INVESTMENT BANKING INTERVIEW GUIDE – WITH EXAMPLE QUESTIONS AND MODEL ANSWERS

CITY INVESTMENT TRAINING

Investment Banking Training and Internship programs.

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About City Investment Training

Why City Investment Training?

Pragmatic training and internships:

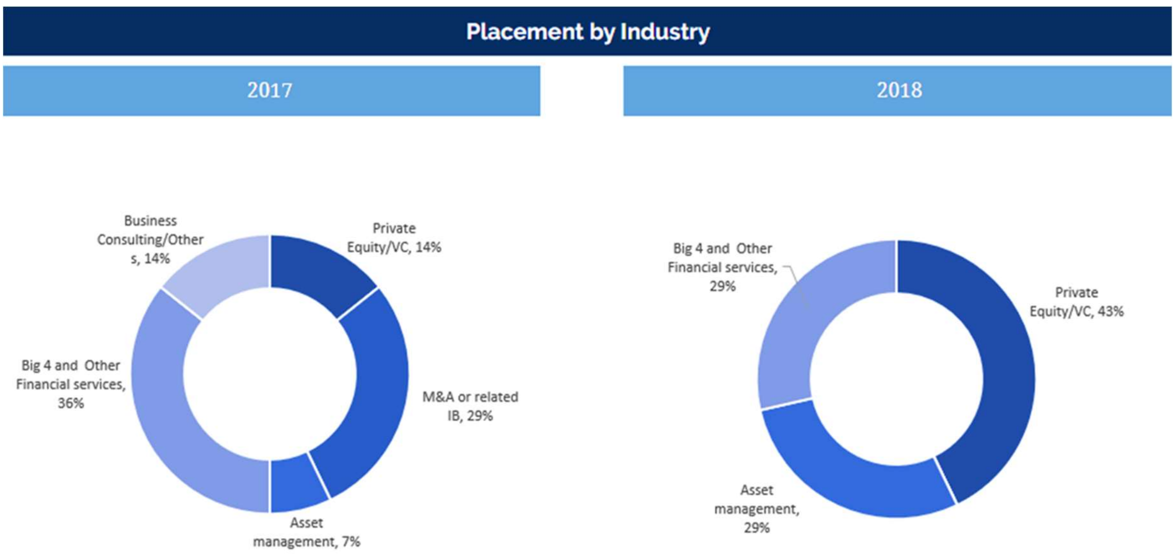
- You can learn to build financial models and value companies just like a seasoned analyst.
- Our advanced programs include case studies from leading business schools including Harvard, LBS and IESE.
- Embark on internship programs to make your CV stand out.

Experienced trainers:

- Our lead trainer has almost a decade's experience in investment banking, working for bulge bracket names ranging from Goldman Sachs to Barclays.
- He has covered stocks across a broad range of sectors, including Chemicals, Fintech and Real Estate with market cap ranging from $50m to >$100bn.

Careers:

- We have an exceptionally high placement rate of 90%* for our (8 weeks) programs run between July 2018 and August 2019 (excluding students who went on to continue their Undergraduate or Postgraduate studies).
- We help to send our students' CVs to hundreds of Investment Banks, Private Equity and Venture Capital firms across the UK.
- We help to identify investment banking opportunities for our students to give them a head start in their job search.
- Past students have gone on to work for marquee names such as Goldman Sachs, Citibank, Rothschild and KPMG amongst others.



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Introduction:

About Our Founder:

Sameer Merchant is a former investment-banker with a wealth of experience working at bulge-bracket companies ranging from Goldman Sachs to Barclays Capital. As an analyst, he has covered stocks across a broad range of sectors, including Chemicals, Fintech and Real-Estate with market-caps ranging from $50 million to over $100 billion.

In March 2017, Sameer resolved to dedicate himself to helping the next generation of analysts and investment bankers, and so set up City Investment Training, an investment banking training school helping students to achieve their full potential.

About This Guide:

This book will serve as a guide to embarking upon a career in investment banking. It is the culmination of extensive research, expertise, and the experiences of Sameer, his staff and his students in the field of investment banking. Please note, however, that the world of investment banking is far broader than the materials contained within this book. That said, the information contained within should help you to prepare for and land your first job in investment banking.

Following this short introduction, we will provide you with a general overview of investment banking. We will take you through the differences between bulge bracket firms and boutique investment banks, providing lists of both to aid your job search. We will outline general responsibilities and career development prospects for an investment banking analyst, and after this, we will run you through the typical hiring process for an investment bank.

Primarily, however, this guide will contain a host of investment banking questions with detailed answers to help you to succeed in job interviews. We would like to thank our City Investment Training students who shared their investment banking interview experiences and questions with us, allowing us to prepare this guide.

Although we have compartmentalised the guide into M&A, Equity Research, Private Equity and Venture Capital, it is imperative that you read all sections before going to an interview, especially the section on valuations/equity research. This section contains a plethora of fundamental valuation questions that are often asked irrespective of the interview being for an M&A, VC or Private Equity role.

Working in Investment Banking:

Investment Banks: What are they and how do they work?

Given that you are presumably interested in or applying for an investment banking job, this is a crucial question. Investment banks are effectively middlemen that bridge the gap between two groups of people – those who demand capital, and those who provide it. In reality, investment banks provide a wide variety of services.

Investment banks can provide financial advice to major investors and companies. Through understanding the company, its goals and its objectives, investment banks are able to advise on long and short-term activities for their clients to boost performance and tackle challenges head-on.

Investment banks also assist with mergers and acquisitions. Imagine I owned a soda company and I wanted to expand my operations to take over a bottling company. Analysts at the investment bank would undertake valuations of the bottling company so that I can arrive at a fair price when undertaking my acquisition. Equally, the investment bank will help to facilitate the process, with buy-side advisors helping to employ a range of bidding tactics so that my acquisition goes as smoothly as possible whilst allowing me to maximise value.

The research department of an investment bank, as implied in the name, researches and reviews companies and their prospects, typically proscribing a “buy”, “hold” or “sell” rating for the stock. The knowledge and understanding gained from the research are used to aid traders at the bank as well as to advise clients on investment decisions. Highly successful investments will, through commissions, generate revenue for the bank. During my own time in investment banking, I acted as an equity research analyst at Goldman Sachs, specialising in chemicals companies, and during my period at Barclays Capital, as an equity research analyst, I specialised in the automotive sector.

Due to inherent conflicts of interest between investment banks trading on their own accounts and investment banks advising clients, a “Chinese wall” is put in place between the two departments so that neither side can benefit from inside information that would facilitate unfair profits.

Investment banks are typically arranged in specific regimented hierarchies. The lowest people in the food chain are the analysts. They typically arrive at the investment bank fresh out of university or business school, already broken in by the gruelling job application process. Analysts typically research companies and develop financial models in Microsoft Excel, using the models to produce equity research reports and PowerPoint presentations.

After spending two to three years as an analyst, the bank may promote you to the rank of an associate. There, you will preside over the analysts, occasionally dipping in, preparing financial models and pitch-books. Primarily, however, the associate will spend most of their time liaising with clients to decipher and facilitate their needs.

Once you spend three to four years at the bank, you may be promoted to the role of Vice President. Much like the associate, the VP spends time liaising with clients, updating them on deals and transactions, helping to execute deals with new clients. The Vice Presidents are in charge of both the analysts and the associates, and therefore must ensure that all the PowerPoints and financial models are built effectively.

Next up in the food chain is the Director or Senior Vice President. To get here, you must have worked at the bank for several years and risen up the hierarchy. The Director effectively acts as a bridge between the clients and the lower rank team members.

Finally, at the top of the food chain is the Managing Director. It takes serious skill, talent and dedication to reach here. The MD is burdened with responsibilities, as they are in charge of the profitability of the bank. They must therefore be aware of the progress of all the bank's operations and the satisfaction of the clients. The MD is compensated for the bank's successes and takes the blame for its losses.

Although it should not be the primary motivating factor for your desire to enter into investment banking, you may be interested to learn how much you might be earning as a first year-analyst. Here in the UK, you could be earning anywhere between £24,000 and £50,000 plus bonuses depending on the size of the firm and your performance.

The Best Banks:

"Bulge bracket" investment banks are among the largest investment banks in the world. They typically offer a range of services including financing and advisory banking, as well as market making, sales and research for a multitude of financial products. Their clients consist of large multinational corporations and even Governments. They are some of the largest and cost profitable financial institutions in the world. Importantly for you, they are also the most competitive when it comes to careers. Their interviews are long and intense. It is a testament to your skill and experience to be hired by one of these firms. The list of bulge-bracket firms is as follows:

1. Bank of America Merrill Lynch
2. Barclays Capital
3. Citigroup
4. Credit Suisse
5. Deutsche Bank
6. Goldman Sachs
7. JPMorgan Chase
8. Morgan Stanley
9. UBS

At the other end of the spectrum we have boutique investment banks. These are typically much smaller companies specialising in at least a single aspect of investment banking. These banks are largely focused on smaller mid-market companies, specialising in just a single aspect of investment banking, such as M&A or raising capital. The hiring process for such banks is less competitive than that of their Bulge Bracket counterparts, and so they can be effective starting points for breaking into the industry. Despite this, they can be just as reputable as bulge bracket firms, given that many are founded by high profile investment bankers who have started their own firm. A list of the best boutique investment banks is as follows:

1. Allen & Company
2. Cowen
3. Perella Weinberg Partners
4. Lazard
5. Rothschild

6. Evercore Partners
7. Greenhill &Co.
8. Blackstone
9. Houlihan Lokey
10. Jefferies & Co.

Life as an Analyst:

Putting the wild claims aside, as an investment banking analyst, you will probably be working about 80 hours per week, with standard variations across different banks. You may be expected to work over weekends, and slowly, your work becomes your life. Analysts are the backbones of investment banks. After a month or two of intensive training, they perform most of the analytical work vital to the functioning of an investment bank. Analysts produce financial models, using a series of analytical formulae to help value to value and forecast the futures of companies in a range of different scenarios. In addition to this, analysts will help to prepare PowerPoint presentations for clients and pitch-books to flaunt the company's history and past successes.

