if you pause here and think about this from sort of a drug design perspective you might think that well why don't you just target downstream protein one that way you would get the positive effects of tumor shrinkage and you wouldn't mess with this pathway that's important for for normal healthy function and that's in fact what hypothetical therapeutics is doing so they've designed an inhibitor uh specifically downstream protein one that leads to tumor shrinkage and it doesn't mess with the healthy function um that density protein 2 is involved in okay so with that in a very high level fact pattern in mind um in the the valuation information and information on the trading history of the company do you invest so just to recap this company hypothetical therapeutics traded down 80 because

the competitor study failed the competitive study failed because despite their drug being effective at shrinking the tumor it had unacceptable side effects you have done a lot of research in the space studying the pathway that both of these companies target and you have a really strong conviction that the mechanism of action of hypothetical therapeutics product will avoid the safety issues that the competitors saw so do you invest so it's not a trick question here um but we'll just kind of go through a simple quantitative example of how you can think about uh this investment decision a little bit more quantitative matter so the current market up is 100 million dollars and we're assuming this is a single asset company and this phase 2 study is sort of the biggest driver of the company's valuation so essentially you can decompose the market cap into the probability of success of the study times the market cap if the study succeeds plus one minus the probability of success of the study times the markup of the study fails and here we assume that 500 million is the markup of the study succeeds because that's where the stock was trading prior to the competitor's negative data readout in reality the stock would probably trade higher than 500 million uh if the study was successful just because that 500 million dollar evaluation probably baked in some probability of failure for the phase two study and once the face study to study is actually successful then that probability of failure will no longer exist um so the valuation will be higher we've used 50 million here as the markup of the study fails they have like 70 million in cash um so we just assume that they traded a slight discount to cash if this study fails and it's their only asset so we can quickly solve for probability of success and it's like 11 in this example but again because the 500 million dollars you can almost think of that as a floor for the company's valuation if the phase 2 study is positive in reality the market's describing probably a less than 10 percent probability of success to this study so if you think that the probability of success

is dramatically higher than 10 percent then this might be a good investment but what if you think the probability of investment is like 15 or 20 can you invest around that or does it need to be you know do you need to think it's like a 50 or a higher probability of success to invest so that's sort of where evaluation comes in another way to think about that is you know maybe you invest if the market is 100 million but what if the markup is 200 million what if it's 500 million what if it's a billion as the market cap at which you invest increases the probability of success in the market is pricing and also increases so if you think the study is going to succeed you don't really have as much of a divergent view if the market also thinks that the study is going to succeed so obviously if you think about it the investing decision should become more difficult as the market cap if the company gets higher so one thing this evaluation can help you do and this is how i like to think about valuation especially from a clinical or earlier stage biotech perspective is evaluation helps you understand the terms and the odds of the bet that you're making so when i say the terms of the bet i mean which assumptions are you betting on which assumptions is the market betting on so in hypothetical therapeutics example the probability of success of that phase two study is really the core assumption that drives the stock price in the near term the stock might also move based on information around um you know the ultimate market size or some other competitor drug that's earlier stage or various other things like that but all of those assumptions don't have as much impact on the near-term valuation as this probability of success for the phase 2 study and when you do a valuation analysis you will get a better better insight into which assumptions drive the stock in the near term and you should supplement this by talking to other investors and sort of getting a sense for what consensus is but valuation is a good way to ensure rigor and discipline around that exercise so addition to getting to you the terms of the bet evaluation can

help you understand the odds of the bet how much you might make if you're right and how much you might lose if you're wrong so in our example of hypothetical therapeutics at 100 million valuation if um the phase 2 study succeeds the stock's going to go up at least 5x you think and then if the study fails the stock will go down probably at most 50 so your upside is much higher than your downside in that case and that's an important thing to take into account when you're making an investment decision right if the market cap is 500 million and you think that it's going to trade up to 600 million if it's successful but if the study fails you think it's gonna trade back down to 50 million then your upside is much lower and your downside is much higher and the odds of that bet are not as favorable to you if you're if you're an investor if you're a buyer of that stock however these the terms and the odds of the bet are not the sole inputs into the investment decision obviously your risk tolerance target return and conviction in your thesis will determine what odds you accept so if you have a certain financial goal that requires you to get at least a 10 return on each investment you make then obviously you're going to need that level of return for each investment in order for it to make sense for you and your personal goals likewise your conviction and your thesis is very very important so in the hypothetical therapeutics example if you have a ton of conviction that hypothetical therapeutics mechanisms of action will avoid the safety effects the competitors saw then you can invest at a much higher valuation so for sort of a way to put this in in terms of the you know the formula we laid out if you have a high degree of confidence that the probability of success at that phase two study is like sixty percent and the market's pricing at under ten percent then that's an investment that you should make as long as you know your target return is under under five x however if you don't have a ton of conviction in their thesis if you think yeah this might actually work but you're not totally sure then maybe