So, is the lifestyle worth it? Absolutely! Investment banking is extremely rewarding and highly paid. You will develop enormously as an individual, overcoming obstacles and hurdles that you never thought you could. You will develop effective time-management skills, and will learn how to survive in a high-pressured stressful environment. The pay is good, and once you have completed your analyst program at a bank, you will have a plethora of career options available to you. From Private Equity to Hedge Funds, the world is your oyster.

The Hiring Process:

Getting into investment banking is extremely tough. If you thought getting into Oxbridge or Harvard was difficult, at Goldman Sachs, the typical acceptance rate for applicants is roughly 1.8%. Preparation and research are key to developing the skills you need to break into the financial world.

The recruitment process varies between banks, but the general structure is largely the same. To begin your application, most banks will have an online form that you need to fill in, but others will require a traditional cover letter and CV. This acts as the first hurdle for applicants. Larger banks will use automated systems to filter out the majority of applications they receive in one fell swoop. To avoid this, your application must be exemplary. Your academic credentials must be excellent, and your extra-curricular activities must somehow translate into the skills you wish to bring to the bank.

Until recently, banks used to run a series of tests to further filter out candidates, but this is changing. In an attempt to be more open minded, many banks are scrapping these tests in favour of more open-ended questionnaires to allow recruiters to better understand the candidates that they might be interviewing. Make sure you know whether your bank uses psychometric tests. If they do, find practice material on the internet and ensure that you are prepared.

So, you've passed the test and got to the interview stage. What next? Many bulge-bracket banks and larger financial firms will use technology for the first interview round. Goldman Sachs has been known to use HireVue, a webcam interview to conduct the first stage. You will typically record answers to pre-recorded questions, and these answers will be analysed by advanced algorithms to filter out the wheat from the chaff.

Should you be successful, you will be invited to a series of face to face interviews where you will be grilled on a range of both technical and problem-solving questions. Not only will this allow the bank to assess your technical knowledge and general intelligence, it will also allow the company to evaluate your ability to think clearly and strategically under pressure. As such, it is imperative that you conduct practice interviews to assess how well you come across.

It is also extremely important to run through practice interview questions so that you are familiar with the questioning you may receive. The reasons for this are twofold. One, by doing so, you will not be caught unawares, and as such, you are more likely to perform well in the interview. Secondly, by having thought about questions you may receive, should you receive a similar question in an interview, you will be able to answer the question more confidently and comprehensively.

Interview Etiquette:

In addition to knowing your stuff, in an interview, if you are able to strike the right chord with your interviewer, it is far more likely that you will be offered a job. You must arrive at the interview with time to spare, but not too early. It is likely that the interviewer also needs to prepare before the interview, and as such, you should arrive about 15 minutes early. Make sure you give yourself plenty of contingency time for transport issues and also to allow yourself to find the place.

Whether you agree with it or not, the interviewer will begin judging you the moment you walk into the room. After all, the first thing that will be noticed is your appearance. You will be expected to wear formal business dress. For men, this will entail a dress shirt, a well-fitting suit, a formal tie and formal, well-polished shoes. For women, this will entail a formal blouse or shirt, formal skirt or trousers, and formal shoes. If it is possible to discover the bank's dress code, make sure you adhere to that rigidly.

Before you get into the room, make sure to turn off your mobile phone. Don't risk leaving it on silent. Turn it off. It is also always a good idea to find out who will be interviewing you. If this is possible, when you walk into the interview, make sure you address them by their title followed by their last name. This will make you appear personable and likeable, allowing the interview to start on a positive note. Handshakes are also important. This should be firm, but not tight. It is always worth practicing this before the interview to make sure you get it right on the day.

After you have greeted your interviewer and have been invited to sit down, your interviewer will likely offer you a glass of water. Take it. It will help you to appear calm and collected whilst also allowing you to take a short pause between questions. When siting down, your body language is extremely important. Subconscious biases form over the course of the interview, and if your body language and posture are poor, your interviewer will be far more likely to reject your application. Make sure to sit up straight, keep good eye contact, and remain fully engaged.

When speaking to your interviewer, you should speak in a calm and collected fashion. Make sure to vary the tone of your voice and keep concise and to the point. Be friendly and open, but maintain a professional distance. Do not overshare. Be wary when sharing information about your personal life, and always remain upbeat and positive. Once your interview is over, make sure to thank the interviewer with a firm handshake, and consider following up with a thank you email for good measure.

Much of this is common sense, but you would be surprised by the number of people with excellent and competitive credentials who fall foul of these guidelines.

Networking:

Getting an interview is tough. Investment banks are bombarded with hundreds of job applications daily, meaning that solely relying on the application system renders your recruitment chances slim. This is where networking comes in.

When you apply for a job at an investment bank, much of the time, the Human Resources department seeks an internal reference from somebody who works at the company to cut through the sheer number of applications. As such, developing long-term relationships with people working at the bank is key to maximising your employment prospects.

One of the many ways to harness digital technology to network effectively is to use LinkedIn, an online CV-like application allowing you to connect with others in your field. If you haven't already, set up a profile. Remember, this is a professional networking application, not a social media platform. Do not put anything on there that isn't strictly related to your professional life. Make sure to connect with people you know and send out a few connection requests to mutual connections working in your industry. From there, if possible, send out a message and begin a professional relationship. It's as easy as that.

Take advantage of networking and recruitment events. Take a bundle of business cards with you and take time to talk to people in your field. Smile, make eye contact, and focus on them. The secret to any successful conversation is making the other person feel good about themselves. When the time is right, exchange contact details and follow up with an email telling the person how much you enjoyed meeting them. Try to arrange a meet-up over a coffee or drink if you can.

Another effective avenue available to students is your school or university's alumni network. At reunion or alumni events, you will be able to interact with people that are guaranteed to have something in common with you. If your school or university is highly selective, you will likely come across many former-students who are now performing highly in their respective fields. Make sure to exchange business cards and follow up with a flattering email and you will have a solid professional network in no time!

Investment Banking Questions and Answers:

Analytical interview questions:

1. How many pizzas are sold in London daily?

The ideal way to approach this question is through the supply side. That is, if we can estimate the number of pizza restaurants and the number of pizzas each sell a day, we should be able to figure out the number of pizzas sold. Yes, there are also pizzas sold at supermarkets, but for the purposes of this question we will keep this aside.

First, in trying to estimate the number of pizzas restaurants in London, let us break the city down into different zones and locations. The city has 11 tube lines in addition to its overground rail network. If we estimate that each tube line has roughly 25 stations, with basic multiplication, we can estimate a total of 275 stations. The actual number is 270 – not far off!

We can assume that London has roughly half as many overground train stations, leading us to roughly 130 overground stations. In reality, there are 112 stations, so again, we aren't far off. We therefore reach a rough total of 400 stations.

Assuming that there are roughly 5 pizza places stations per train station, we can deduce that there are roughly 2,000 pizza places in London.

From then on, assuming that each restaurant takes about 5 minutes to make each pizza, we can estimate that 12 pizzas are made per pizza store per hour. On a 12-hour work day, we therefore get roughly 144 pizzas sold per restaurant per day.

To tie this all together, we multiply the number of pizzas sold per pizza place daily by the number of pizza places in London to get the total number of pizzas sold daily. This can be calculated by multiplying 144 by 2000, resulting in an estimate of 288,000 pizzas sold daily.

Is this a believable estimate? Well, there are 8.5 million people living in London at the time of writing, and as such, this estimate implies that 3.5% of the population is chomping away at a pizza daily, So, yes, it is a believable estimate!

2. If a string wrapped around the equator is made to expand 15 centimetres outwards how much more string is required?

This question looks daunting, but it is actually far simpler than you might have initially thought. Cast the physics equations about the mass and radius of the earth out of your mind and recall a simple principle - no matter what the size of the circle i.e. the circumference of the earth, when the circle increases by 15cm outwards, the length of the string will expand by the same amount each time.

As such, the circumference of the circle will increase by $2*\pi*$radius. If the thread therefore expands by 15cm, the additional thread required will equal $15*22/7*2$, which comes to 94cm or almost 1 metre.

Note that this will apply to whatever the size of the initial circle, whether it be the circumference of a tennis ball or the circumference of the earth.

3. How many people pass through Heathrow's Terminal 1 daily?

The key here is to first estimate the number of planes that land on the runway every day. From there, we can estimate the number of passengers each plane carries and approximate capacity utilisation of each aeroplane.

Let's take-off (sorry for the pun) by estimating the number of planes that land on the runway at Heathrow Terminal 1. Assuming we have an average of one plane landing/take-off every four minutes at the runway, we can estimate 15 planes landing or taking off every hour. If we multiply this by 24 hours, we get a total of 360 aeroplanes daily.

We can assume that each aircraft can carry 300 passengers and that each flight is 90% full. Each aircraft will therefore carry an average of 270 passengers.

Finally, we multiply the 270 passengers per aircraft by the 360 aeroplanes landing and taking off daily to come to a total of 97,200 (almost 100,000) passengers passing through Heathrow Terminal 1 daily.

4. How many toothbrushes are sold in London every day?

First off, let's estimate the total population of London. Using our general knowledge, we can estimate this to be about 9 million in total.

Assuming that people aged between 1 and 3, and those aged 75 and above brush infrequently or do not brush at all, and assuming a total life expectancy of 80 and an even distribution of ages, we can estimate that 90% of the population brush their teeth, leaving us with roughly 8 million people.

From your own experience brushing your teeth (I hope!) we can estimate that the average person changes their toothbrush every four months. This means that people purchase toothbrushes three times per year. If we multiply this by the 8 million people, that means that 24 million toothbrushes are purchased in London every year.

To work out how many are sold each day, we divide 24 million by 360 (for simplification purposes) to get an average of 66,667 toothbrushes sold daily.

5. How many TVs are there in Scotland?

This is a trickier question, because the likelihood is that you do not know the population of Scotland. We will therefore need to estimate it.

Start off with what you know. The UK has a population of about 60 million, and London has one of about 9 million. Given that England alone has a population of about 40 million, and assuming the rest of the population is split roughly evenly between Scotland, Wales and Northern Ireland, Scotland should have a population anywhere between 5 to 7 million. In reality, Scotland's population is 5.5 million. Bingo!

If you are off with your numbers a little but have a sound justification for them, you will sail through your interview. If you are off by miles, the interviewer will ask you to stop and reconsider the assumptions made. Remember, these questions are designed to test your thinking processes and analytical skills. As such, a lousy estimate without a good justification will lose you very important points.

Now that we have a population of roughly 5.5 million, the next step is to decipher where televisions are most commonly used. Some common sense will tell you that they are mostly used in the home. Therefore, we must estimate the number of households in Scotland.

We can assume that the average household has 2.5 to 3 people in it. This will account for the variations between families with children and couples without any. We can therefore divide the 5.5 million people by the 2.5 people per household to estimate the number of households. For ease of calculation, we can round this up to 2.5 million households.

If we assume that each household has 1.5 televisions, then by multiplying this by 2.5 million households we get a total of 3.75 million televisions in Scotland.

But wait! We aren't finished yet. Where else do we find TVs? Restaurants, bars, offices, schools, in addition to a whole host of other places. We can estimate this to be roughly 10% of the total number of TVs in people's homes. We can therefore add 3.75 million to 375,000 to get a total of 4.125 million TVs in Scotland.

6. What is the value of the Eiffel Tower?

Let's start off by valuing the Eiffel Tower purely from a business perspective. Constructing a probable income statement will help and we can start with revenue.

Revenue:

Let's start with calculating the average price per ticket. If you have been to the Eiffel Tower, you will know the approximate price per ticket. If you don't, that's ok! You should end up with an estimate of anywhere between €10 to €40. At this point, the interviewer should help you out.

Taking into consideration the knowledge about the approximate prices for sightseeing, we can assume €20 per ticket. The current the price for a ticket in fact averages €17.50. We can assume that there are approximately 10 ticket counters at the tower, and that for each one ticket sold at the counter, 1.5 tickets are sold online.

Assuming the time to issue one ticket is approximately 1 minute (including families), we get an average of 60 tickets issued per hour. Given that the Eiffel Tower is open to tourists between 9.30 am and 11.00 pm every day, we can calculate the annual revenue to as 13.5 * (10+15) * 60 * 360 = 7.29m tickets per year (See below). Well that is pretty good maths, as Paris sees approximately 7m visitors a year.

13.5 = hours

10 = ticket counters

15 = online tickets for everyone ticket counter

60 = minutes

360 = number of days in a year (simplified)

So, annual revenue for 100% occupancy will be 7.29m * €17.5 = €127.6 m

Let's assume 80% occupancy, which gives us a more realistic annual revenue of €102m.

Expenses:

Assuming that there are 30 employees paid a salary of €30,000 annually, we come up with a staffing cost of €900,000.

Repair & maintenance along with Depreciation costs can be estimated at 2.0% of the value of the tangible asset (Assuming the total steel structure costs £100m). The repair & maintenance with depreciation costs therefore work out to approximately €2m.

Ancillary revenues:

We should also add ancillary revenues (gifts, souvenirs and other inside facilities such as shops, restaurants) to paint a more accurate picture.

Assuming that 1 in 5 people visiting the Eiffel Tower enter into the restaurant or purchase some souvenirs, at an average revenue per customer of €20, we get we get ~€29m revenue annually. Therefore, total revenues would be €102m+€29m = €131m

Cost margins for ancillary revenue would be 50% * €29m = €14.5m

Finally, we can calculate the profit as revenue – costs which is €131m -€2m - €14.5m -€1m = €113.5m

The Eiffel Tower as a cultural monument with stable profitability would be valued at least 20x its net income per year = €113.5m * 20x = €2.27bn

So, the value of the Eiffel Tower is approximately €2.3bn.

7. What is the weight of the Empire State Building?

To kick things off, we can first calculate the weight of the materials used for the first floor of the building. We will then use this number and multiply it by the approximate number of floors for the building. We can estimate that the building has 100 floors in total. In reality, it has 102, so we're not far off!

Let's start with the first floor...

If the Empire State Building is square shaped, we need to guesstimate the height, length, and width of the first floor to calculate the volume. Generally, each office floor's height is around 3.9 m. If you did not know that, you should be able to estimate it by doubling the height of the average human. To estimate the length of the floor, let's assume that the building has 40k sq. ft of office space per floor, or 3.6k sq. meters of space per floor. Given the square shape of the building, we can square root this number to get the length and width of the building as 60m each.

You should know that to determine the volume, you multiply the length, the width and the height together. We can plug in the numbers to find that 3.9*60*60 = 14,040 m^3.

Next, we can assume that the Empire State Building's walls, pillars and foundations are made of steel, cement and glass. Assuming the volume consists of 10% of cement, 10% of steel and 5% of glass we get…

Weight of cement:

If 10% of the total volume is cement, then the volume of cement used is 10% * 14,040 = 1,404 m^3.

Now, if we don't know how much 1m^3 of cement weighs, the interviewer should be able to help you out. The actual number i.e. 1 m^3 of cement weights 1.51 ton, so, the total cement to construct the first-floor weighs 1,404*1.51 = 2,120 ton

Weight of steel:

Similarly, given that 10% of the volume of the building is steel, we have...

10% * 14,040 = 1,404 m^3

Since 1 m^3 of steel weights 7,800 kg or 7.8 tonnes, the total steel used to construct the first floor weighs 1,404 * 7.8 = 10,951 tonnes

Weight of glass:

...and finally, for glass we compute.

5% * 14,040 = 702 m^3

Converting to tones, 1 m^3=2.49 tonnes (for the glass),

So, the total weight of the glass used to construct the first floor is 702*2.49=1,748 tonnes.

Total weight of the first floor:

By adding together the weights, the of steel, cement and glass used to construct the floor, we estimate the total weight of the first floor of the Empire State Building as 2,120 + 10,951 +1,748 =14,819 ton.

Total weight of the Empire State Building:

Finally, we can estimate the weight of the Empire State Building by multiplying the first-floor weight by the number of floors, which equals 14,819 * 102=1,511,560 tonnes.

Answer: The total weight of the Empire State Building is therefore ~1.5m tonnes.

*** this is the weight of an empty building and we can always add weight for things like tables, chairs and computers etc.

8. What is the internal angle between the hour and the minutes hand if the time is 4.40 pm?

Let's start off by working out the angles for everyone hour or five minutes. From there on we can work out the angles for any time.

The number of degrees in one hour:

We know that a circle consists of 360 degrees. The clock has 12 hours, so we need to divide 360 by 12 to get the degree for every hour or five minutes, which is 30 degrees.

The angle between 4 hour and 40 minutes:

The minutes hand at 40 minutes means the same as the hour hand at 8 pm. So, for working out the angle for 4:40 we get 8 – 4 = 4 hours. The angle for four hours is 4 * 30 degrees = 120 degrees.

Be careful – it isn't over yet – this is what separates a good candidate from a great one.

The angle at 4.40pm:

Remember, at 4:40, the hour hand does not stand still at four. Rather, it has started to make its way towards five. The question is by how much?

If the time is 4:40, then the minutes hand has moved 2/3rd its way towards 12 and so the hours hand would have moved by the same proportion i.e. 2/3rd which gives us an angle of 2/3rd of an hour or 2/3rd of 30 degrees i.e. 20 degrees.

We will now subtract this from 120 degrees to get 100 degrees.

The final answer:

The angle between the hour and the minutes hand at 4.40 pm is therefore 100 degrees.

Bravo!! - If you got the tricky bit as well without being prompted, you just managed to impress your interviewer.

9. How many black cabs are there in London?

There are typically two ways to answer sizing questions such as these – Demand side and supply side. When it comes to sizing this question using demand side there are several data points such as number of cars, the percentage of Londoners who use black cabs during the day, and multiple demographic inputs which will see us throwing a lot of spaghetti on the wall without a guarantee of any of it sticking. Therefore, it is best to answer this question using the supply side.

We first need to estimate the number of cars on road in London (supply of cars). After this, we will take a percentage of these cars as being cabs or black cabs to get to an approximate answer. Let's start with approximating the number of people with driving license in London.

The number of people with driving license:

Knowledgeable candidates will know that London houses around 9m people. Not everyone can drive a car, so let's break the population down by age groups.

People, who can drive are typically in the 18-72 years bracket. Assuming the average Londoner lives up to the age of 80 and a roughly even age split, we get 66% of total population eligible to drive a car or ~6m people.

Not every Londoner can afford a driving license, so let's strike out 20% to get 4.8m people who have a driving license in London.

The number of cars in London:

Not everyone with a driving License owns a car. Assuming, only 50% of total license holders own a car, we get 2.4m car owners in London. Now, some of the owners will have more than 1 car. Let's assume that 15% of owners have 2 cars on an average, we get a total car population of 2.9m cars in London. We have done some due diligence (Not that you will be able to do this during the interview – if you are lucky the interviewer will second your estimate) and found that there are 2.6 million cars in London (Link below). So, we are close. Bravo!!

http://content.tfl.gov.uk/technical-note-12-how-many-cars-are-there-in-london.pdf

The number of black cabs:

Now, we know that total cars which are cabs must be a small proportion of total cars. Assuming that 5% of total cars are cabs. From first-hand experience, you may estimate more that 5%, but remember, private cars are not always out and about, whereas a cab is. So, we get total number of 143k cabs in London. We have plenty of Ubers and private taxis on the road – no points for getting that right in the interview. So, if 15% of all cabs are black cabs, we get a final answer of 21,500 black cabs in London.