you invested 100 million but maybe at 200 million 300 400 million maybe that's a little bit too tight for you maybe that doesn't provide you enough margin of safety given your conviction and maybe you don't invest at that level and then obviously risk tolerance is a huge factor as well the higher your risk tolerance the more investments are acceptable to you um because you don't really care as much about if you lose money so another thing that i'll mention here about evaluation is when you read about evaluation or hear people talk about valuation a lot of times you hear them say it helps you determine the intrinsic value or the fair value of a company and that's partially true but that can be a little bit of a siren song when you think talk about early stage biotech valuation because any evaluation technique you perform even like the best most rigorous dcf for an early stage or a clinical stage biotech company is going to be so uncertain there are so many assumptions that go into that model and each of those assumptions has a huge impact on the overall stock price so if you're a little bit wrong on a key assumption your valuation is going to be completely incorrect so yes you can think about valuation uh uh in a from the perspective of an investor in early stage buy tech companies you can think about valuation as a way to sort of get at the fair value of a product but with the huge caveat that you need to be very very careful about how much confidence you have in that valuation these are imprecise and inaccurate valuations so just be very mindful of that this is an art it's not a science so how do you actually implement that caution how do you actually act on that advice of you know be careful about um relying too much on evaluation it is quickly don't use evaluation analysis as a big um as a reason to invest right just saying a company is undervalued is not a reason to invest in in biotech you need to start with a differentiated view on the science or the market opportunity or even something like the management team and then you do your evaluation analysis to tell you okay this different view that i

have on something about the company does the market care about that does that move the stock price so that's the first thing that's the terms of that we talked about and secondly think about if you're right about this divergent view if you think something that the market doesn't think and you're right how much do you make if you're right and then how much do you lose if you're wrong so what are the odds of the bet okay so when i talk about valuation and biotech a lot of what i'm talking about is really just understanding the terms and the odds of the bet you can get a rough sense of a company's value as well but just be mindful it's a very rough sense of the valuation now if you are in a different field if you're not an investor if you're like an accountant for example and you're doing evaluation for like 409 a purposes then you're going to look at valuation from a different perspective you don't care about the odds in terms of the bet you want to find a specific value that's defensible that you can use for your work likewise even if you're a financial analyst at a big pharma company and you're working with a huge team of people to um value a potential acquisition target for example then you're the goal of your evaluation is different the role of you the role your role as an analyst doing the valuation is different so you're going to approach valuation from a different way and use different techniques so a lot of the stuff that i talk about here in these videos is specific to investing uh and specific to investing in early stage biotech and basically the what the most important takeaway here is the strength of your assumptions is much more important than the robustness of your evaluation models here which is why it's so important to have scientists and medical doctors in biotech investment because everything is really driven by this differentiated view on the science the clinical profile or the market opportunity the valuation analysis is supplementary not primary all right so with that out of the way this is a quick overview of common valuation techniques so we'll go through each of these in more detail in

subsequent videos but this is just an overview of uh some common ways to value companies in general and then the ones in bold are commonly used in biotech so there's two basic buckets of valuation techniques that are used so one is fundamental evaluation methodologies of which discounted cash flow analysis is very prominent and when i say fundamental i mean you're trying to get at uh the future cash flows that a company will generate and then determine the value of the company that way the second bucket are multiples based valuation or comps so these are more like market-based as opposed to fundamental base valuation metrics and when i say market base i mean you're thinking about the value of a company in terms of what others are willing to pay for for that company you still think about some of the fundamental drivers of value um but but there's a much bigger input the market valuation and the price investors willing to pay is a much bigger input so i'll quickly walk through these here and then we'll go on another slide to touch them in more detail and then subsequent videos we'll go through even more um but the dcf you're basically building a model here to project the cash flows every year in the future up to a certain time period and then discount those cash flows back to a present value so we'll talk more about what discount rate and discounting means but just for now just know that um it represents what's called the time value of money which means a dollar today is worth more than a dollar tomorrow um because you can invest that dollar and you can generate a return um if you invested today so that dollar today invested at say a five percent interest rate will be worth you know a dollar and five cents in a year um so a dollar today is worth more than a dollar tomorrow and then the discount rate uh is different depending on the company but in general you can think about it as the opportunity cost of an investment so if you have 100 to invest and you have six things that you can invest in um you have to think about not just the return from an individual investment but what return would you get

if you invested in something else right so if your investment a gives you a 10 return but you think investment b is going to give you a 15 return then you should probably invest in investment b but you would need to discount investment b by 10 percent which is the the discount rate um that you would use because that's what you can get from investing in other products so don't worry about that if it doesn't make too much sense now just for now know that the dcf you project the cash flows that a company will generate in future years and then you just discount them back because the money tomorrow is worth less than money today so the next bucket our comps-based valuation techniques so these comp space evaluation techniques basically abstract a lot of the assumptions away from a dcf so when you build a dcf you have a lot of specific assumptions that you're forecasting around the number of patients who get a drug what the price is going to be what revenue is how revenue grows every year a bunch of assumptions around the different costs of the business there's a lot of complexity that goes into building a dcf comp space valuation you abstract a lot of the assumptions away you say we don't care about a lot of these assumptions in most cases you know we're gonna have similar assumptions for like cogs for um you know company a and company b so we can abstract a lot of that away and then just have a constant called the multiple that represents all of these assumptions at a dcf and then you use one specific financial metric as your your variable of interest so basically to do a comp space valuation you pick a set of similar companies called comps so for a phase two oncology company like hypothetical therapeutics you'd probably get a group of other you know oncology small molecule therapeutics and mid-stage clinical studies and then for each comp you calculate the relevant metric so earlier we have here different metrics so all of these are ratios that you use to calculate multiples for comps so these are all different ways to abstract away different different assumptions