10. How do you get exactly 4 litres of water given a 3 litre and a 5-litre bucket? There is no way of measuring partial fills in a bucket.

Let's start by filling up the five-litre bucket first and then pouring the contents into the 3-litre bucket. We now have 2 litres of water remaining in the five-litre bucket. We can then empty the three-litre bucket and pour the 2 litres from the bigger bucket into the three-litre bucket. Fill up the five-litre bucket again and pour water from this bucket into the three-litre bucket up to its brim. Given that the three-litre bucket already had 2 litres of water in it, only 1 litre of water is transferred into the three litre-bucket, leaving us with four litres of water in the five-litre bucket.

We can also start by filling up the three-litre bucket first, and then pouring the three litres into the five-litre bucket. By repeating the process, you will be left with one litre of water in the three-litre bucket. Empty five litre bucket and pour one litre from three litre bucket into the five-litre bucket. Fill up the three-litre bucket up to its brim again and pour into five-litre bucket giving us four litres of water in the five-litre bucket.

For a graphical representation of the answer, please visit our website.

Accounting Interview Questions:

1. Walk me through an income statement.

Net Revenues: also known as "sales" is the top line of most income statements and tells the reader the value of goods and services sold by the company in a period.

Cost of Goods Sold (COGS): Also "cost of sales" represents the direct expenses that are incurred by the business to generate revenue or sales.

Gross Profit: Revenues less cost of sales is broadest measure of profitability.

SG&A: Operating expenses that are not directly linked to generate revenues – salary (Manufacturing), marketing, administrative, commissions, travel and other ancillary expenses which at times also includes research and development.

Research & Development: Expenses that are directed towards developing new products or procedures.

EBITDA: Earnings before Interest, Tax, Depreciation and Amortization is Sales less all the expenses listed above i.e. Sales – COGS – SG&A – R&D.

Depreciation: The allocation of costs related to Property Plant and Equipment on a piecemeal basis over each period.

Amortization: The allocation of costs related to intangible assets on a piecemeal basis over each period.

Other operating expenses: Expenses which are not classified in the above listed categories.

EBIT: Earnings before interest and tax is EBITDA less D&A. This is also known as operating profit of the company.

Interest Expense: Cost related to the interest that a company pays on its borrowings.

Interest income: Interest income generated from deposits at banks or other short-term investments.

Unusual or infrequent income expenses: These are expenses which are one-time expenses, including restructuring costs, Gain or (loss) from assets, disposal of a businesses, impairment charge and write-offs amongst others.

Pre-Tax Profit: EBIT – Unusual income/expenses.

Income Taxes: Expenses owed to tax authorities and calculated on pre-tax profit.

Net Income: All revenues and incomes less all expenses.

2. Walk me through a balance sheet.

Current Assets (expected to be converted into cash annually) – line items:

- Cash & Cash equivalents - Cash held in the bank in deposits or low risk short-term investments.
- Marketable Securities - Short-term debt or equity investments.
- Accounts receivable – Money owed to the company by customers who have purchased goods.
- Inventories – Represent the money invested by the company in unfinished or finished goods which are still to be sold.

Long term or Non-Current Assets – Key line items:

- Property Plant & Equipment – Any long-term investments made by the company relating to the operations of the business such as equipment, plants, building, vehicles etc.
- Intangible assets/Goodwill – Intangible assets such as brands, trademarks etc acquired by the company.
- Deferred Taxes assets– Potential future tax savings due to excess tax paid historically. This is the difference between tax paid on the financial statements and the actual taxes paid.
- Other Assets – These are assets which are not included in the above-mentioned line items, including prepaid expenses and long-term investments among others.

Liabilities – Key line items:

- Accounts payable – Money that the company owes to its suppliers for the goods/service purchased.
- Notes Payable – These are the primarily short-term borrowings.
- Long term (LT) debt– This the company's debt which has a maturity of more than 12 months.
- Current portion of LT debt – The proportion of LT debt that is payable within the next 12 months.
- Deferred taxes – Future tax obligations arising due to the company paying lower taxes then what is measured by its financial statements.
- Minority interest– Equity component of the proportion of consolidated business not owned by the company.

Shareholders' Equity:

- Preferred stock – Stocks that have priority over common shareholders and have special rights.
- Common shareholders' equity – This is the par value of units of ownership of a corporation.
- Additional paid in capital (APIC) – The value of shares when it is sold above its par value.
- Treasury Stock – These are shares which were first issued but later bought back by the company.
- Retained Earnings –Cumulative net income of the company since inception less dividends and losses.

3. Walk me through a cash flow statement.

The cash flow statement is a three-tier structure consisting of 1. Cash flow from operations 2. Cash flow from Investing and 3. Cash flow from Financing.

Cash flow from operations (CFO):

Cash flow from operations start from the net income of the company and deducts all non-cash income and adds back non-cash expenses. Some of the non-cash expenses added back to CFO includes…

Depreciation: Recall that depreciation expenses are non-cash expenses on the income statement which aims to capture the component of fixed asset which was used in that year.

Change in working capital: Working capital is current assets less current liabilities. We will discuss this in more detail later.

Increase or decrease in deferred taxes: Remember deferred tax assets or liabilities are created due to the difference in the actual tax paid and the tax calculated on the company's income statement.

Any increase in assets is seen as use of cash which means cash will reduce by that amount. Any increase in liabilities is a source of cash – meaning the cash balance will go up by that amount. So, in the above entry of deferred tax assets and liabilities – when deferred tax assets go up cash will go down and when liabilities go up cash goes up.

Cash flow from investing activities (CFI):

- Cash flow from investing activities include items relating to the investing activities of a company both operating and non-operating.
- Capex: i.e. Investment in PP&E
- Acquisitions: Assets acquired through the acquisition of other companies
- Disposals: Sale of fixed assets
- Investments: These are securities and debt instruments invested in by the company
- Sale of investments securities
- Others.

Cash flow from financing (CFF):

CFF include the company's equity and debt financing used to fund its operations:

- Debt issuance: The cash inflow resulting from the issuance of any debt.
- Debt repayment: This is the cash outflow driven by the re-payment of debt.
- Dividends: Any dividends paid by the company is recorded as cash outflow.
- Common Stock Issued: Cash inflow resulting from the issuance of any new equity.
- Common Stock repurchased: Cash outflow driven by the share repurchases.

4. If an analyst is given only one statement to analyse the investment, which one should it be and why?

From all the statements, the analyst should opt to look at the cash flow statement as it allows the analyst to assay the free cash flows which can be used to build a DCF valuation model on the company. Furthermore, the analyst could also compute comparable based valuations techniques on the company using multiples such as Price/FCFE or EV/FCFF. Cash is King!

5. What is minority interest expense on the cash flow statement?

When a company has not only significant influence but also a controlling stake (50-99%) in another company then it needs to report minority interest for the component of the business it does not own.

Companies need to consolidate all the financials of the investee company in its own financial statements and report a minority interest for the component of the investee company it does not own.

6. What is working capital?

Working capital represents non-cash current assets less its current liabilities. Current assets are all assets which can be converted into cash within a year. Current liabilities on the other hand are obligations that need to be paid within the next 12 months. Working capital is an important indicator of the company's ability to cover its day to day operations. Current Assets include accounts receivable, inventory and other current assets. Current liabilities include accounts payable, accrued expenses and other non-debt current liabilities.

7. What is the difference between capital and operating leases?

Capital Leases:

These are long term contracts signed by the company to use certain PP&E over several years in return for payments to the owner (lessor) of the PP&E. Although companies are leasing the assets, capital leases treat these contracts as if the company owns the assets and adds it to the balance sheet. The assets are depreciated over its useful life and lease payments or rental payments are treated as a liability almost like debt obligations.

Operating Leases:

Unlike capital leases which treats the PP&E as if the company purchased it, operating leases see the company recording no assets on its balance sheet. The operating lease payments or rental payments hit the income statement directly. On the balance sheet cash goes down by the lease payments and equity reduces by the same amount through retained earnings. Many analysts treat operating leases as off-balance sheet financing and will convert them to capital leases to compare apples to apples with other companies in the sector which treat their leases as capital leases.

8. What is goodwill?

When a company acquires another company, goodwill is calculated as the difference between the purchase price of the company and the fair market value of the assets less liabilities of the acquired company. Goodwill is only recorded after all the identifiable intangibles of the acquired company are considered, including patents, trademarks and licenses among others. Goodwill is not amortised but rather is tested for impairments annually. If the assets are found to be impaired by the valuers/auditors, then goodwill is written down and the company takes a hit on its income statement for the impaired amount.

9. Explain the difference between Capitalising vs. Expensing.

Capitalising is when the company creates a fixed asset for the expense incurred on the balance sheet and records a proportion of those assets as an expense such as depreciation or amortisation on the IS over time. If the expense incurred by the company offers a potential benefit over a year and can be clearly quantified, then accounting regulators allow those costs to be capitalised.

However, if expenses do not provide future benefits or cannot be clearly quantified then a company will need to book the entire expense on its income statement in one go in the period it was incurred. There had been some debate previously on whether advertising expenses should be treated as assets as they clearly provide future benefits. However, given its unquantifiable nature, companies need to book advertising expenses all in one go in the period incurred.

10. Explain the concept of Deferred Tax Assets and Liabilities.

The taxes a company pays to the tax authorities does not always equal to the amount calculated on the financial statements of the company. Company’s chart out two types of financial statements – one of which is for the public and stakeholders. The other is for tax authorities which follows different set of rules set out by the taxman. The difference between these two accounting statements leads to a different pre-tax income which ultimately leads to a different tax figures - ultimately creating either a deferred tax asset or a deferred tax liability. If the company pays more tax under tax-based accounting methodology leading to more cash outflow, then the company creates a deferred tax asset on the BS. The reverse is true for deferred tax liabilities.

Private Equity Questions:

1. What is a leveraged buyout?

A leveraged buyout is when an investor or typically a PE fund acquires a company by using significant amount debt. Anywhere between 50 to 80% of the purchase price of the company is funded with debt, allowing Private Equity or Buyout funds to invest very little equity of its own. Given that cost of debt is typically lower and allows for a tax shield, PE companies make handsome returns when companies with the ability to generate high cash flows can service the debt over the 5 to 8 year holding period. Returns are also generated from a higher tag price of the company at the time of sale which the PE fund can extract if it manages to sell at a higher exit multiple versus that of entry or increase the profitability of the investee company.

2. What are the sources of return on investments for Private Equity companies?

Private Equity companies typically make returns through four strategies 1. Deleveraging 2. Arbitrage 3. Operational improvements and 4. M&A. Let's work with a case study to understand this better.

Assume a PE fund, (let's call it City Ventures) just purchased a silicon chip company (Valley Inc.) for £100m. Given the strong cash flow of the business, banks were willing to lend City Ventures £80m to fund the deal. City poured in the rest of the £20m in the form of an equity investment.

Valley Inc. was producing £20m of free cash flow (FCF) at the time of the purchase, meaning that City Ventures purchased it at 5x it's free cash flow.

After five years of holding the company and improving its profitability to £35m, City Ventures was able to sell the company at 8x FCF at £270. Let's assume that the FCF generated by Valley Inc. allowed it to repay 80% of its debt in addition to servicing the interest expense. The total debt outstanding at exit was £16m (£80m *20%).

At exit City Ventures gets £254m (£270m exit value - £16m debt outstanding). Over a five-year period, this equates to a 12.7x return or a mind-boggling IRR of 66%.

The return was generated by three sources: 1. Increase in profitability (£35m from £20m) 2. Higher exit multiple (8x) versus the entry multiple (5x) and 3) Paying back debt (£16m of debt at exit versus £80m at entry)

Additionally, PE companies may also indulge in buying similar companies and merging the two companies. This allows investee companies to become larger players in the industry, also allowing for synergies.

3. What makes a company a good LBO candidate for a Buyout PE fund?

The priority of a buyout fund which borrows significant amount of debt is to service the debt, i.e. both the interest and the principal promised to be paid back annually. A good LBO candidate has the following characteristics:

- Strong and sustainable cash flows
- Significant amount of fixed tangible assets to offer as security versus the debt borrowed.

- Market leading position (giving it stability)
- Preferably a strong management at the helm. Even though this is not a deal breaker as a new management can always be parachuted but adds risk to the business model.
- Some non-core assets which can be sold quickly to reduce leverage.
- As with all investment - a low valuation at entry.

4. Given a choice between a company B with almost no leverage and company A with a high leverage, all else being equal which company is more attractive for the PE company to buy and why?

Intuitively, the first answer that pops into the head is buy the company with low leverage as we can add debt to make a profit as the cost of debt is lower than that of cost of equity. However, to buy any company investors need to pay a premium on the value of equity which makes a significant difference to the purchase price of the company.

Let's work with a case study to drive the point home.

To buy any company the investor needs to pay a premium, Let's assume a 30% premium which is customarily the real-life average of what investors pay.

Assuming two companies are for sale – all else being equal the only difference between the two are the capital structures. Company A is on sale with an EV of £100m - £80m of debt and £20m of equity. Company B is on sale also with an EV of £100m but has £20m of debt and £80m of equity. The equity investors are likely going to want a premium of 30%.

This translates into a tag price of £106m for company A (£80m Debt + £26m (£20m*1.3)) versus a tag price of £124m for company B (£20m of debt and £104m of Equity (£80m*1.3). Therefore, investors would chase company A - Kapish?

5. Explain the use of mezzanine debt in LBOs.

Mezzanine debt (or commonly referred to as Mezz) is a hybrid security which can be structured to allow the holder to earn higher returns based on equity or warrants. Typically, Mezz allows the holder to earn interest income but also allows them an option to convert the instrument into equities later. in case where the investee companies are successful.

Mezzanine debt is an interim layer of capital that sits somewhere between equity and debt capital in an LBO. Mezz is a funding product which is tailored to the requirements of the borrower and the investor based on the specific deal and return profiles. It is typically used by the PE funds as it comes at a lower cost of capital than that of equity investments, also helping reduce the total equity investment in the deal. It can also be used to replace or complement high yield debt when the market to raise high yield debt is not conducive.

6. What is the difference between a Venture Capital and Private Equity fund?

Typically, Private Equity funds make much larger investments at later stages of a company's business cycle and will tend to have almost 100% ownership. A buyout Private Equity fund will almost always invest at the mature phase of a company. There are also growth PE funds which invest in the growth phase of the company infusing very little leverage and this is where the lines between Private Equity and Venture Capital start to blur.

A Venture Capital company will almost never make use of leverage and will invest in earlier stages of a company's life cycle. Unlike Private Equity, Venture Capital companies will also never own 100% of the businesses they invest in.

7. What is an IRR?

IRR or Internal rate of return is the discount rate that will equate future cash inflows to the initial cash outflow or the investment value. Let's work with a case study. Assuming a PE company invested £100m in a company which gave dividends of £5m a year for five years and was sold after for £200m

The IRR (r) is the discount rate which will equate £100m to all the cash inflows i.e. £5m a year for five years and £200m.

Year 0:	Year 1:	Year 2:	Year 3:	Year 4:	Year 5:
$£-100$	$\frac{£5}{(1+r)^\wedge 1}$	$\frac{£5}{(1+r)^\wedge 2}$	$\frac{£5}{(1+r)^\wedge 3}$	$\frac{£5}{(1+r)^4}$	$\frac{£5}{(1+r)^\wedge 5}$

The IRR in the above case is 19%

8. What are the levers of return for a PE fund?

- Buy low sell high (Arbitrage strategy)
- Use additional leverage (Leverage)
- Increase profitability of the company (Operating improvement)
- M&A

9. Explain the fee structure of a PE fund – What is the 2-20 fee structure?

Customarily, PE funds charge two types of fees.

- **Management fee:** This is c.2% of the funds raised and is independent of the performance of the fund. Assuming City Investment Venture raised £1bn fund then the management fee works out to be £20m annually. This fee is used to paying the fees of the fund's employees, office rent and other admin related expenses.
- **Carried interest:** Private Equity funds also share 20% in the profits of the fund, once its returns exceed the hurdle rate. The hurdle rate typically around 8 to 10% is the minimum return that the fund should generate before the PE fund can share 20% of the investment's upside.

10. Explain the role of GPs in a PE fund?

General Partners are senior officers in a PE fund who are responsible for investment decisions and typically have a seat on the board of investee companies. A founding General Partner signifies even more seniority versus a General Partner and are typically the founding partners of the PE fund.

11. Why are you interested in joining this PE fund?

Homework is critical in answering this question. Not all the following may be relevant to the fund you are interviewing at, but typical good answers include highlighting the fund's:

- Impressive performance since inception.
- Sector it operates in.
- Strategy of the fund.
- Management (Where they have worked previously i.e. Bulge bracket names and their experience in Private Equity).
- Size of the fund.
- Most importantly the learning opportunities it offers to young analysts - (typically derived from the interviewer or a friends/family member who has worked at the fund previously).

12. Which of the deals on our website did you like the most and the least – State your reasons clearly?

This is where the ability of an analysts to analyse investments come into play. Make sure to peruse through some of the deals before walking into an interview at a PE fund. Good investments are those which have attractive valuations, (so the ability to talk numbers e.g. EV/EBIT ratios, rev and profit growth amongst others is critical) attractive business models along with robust industry positioning and growth prospects. Also mention the IRR, the investments or funds have delivered.

13. Explain the use of convertible preference shares in structuring a deal?

Convertible preference shares allow PE's to protect their downside if a company goes into liquidation as they get the first right to recover their investment before that of normal equity investors. On the flip side if the investment is a homerun, if structured correctly - PE funds can also enjoy all the upside by converting their preference shares into normal equity shares. i.e. Preference shares allow Private Equity funds to have their cake and eat it too!

14. Explain the drivers of a hypothetical company – let's say Ferrari?

The most important drivers (What is going to increase sales/profitability) for Ferrari are…

- The continued growth of the global High Net Worth Individuals (HNW's)
- Continued low penetration of Ferrari cars in this demographic to maintain exclusivity.
- Launching new car models on a regular basis.
- Launch of new products such as the SUV which it is about to launch in 2019.
- Ongoing success in F1 which has a second derivative impact on brand perception.

15. Explain the lifecycle of a PE fund?

Typically, a life cycle of a PE fund constitutes three phases and lasts for 10 years.