around a company's financial performance and sort of normalize it with a certain financial metrics so they're all of the format the numerator is some uh you know equity value or enterprise value some way to measure the value of a company and then the denominator is a specific financial metric usually related to earnings or profit or to revenue so here pe you're looking at market cap or equity value over net income which is a profit metric ev to ebitda is another common ratio not as much use in early age biotech but here you're looking at enterprise value and you're dividing it by ebitda which is another sort of earnings metric you also look at enterprise value divided by revenue enterprise value divided by peak sales which is basically revenue but when you do a revenue multiple like this you're either doing it on last year's revenue or next year's revenue or revenue in three years um but in peak sales you don't care about a specific year you just want to get the year the level of peak sales and then discount to m a value is a little bit different we'll talk about that later but all of these comps are the format the numerator is equity value enterprise value and the denominator is a revenue or a profit metric so then once you have your comp set and you have your target you know metric that you're looking to calculate just do that simple math for each company in the comp set and then that will get you a value ratio range from your target company so if your comp set for example um if you're looking at you know ev to peak sales and you have 10 companies you calculate even peak sales for each of those companies the average multiple is let's say 5x then you might just multiply the peak sales of your target company by five and that will get you your enterprise value sometimes you'll use the median value sometimes you'll have a you know a wider range of the values you use from the comp set um but that's the basic principle behind it so we'll talk about this in a different video but just to sort of start you thinking about the logic behind these comp sets and how you could use them in practice so why might one company

have a higher revenue multiple than another similar company so if they're both targeting the same indication and it's a somewhat similar mechanism of action maybe a little bit different maybe it's going after a different target but the same patient population why might one company have a higher revenue multiple than another company and another question to think about is why would you use a revenue multiple in early stage biotech as opposed to a an earnings multiple which is commonly used for for other industries additionally why would we use peak revenue as opposed to using next year's revenue or last year's revenue or revenue in three years so just things to think about to understand sort of the logic behind valuation we'll talk about those more later um and this is just a quick chart that sort of lays out uh these different evaluation techniques used for early stage biotech on a couple axes so this y-axis just the time it takes to do the analysis so discount m a um is basically a valuation technique where you say for this particular type of company it's often acquired by a larger pharma company at some point so to value that company you're sort of arbitraging um sort of like an m a sort of arbitrage you think that a company might be acquired um so you value it based on some discount to the price at which an acquirer might pay for it so you just pick a group of companies that are similar that have been acquired see the valuation that they had and then you just say maybe you know we think there's a 25 chance that this company will be acquired at a level um similar to what the comps were required at and then you do your evaluation that way very quick and dirty other hand you have a dcf where you have to literally forecast and do research on dozens of assumptions and then the actual calculation is a little bit more complex as well so that takes a lot more time and then a peak sales multiple is somewhere in between finding the peak sales of a bunch of different companies is a little bit more time intensive than finding the the m a comps but it's still a pretty straightforward exercise to do this and then we talked

a little bit about market base versus fundamental earlier um so the dcf is more fundamental it still does take input from the market but you're really more focused explicitly on understanding the fundamental underlying assumptions that drive the future cash for the business whereas something like a discount to m a you really just care about what others are paying for these assets and you only care about the fundamentals in as much as they are incorporated in the valuation that other companies pay or um you know with respect to the specific odds that you used to handicap the likelihood a particular company will be acquired and then peak sales multiple is is somewhere in between you are taking a lot of input from the market but then when you choose your multiple you are thinking about specific fundamental considerations of a company and as you do more dcfs and get more familiar with what moose stock prices and um which assumptions you use and how companies stack up on financial metrics then you can start being more comfortable using comps um because at the end of the day again comp just abstract away a lot of the complexity of a dcf and if you have a good sense for what drives what moves the stock price then you can be a little bit more intuitive about using comps but for most or pretty much all evaluations you're going to use a variety of techniques to to arrive at the valuation that you ultimately uh use to inform your investment decision so that's it for this video next video we'll talk about discounted cash flow analysis specifically uh there's a spreadsheet that i've put together google should have put together that walks through an example dcf and tells you sort of what each line item represents where you can find the information to support each assumption and that will be shared in the next video as well so thanks for watching hope you guys enjoyed this and again if you have questions comments feedback let me know in the comments thanks