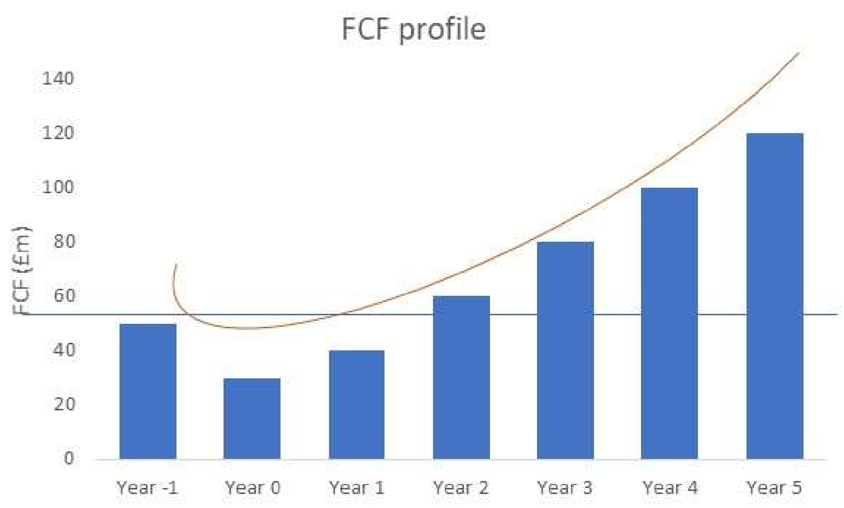
- The first phase lasts for one to two years and are dedicated to fund raising where the PE fund will work with marketing teams to raise the targeted funds.
- The second phase lasts for two to three years where the fund will source, identify and make investments on the funds raised.
- Finally, in phase three which customarily lasts for five to six years the PE fund will harvest their investments and work with management teams of their investee companies to add value. The end of the phase will see funds exit their investments and return the money to Limited Partners (investors in the PE fund).

16. Explain the concept of a J-curve in Private Equity Investments?

The J curve is the return profile of a PE fund's investments as they typically tend to be negative in the early period of the investment versus the back end (fourth and fifth year of the investment).

Earlier in the investment period of the company, the financial sponsor (PE fund) typically invests money into the business to restructure the operations and to execute the strategy outlined before the company is even purchased.

The J curve return profile is an underlying feature of most PE funds, given the time taken for companies to see the benefits of the strategy implemented in the earlier stages of the investment.



17. What does a Private Equity Analyst do on a day to day basis?

- A Private Equity Analyst is expected to peruse through information memorandums and help identify attractive investment opportunities for the fund.
- Analysts also need to be able to create, both paper LBO's and full-blown LBO models and target companies.

- Value target companies using Comparables and Discounted Cash Flow techniques.
- Build full blown five-year financial models for target companies.
- Create investment presentations on target companies.
- Sit on boards of investee companies – mostly as a silent board observer but may contribute to board meetings from time to time.
- Attend investor presentations.

18. Why Private Equity versus M&A or Equity Research?

For most analysts in the investment banking industry, Private Equity is a dream job for several reasons:

- Unlike in M&A where once a deal is completed, analyst move on to work on other deals immediately, Private Equity companies must work with their investee companies to add value to the business.
    - This brings in an entrepreneurial aspect to the job which is often lacking in other areas of investment banking.
- The pay structure is the same, if not more than some of the other areas of investment banking.
- Hours can be long but are still more civilised than a typical M&A gig at a bulge bracket firm.
- In the longer term, there is a strong allure for analysts who become GPs to start their own PE funds.

19. How do Private Equity funds manage companies differently to that of public listed companies?

Managing a Private Equity company is not much different than managing a public listed company. However, given that PE funds typically hold underlying investee companies only for five to six years bring a sense of immediacy to the game. Also, the use of leverage makes running a PE funded business much riskier and there is a laser focused approach on cash flow as it is critical to servicing the mountain of debt used to fund the deal.

20. What stage of the business life cycle would a buyout fund purchase a company at i.e. Startup, Growth phase, Maturity or Decline?

The correct answer is in the maturity phase. Buyout funds borrow significant debt, sometime almost as high as 70% to 80% of the purchase price of the company. Servicing this mountain of debt is critical for the survival of the business. Only companies in the mature phase which are generating healthy operating cash flows and have minimal capex requirement have the financial muscles to service the debt. Additionally, mature companies also typically have significant fixed tangible assets that need to be pledged against the debt borrowed.

Growth companies are ruled out as they generally require high capex to fuel that growth which eats into the cash flows required to service the debt. Growth companies also trade on higher book value multiples which means the level of fixed tangible assets may not be enough to offer as a security for the debt raised.

Start-up companies are riskier and typically have negative cash flows, meaning taking on too much debt equates to signing a suicide note for the company.

Companies in decline phase generally see cash flows decelerating which can make for a twitchy lender. Having said that some Private Equity companies specialise in buying companies in decline or distress on the cheap and turning them around to make handsome returns.

Valuation / Equity Research Questions:

1. Walk me through a Discounted Cash Flow.

Discounted cash flow (DCF) is one of the most respected techniques in the financial world to value companies. DCF values a company based on the Present value (PV) of the future free cash flows that a company will generate until eternity.

If the financial model has five years of forecast, the total value of the business is derived by adding the company's present value of free cash flows to equity over the next five years and the PV of its terminal value (TV).

2. What is Terminal Value (TV) in a DCF?

One of the primary techniques to calculate TV is by using the Gordon growth model which is:

*FCFE5 *(1+ g (sustainable growth rate of the company's cash flows to eternity))*

*Terminal value = (FCFE5 *(1+g))/ (Cost of Equity – g)*

3. What is WACC?

WACC is the weighted average cost of capital. This captures the cost of capital for the entire company given its capital structure and the underlying risk attached to the underlying cash flows. WACC is the minimum rate of return a company should earn given its capital structure.

*WACC = [Cost of debt * (% of debt * (1- Tax rate)] + [cost of equity * % of equity)]*

% of debt = Total Debt/ (Debt + Equity)

% of Equity = Book value equity/ (Debt + Equity)

4. What is cost of debt?

Cost of debt is the after-tax interest expense that the company pays on its debt. It can also be calculated by using the current market yield of the company's long-term bonds.

5. How do you calculate cost of equity?

Cost of equity is calculated using capital asset pricing model which states that the cost of equity of any company is the risk-free rate + Beta multiplied by the equity market premium.

- Risk free rate is the rate an investor receives for investing in risk free investments such as government bonds in the investor's country.
- Beta attempts to capture the risk of investing in an individual stock versus the equity index. It is calculated by comparing the volatility of the individual stock versus that of equity index
- The Equity market premium is the additional rate an equity investor should earn over and above the risk-free rate for investing in a stock index.

6. Explain the drivers of a hypothetical company – let's say Ferrari?

The most important drivers (What is going to increase sales/profitability) for Ferrari are…

- The continued growth of the global High Net Worth Individuals (HNW's).
- Continued low penetration of Ferrari cars in this demographic to maintain exclusivity.
- Launching new car models on a regular basis.
- Launch of new products such as the SUV which it is about to launch in 2019.
- Ongoing success in F1 which has a second derivative impact on brand perception.

7. Explain Enterprise Value.

Enterprise Value = Market cap of Equity + Net Debt + Capital leases + Options and Warrants + Pension Deficit. Most of the times in an interview EV = Market cap of Equity + Net Debt should suffice.

8. What does a typical day of an equity research analyst look like?

An equity research analyst is responsible for covering or providing expert commentary on a set number of companies in his sector. This typically ranges from 10 to 20 companies per analyst.

Analysts are expected to provide daily commentary on the latest news on the companies under coverage. Additionally, during results season, the analyst will write notes on their companies' quarterly and annual results.

Equity research analysts will write detailed pieces on the drivers of a company or longer-term themes affecting the sector such as the impact of driverless cars on the automotive industry.

When analysts write research reports on a company for the first time, the reports are called initiating coverage reports which tend to be 30 to 50 pages of a detailed analysis of the company.

Senior analysts will also field calls from clients, typically portfolio managers at buy-side equity funds who will ask them questions about the companies they are covering.

M&A analysts may also need help from equity research analysts to write IPO documents, other deal related documents and to spread financial models since equity research analysts are considered experts in their respective sectors.

9. Stock pitch – Unite Properties online.

Please see our website for a full stock pitch on Unite Properties.

10. Why Equity Research versus M&A?

Equity research analysts are considered experts in their field and are the go-to people when important news breaks out in a sector. Their day to day tasks involves writing detailed research reports and spreading and updating financial models and valuations for companies under coverage.

Whilst M&A analysts work on M&A deals and spread financial models, they will still consult the equity analyst to get a second opinion.

11. How do you forecast revenues for Google?

Google primarily earns revenues by selling advertising. We first find out the total advertising market globally from which we find the market share of total digital advertising. Given current markets, we can find the market share of Google of the total digital advertising market. We then forecast the total revenues of Google by using the forecast of digital advertising market from a third party and increasing or decreasing the market share of Google of the total digital advertising market.

12. What is ROE?

Return on Equity is calculated by dividing the net income of the company by the average book value of its equity. Return on equity allows analyst to read into the efficiency of management.

13. How do you compute free cash flows to firm (FCFF)?

Free cash flow to firm is a commonly used matrix to calculate the fair value of the firm. Free cash flow to the firm is identified by reducing capex from the operating cash flows of the company.

The precise formula to calculate Free cash flow to the firm (FCFF) is:

*NOPAT (EBIT *(1– Tax rate))*

+/- changes in working capital

+ Depreciation and Amortisation

- capital expenditure

+/- Deferred tax assets/liabilities

14. Is increase in working capital lucrative to valuations?

This question was recently asked to one of my students who was interviewing for the role of an M&A analyst for a leading mid-market advisory company in London with a focus on IPO's.

Increase in working capital is a cash outflow which increases the capital required to run the day to day operations of the company. An increase in working capital is a negative for the valuations of the company. Management of public listed companies and Private Equity funds focus on reducing working capital investments of a company as it frees up capital that can be used to pay back equity holders – thus increasing return for investors.

15. Why would two identical companies in the same sector be trading at different valuation multiples?

The most important reason why two companies are trading at different PE ratios or EV/EBIT multiples is because of the underlying growth in profitability. Investors are willing to pay a higher multiple for the same dollar of earnings for a company with a higher growth in profits versus another company in the same sector.

Other less important reasons of why multiples differ is because of sustainability in earnings, unsystematic risk profile of the company and potential acquisition premium to list a few.

16. Given a market cap of equity and net profit of a company, please calculate its PE ratio.

This is a question I came across whilst solving a case study exercise for one of the leading bulge bracket investment banks based in Canary Wharf. The question is tricky as the formula to calculate PE ratio is Price per share on Earnings per share. Given that both the numerator and the denominator of the formula have the same number of shares as the common denominator, PE ratio can also be found by simply dividing the company's market cap of equity by its total net profit.

17. Why this investment bank or research house (Rank)?

One of the key reasons to work for an equity research house is its rank in the table of equity research houses.

Additional reasons for working for an investment bank could be the rank of the sector team itself. A higher ranked equity research team generally have senior analysts who are extremely well respected by clients in the industry.

18. How does an analyst value a loss-making company?

There are usually three ways to value a loss-making company.

Firstly, the company could be a fast-growing technology company which needs to reinvest all its profits into marketing to fuel its high growth and win as many customers before competition kicks in. Using a DCF valuation technique, the analyst could build a longer-term model of 10 years than the typical five-year model (if relevant) and assume that profits of the company normalises to that of similar companies in the same sector or technology companies in a different sector. For example, this technique is used to value even behemoths such as Amazon which operate on wafer thin margins but trade on PE multiples of more than 50x which is significantly higher than the multiple of other technology companies operate with high operating margins.

Secondly, the analyst could use a simple Price to Sales ratio to value the company. An analyst can compare the company's price to sales ratio with similar companies in the sector which already operate on a normalised operating profit margin.

Finally, Price to Subscriber or some other matrix such as Price to Website Visitors etc allow investors to quantify revenue and profitability potential of the company. The advantage of this method is that it allows investors to value companies in the early stage which are currently pre-revenue but have several free subscribers or repeated website visitors.

19. Why do analysts use EBITDA versus net income to value a company?

EBITDA = Sales – COGS – SG&A – R&D

EBITDA is a popular measure of profitability amongst investors and analysts. It is widely used to value companies for public comparables, and sllows for comparability of profitabilits across sectors. Since EBITDA is income before Interest Tax, Depreciation and Amortisation - it ignores financing, taxation and capital decisions of the company and projects the true operating profitability of the company. Companies with different capital structures i.e. capital light such as software and IT versus capital heavy such as autos are not differentiated when comparing EBITDA. EBITDA also ignores the tax structure of the company. If a company has tax advantages such as REIT versus normal companies which are paying taxes, the company will be considered equal when comparing EBITDA across the companies in these sectors.

Another important ratio includes EBITDA margins or EBITDA/Sales. EBITDA can also be used in debt related ratios such as Debt/EBITDA and EBITDA/Interest (interest coverage ratio) to convey riskiness of a company's leverage.

20. What are some of the shortcomings of using EBITDA to value a company?

At times, EBITDA is used as a quick and dirty proxy of the firm's free cash flow. But free cash flow includes capital investment, changes in tax assets and liabilities and changes in working capital.

Given that EBITDA ignores the company's debt, tax and capital obligations it remains open to manipulation by the management and gives an incomplete picture of profitability.

Therefore, many investors/analysts who use EV/EBITDA to value companies compliment this by using EV/EBIT as well to value the company.

Capital intensive industries such as autos, shipping, telecom and transportation amongst others are extremely capital heavy industries and using EBITDA measures to analyse profitability of these companies ignores a critical component that weighs on valuation i.e. capex.

Venture Capital Questions:

1. Who is an angel investor and explain Super Angels?

An Angel investor is a high net-worth individual who typically invests from their own funds in a small company that they have no personal relations to. Business Angels are one of the oldest and largest sources of seed and equity capital. Since they do not face the same transaction costs as venture capital firms, they are able to fulfil smaller seed and start up-stage investments. They therefore fill a gap between friends and family and Venture Capitalists. Some angels make several small investments and are often called "Super Angels". This typically occurs when an Angel has had a good exit and has therefore decided to make several small investments. In the UK, a certified sophisticated Angel investor needs an annual income of £100,000 or more and net assets worth £250,000 or more, excluding property that is the primary residence or benefits payable on the termination of a service or retirement.

2. Explain the different rounds in the Venture Capital Game.

- Pre-seed round – Stage before the seed round.
- Seed round - Early stage investments and precedes series A round.
- Series A round – The first serious VC check. However, pre-seed, Seed and Series A are all considered early stage investments.
- Also expect to find names such as Series B-2, Series D-3 and Series A/B/C crunch – When the same VC invests another £5m in addition to the £10m invested before on the same terms, the round becomes a Series B-1 round and if the same happens again it will be Series B-2.
- Series B, C and …. – Latter funding rounds led by a new investor and are mid stage companies.
- Series D and beyond – Generally considered late stage companies.

3. What is a syndicate?

When VCs or investors invest with other VCs, the group of investors is called syndicate. This includes any investor and not limited to VC – i.e. Angel investor, strategic investor, corporate and HF among others. Most have one lead investor but also common to see two or three VCs co-lead a syndicate.

4. What is convertible debt?

Convertible debt is a debt instrument at its core with an option to convert into equity at some point in the future, predicated on unfolding of a specific event laid out in its clause. It sits above an equity instrument in the capital stack and has a right of receiving money before equity holders. Commonly, the instrument converts into equity upon a qualified financing round, characterised by equity financing of a sizable amount but can get converted on other events.

5. When do entrepreneurs use convertible debt?

Convertible debts are simpler, quicker and cheaper than preferred stocks in most cases. It is commonly used when entrepreneurs raise money from friends and family before more sophisticated investors join later funding rounds. It is used when the debt is less than $500,000. When the debt is greater than $1 million, it is advisable to use preferred stock instead. However, there are always exceptions to both cases.

6. What are preference shares?

Preference shares represent equity ownership and sit below debt and convertible debt in the capital stack. They have priority over normal equity shares in liquidation and dividends.

7. Why do Venture Capitalists use convertible preferred stock?

Convertible preferred stock gives Venture Capitalists downside protection when deals go bad but allows them to enjoy all the upside of normal equity ownership.

8. What is pre-money valuation?

Pre-money valuation is the imputed value of the company immediately before a fresh investment is made. It allows investors to compute the percentage of shares and the price per share of the company being sold.

9. What is post-money valuation?

Post-money valuation is the imputed value of the company immediately after a fresh investment is made. It is calculated as Pre-money valuation + new money invested.

10. How can VCs use terminologies such as pre-money and post money to trick entrepreneurs into lowering the value of their company?

When Venture Capitalists say that they will invest £10m at a £30m valuation, it means on a post-money basis. i.e. VC's £10m will buy him 33.3% equity stake in the business. The entrepreneur might think the Venture Capitalist values the business at £30m pre-money and is topping up another £10m for a 25% equity stake. The entrepreneur should therefore be presumptive and clarify by saying "I assume you mean £30m pre-money?"

11. What is an option pool?

Options give the right to employees to buy stocks in the future at some pre-determined share price. They are granted mostly to employees but may include consultants, advisors and board members. An option pool is the number of shares reserved for current options granted and expected future options. Options are used to motivate employees especially when start-up companies cannot compete with talent from bigger corporates, e.g. Ali Baba vs Microsoft.

12. What are warrants?

A warrant gives a right to the holder to purchase equity shares in the company at a predetermined share price for several years. A 10-year warrant for 1m shares of series A stock may allow the holder to purchase these shares at $1 each, regardless of the what the share prices are worth at the time of exercise. This is another technique used by Venture Capitalists to push for lower valuations through the back door.

13. What are bridge loans?

Warrants are common when bridge loans are part of the financing structure. Bridge loans are commonplace when investor is waiting for other investors to contribute to future financing rounds Bridge loans take form of convertible debt and given the risk undertaken of not raising additional funds in the future, will see the loan value converted into equity at a 20% discount of future funding round or warrants at a 20% discount.

14. Define some of the following VC terminologies:

- Up round - Pre-money valuation of the next round is higher than the post money valuation of the previous round
- Down round - Pre-money valuation of the next round is lower than the post money valuation of the previous round
- Flat round - Pre-money valuation of the next round is same as the post money valuation of the previous round
- Cap table – Works out the shareholding structure of the company after every new round of investments.

15. What are some of the sources of funding for Venture Capital funds?

- Educational endowments such as Harvard and Stanford.
- Governments.
- Corporate pension funds.
- Large corporations.
- Banks.
- Professional institutional investors.
- High Net Worth (HNW) individuals.
- Fund of funds.
- Charitable organisations.
- Insurance companies.

16. Explain clawback provisions in carried interest fees of VC and Private Equity companies.

If the VC was to invest $30m during the initial life of the fund and make $20m profit on it, it will be allowed to take $4m from the fund (20% carry). However, if they invest the rest of the $20m which goes south and generate no profit at the end of the fund then the clawback provision will see them pay back the initial $4m earned.

What if the partner who earned the carry has already moved on to another fund and has already paid taxes on his profit and splurged the funds? The LPs do not care one bit and it is the responsibility of the VC fund to pay back the money to the LPs.

The VC fund will typically reach out to the partners of the fund and will try to recover their money from them – as you can imagine, it can get ugly pretty quickly….

17. What is a zombie fund?

- Commitment period also known as the investment period is typically a five-year period which is the time that the VC has in identifying and investing in companies.
- After the commitment period the VC can no longer make investments in new companies, but it may make additional investment in existing portfolio companies.
- Therefore, VCs typically raise new funds every three to five years i.e. once they have invested all the money from the previous fund raised.
- An entrepreneur should be careful when raising money as there are several walking dead VC funds that continue to meet entrepreneurs to show their relevance in the industry but have no money to invest given their failure to raise new funds.

18. Explain the anti-dilution clause in the term sheet.

Anti-dilution is used by VCs to protect them from dilution in case of new equity being raised comes in at lower valuation. Mechanism/formula is set up in such a way to ensure that there is retrospective adjustment for the share price, so that investors get more shares as if they had invested at subsequent, lower priced round. There are two types of antidilution…

Full ratchet antidilution:

- In a down round, a full ratchet antidilution sees all previous rounds priced effectively at the new lower price.
- In full ratchet clause if one share is sold for a lower price then all previous shares of the VC will be repriced at the lower price.
- Was in full vogue after the internet bubble crashed post 2001.

Weighted average antidilution is of two types…

- Narrow based antidilution– Investors share price is adjusted down only to some proportion of the new round depending on some pre-determined formula which considers the amount of new investment.
- Broad based antidilution – Reduces the share price slightly lesser than narrow based.

19. What are reserve funds and what should entrepreneurs know about them?

Reserves are the amount of investment capital proportioned to individual investment companies. A firm in its early stages may see a VC make a $1m investment but may have set aside a further $5m to invest in future rounds. This is an amount well defined within the VC fund.

However, VCs may have no reserves for a company in its later stage aiming for an IPO soon. A $50m fund with $25m initial investment could have $25m reserves to invest in future rounds.

Under- reserving can see VC's pick favourites and allocate future investments only to their top entrepreneurs. Over reserving is not a problem for entrepreneurs but is economically disadvantageous for VCs and LPS in the fund.

Most VCs can raise a new fund when they have committed and reserved 70% of their funds which incentivises VCs to over-reserve.

20. Define liquidity preference clause in the term sheet.

- Comes into play when a liquidity event takes place such as M&A.
- Preferred stock gets priority over common stocks on getting a specific amount of money back
- Exit value is based on multiples and is common to see 1x 2x and 3x in the term sheet for money invested through preferred stocks.
- Preference dividend are also included if part of the term sheet.
- Preference overhang is the amount of money that preference share will first receive after which the remaining of the liquidation proceeds will then be allocated to the common stock holders.
- Preferred shareholders will always look to convert their shares to common shares if the conversion works out economically favourable.

Three types of preference shares:

- Non-Participating preference shares: First pay the original purchase price of preference shares post which money will be distributed to common shareholders.
- Participating preferred stock with cap: First receives the original purchase price after which preference shareholders participates with common stockholders on a as converted basis until the preferred holders receive (2x) the original investment.
- Participating preference stock: First receives the original purchase price after which preference shareholders participate with common stockholders on a as converted basis.

Mergers and Acquisitions Questions:

1. Explain the role of an investment banker in an M&A process.

The M&A banker provides the following services:

- Provides access to capital either directly or through other third parties.
- Consults and helps negotiate on optimal deal terms and structure.
- Helps find buyers and sellers for the deal.
- Investment bankers can represent buy side, sell side or provide fairness opinion.

2. Explain the M&A process.

If the M&A advisory company is representing the buyside of the transaction, the process can take anywhere between four to nine month and includes:

- Scanning targets and defining acquisition timetable
- Contacting the targets
- Negotiating the NDA and performing Valuations (Financial modelling, DCF, M&A, Trading and Transaction comps)
- Going through the deal process and due diligence – Letter of intent to sellers from buyers. Industry, company, legal, tax and financial due diligence.
- Signing the definitive agreement and closing the deal – Finalise due diligence, arrange capital, file regulatory documents, shareholder and regulatory approvals.

3. Why do you want to work for this M&A advisory company or this bulge bracket?

If it is a bulge bracket then it is important to mention the rank of both, the bank and the likely sector team you will be working in. Highlight the management's experience and achievements in the recent past.

For smaller boutiques, candidates should focus on the past achievements and managements experience working for bigger bulge bracket names.

4. I am sure you have done some homework on our company – can you talk about a deal that you may have come across on our website that you enjoyed reading about?

This is an opportune time for the candidate to showcase his/her financial prowess and talk about recent deals that the boutique or the bulge bracket bank has completed. It is imperative to cover the financials of the deal such as at the what price was the company sold at, valuation in terms of EV/EBITDA multiple, premium paid and the likely value the merger or acquisition will create.

5. What is the difference between a merger and an acquisition?

A merger takes place when two companies come together to form one new company. In an acquisition, one company completely takes over the other company.

6. Why do companies conduct M&A deals?

Companies indulge in M&A to:

- Increase global presence.
- Increase market share.
- Purchase a technology or an IP.
- Expand its product/service offerings.
- Buy a government license which is otherwise difficult or time consuming to obtain.

7. What is transaction comparables or precedent transactions and how does an analyst find the right comparables universe for transaction comparables.

Transaction comparables provides valuation multiples such as PE, EV/EBIT and EV/EBITDA among others for a list of comparable transactions that took place in the same sector as that of the target. Finding the right set of previous transactions requires a deep understanding of the company and the sector. Senior bankers are always consulted first to get some guidance on what set of comparables would suit the current deal. The inclusion of a wrong deal in the table can skew valuations of the deal, impacting credibility of both, the analyst and the advisory. Analyst go through databases such as Bloomberg and S&P's Capital IQ scanning for past deals completed by peers in the sector and ones that the target company completed. Perusing merger proxies of peers can also reveal a set of useful precedent transactions.

8. What is accretion/dilution analysis?

Accretion dilution analysis allows the M&A analyst to see if the combined EPS of the target and acquiring company (Proforma EPS) post acquisition is higher or lower than the standalone EPS of the acquirer before the acquisition.

- Accretion is when Pro forma EPS > Acquirer's stand-alone EPS.
- Dilution is when Pro forma EPS < Acquirer's standalone EPS.
- Breakeven is when Pro forma EPS = Acquirer's standalone EPS.
- Impact is typically based on street consensus of EPS.

9. Why do analysts build an M&A model?

An M&A model allows the analyst to

- Perform accretion/dilution analysis.
- Impact on valuations and credit ratings.
- Deal feasibility from an acquirer's perspective.
- Pricing capacity.
- How will the target be paid (consideration i.e. stock, cash or both)? This can have significant impact on legal, tax and finance.
- Implications on accounting and investor consideration.

10. A company with a PE of 10x buys another with a PE of 7x at a 30% premium. If synergies neutralise all costs related to the acquisition, is the deal accretive or dilutive?

A quick way to find out if the acquisition is accretive or dilutive is to compare the PE of the acquiring company and that of the target. If the PE ratio that the acquirer trades on is higher than that of the target, the deal will be an accretive deal. However, if the proportionate difference between the PE of the acquiring company is lower than the premium paid then the deal is dilutive.

In the above case the PE of the acquiring company is 43% [10x vs 7x (43% = (10/7)-1] higher than that of the target which means the deal will be accretive, despite the 30% premium paid. If the premium paid to acquire the company was more than 43% than the deal will be dilutive, rendering more difficult to sell to shareholders.

11. How does a company fund an acquisition?

- Cash already on the Balance Sheet.
- Stock.
- Debt.
- Combination of the three above.

12. How does an analyst calculate Goodwill using the Purchase Price Allocation method?

Purchase price allocation method of M&A accounting:

Goodwill =

+ Purchase price.

+ FV of previously held Equity interests.

+ Amount of non-controlling interests.

- FV of Target's identifiable net assets.

13. How does an analyst identify an acquirer in a merger?

- Compare the fair values of the two companies.
- Which of the entities is forfeiting its cash or other assets?
- How does the senior management and composition of board look like post acquisition?
- What are the relative voting rights?

14. What are some of the adjustments that need to be made in the real world to find out the accretion/dilution of the deal?

In a real-life M&A model, several adjustments need to be made to get to the combined net income of the companies. These include:

- Synergies.
- Acquisition financing.
- Lawyers and investment banking fees.
- Accounting changes.

15. What accounting changes adjustments does an analyst account for in working out accretion/dilution analysis?

Accounting changes adjustments include:

- Non-cash related items which include incremental D&A, asset write ups, write down: Target's fixed and intangible assets are written up to fair value.
- This typically leads to higher amortisation and depreciation expense in the future for the acquiring company.
- Reduces Proforma (combined) NI and Proforma EPS.
- Creation of goodwill can be the most significant adjustment. May not have an immediate impact on the Income Statement in the short-term.

16. What are synergies in an M&A deal?

Synergies are cost savings that the acquiring companies benefit from when acquiring the target company as it allows it take-out duplicate costs. Duplicate R&D expenses, employee expenses (don't need two CEO's) and closing manufacturing plants are just some of the examples.

17. Given a deal where a financial (Private Equity) and a strategic acquirer (Targets competitor) are fighting it out to acquire the target company, all else being equal, which of the two bidders have more financial fire power and why?

Synergies increase net income. This is a prime reason when deals turn out to be bidding wars between financial-buyers and strategic-buyers, the strategic buyer almost always wins given its ability to pay a higher price due to synergies created.

18. What adjustments will be made to the combined EPS if the acquiring company uses cash on the balance sheet to fund the deal?

If the acquiring company uses cash from the balance sheet to fund the acquisition, the analyst needs to reduce interest income from cash used to acquire the target.

19. Explain the difference between a Stock and an Asset sale.

An asset sale is when the target company writes up the value of the assets on its BS to the fair market value before selling the business.

The acquirer prefers to treat the M&A transaction as an asset sale given it benefits from a higher tangible book value in its tax financial statements allowing it to save on taxes in the future and Goodwill even though goodwill cannot be amortised in its IFRS financial statements they can be amortised in its tax accounts allowing it to save on future taxes

A stock sale is when the target company sells itself without increasing the value of the assets on the BS to its fair value.

The target company prefers a stock sale given tangible assets when written up can attract a higher ordinary income tax rate. The sellers might be double taxed – once for selling the assets to an external company and then again if the shareholders draw that money out from the business.

20. What is a reverse acquisition?

Reverse acquisitions occur when a public listed shell is company acquired by a private company. They allow private companies to list on the public stock exchanges without having to go through the lengthy and painful IPO process which demands a lot of sensitive information to be divulged. To figure out the cost of acquisition use the share price of the listed company as it is difficult to value the private company.