

Technical Questions Guide

2011/12 Edition



University of Cambridge – Finance Department – Mathematics Program

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Answering Technical Questions: Our Initial Tips

- The most important point when answering conceptual/quantitative/technical questions is to voice your thinking. Similar to an exam, an interviewer is likely to give you partial credit (if not significant credit) if you don't answer correctly but if they can listen to your thinking and understand how you dissect problems.
- It is best to try and provide some sort of answer to a question and, as stated previously, articulating your thinking (even if you are unsure of the exact answer) will always help you. The balance to this advice is to ensure you do not ramble with your answer in an effort to try and talk your way out of delivering a direct answer. This will not work and you are likely to only aggravate the interviewer.
- However, if you genuinely do not know the answer to a question, seek further clarification or more information that may help you. If you still don't know, state that you do not know the specific answer to the question and then provide a brief response that looks to address some part of the question.
- It is OK to take a few moments to compose your thoughts but don't take too long or stare blankly at the interviewer.

1. The Basics

1. How does a firm create value?

- A firm creates value by generating return on invested capital, growth, and positive cash flows. A firm should seek to earn a return on its invested capital greater than the opportunity cost of capital. By growing (as long as its return still exceeds cost of capital), the firm creates more value. In doing so, the firm generates cash flows (or “economic profits”).

2. What is a P/E (Price/Earnings) ratio and why do analysts use it? What quantitative and qualitative factors drives the P/E multiple? Explain the difference between two companies with identical earnings but different multiples.

- $P/E \text{ Ratio (or earnings multiple)} = \text{Price of Stock} / \text{Earnings per Share}$
- The P/E multiple is used in comparing the relative attractiveness of stocks.
- It gives investors an idea of how much the market is paying for a company's earning generating capability. For each unit of stock price, a certain amount of earnings is expected. The higher the P/E, the more investors are paying, and therefore the more earnings growth they are expecting. A P/E multiple above 20x generally implies high growth.
- Quantitatively, P/E is moved by changes in share price and earnings through the numerator and denominator, respectively.
- Qualitatively, share price is affected by market perceptions/expectations of risk, growth, quality of earnings (margins), and general investor confidence.

3. Why two companies with identical earnings in the same industry have different P/E multiples?

- Apart from earnings, P/E multiples are also determined by the traded share prices which are due to the different earning growth expectation from investors
- Higher share price indicates a higher earning growth expectation from investors; and a lower share price shows a lower earning growth expectation in the market

4. What do you get when you multiply a firm's Net Income by its P/E ratio?

- Market capitalization.

5. What is EBIT?

- EBIT refers to earnings before interest and taxes. EBIT is an approximate measure of operating income and a common measure of operating comparability. Because EBIT doesn't include interest or taxes, it provides a measure of income independent of the firm's capital structure.

6. What is EBITDA?

- EBITDA refers to earnings before interest, taxes, depreciation and appreciation. EBITDA is an approximate measure of free cash flow – but it does not measure actual free cash flow. By excluding interest and taxes (effects of capital structure) as well as depreciation and amortization (noncash expenses), EBITDA gives a sense of a company's ability to generate profits.
- EBITDA is widely used in financial analysis and valuation. For example, EV/EBITDA is a common used valuation multiples in many sectors. EBITDA margin is also a popular ratio when analysts analyse a company or sector's profitability.
- Also, EBITDA is also widely used in a company's credit analysis. For instance, interest coverage ratio (EBITDA/interest expense) represents a company's ability to pay interest to its creditors. The definitions of those credit ratios are covered by this guide
- EBITDA excludes capital expenditures, working capital needs, dividends, and principal repayments on debt. This can lead to distortions in different industries, for example telecom In order to get to a true free cash flow, one would need to account for the above inflows/outflows of cash.

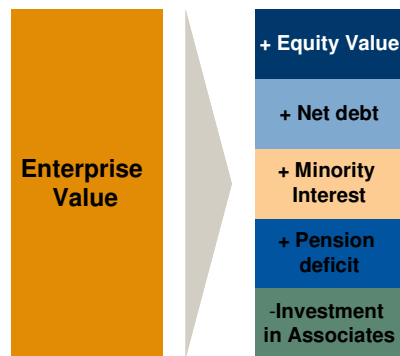
7. What is the Capital Asset Pricing Model?

- CAPM is a model designed to find the expected return on an investment and therefore the appropriate discount rate for a company's cash flows. It is a linear model with one independent variable, Beta.
- CAPM divides the risk of holding risky assets into systematic and specific risk. To the extent that any asset is affected by general market moves, that asset entails systematic risk. Specific risk is the risk which is unique to an individual asset. It represents the component of an asset's volatility which is uncorrelated with general market moves. According to CAPM, the marketplace compensates investors for taking systematic risk, but not for taking specific risk.
- CAPM considers a simplified world where there are no taxes or transaction costs. All investors have identical investment horizons. All investors have identical perceptions regarding the expected returns, volatilities and correlations of available risky investments.

8. What is the difference between Equity and Enterprise Value?

- Equity value (market value, market capitalization) is the stock price of a firm multiplied by the shares outstanding.
- Enterprise Value (aggregate value, total value) includes the market value of the equity and the value of net debt (total debt minus cash). For example, a firm with 100,000

diluted shares outstanding (see explanation in question 14 this chapter), a stock price of \$2.00 per share, debt of \$50,000 and \$10,000 in cash has an enterprise value of \$240,000. (Enterprise value also includes preferred stock, unfunded pension liabilities and minority interest). The graph below indicate the relationship between Enterprise Value and Equity Value:



- Enterprise value reflects the discounted future cash flows to all claimants, whereas equity value reflects the discounted future cash flows only to equity holders.

9. Would you use Enterprise Value/Net Income as a multiple?

- No. When using earnings or revenue related ratios, total value to investor base (numerator) should be matched with potential cash available to them (denominator). Hence, enterprise value, which includes both debt and equity, should be taken as a multiple of earnings before interest is extracted. Similarly, when calculating equity/market value ratios, denominator should be earnings available to equity holders, i.e. earnings after interests have been extracted.

10. If one of your clients had extra cash, how would you tell them to invest it?

- Generally speaking, there are two ways to invest with extra cash: invest them in positive NPV projects (including acquisitions, capital expenditures, and research and development) or return the money to stakeholders in the form of share repurchases, dividends, and debt repayments. Considerations include the cost of debt, the cost of equity, deviation from optimal WACC levels, and tax considerations.
- What constitutes “excess” cash is a subjective question. In cyclical industries, for example, paying out large amounts of cash may leave the company unprepared for a subsequent downturn.

11. In a perfect (tax free) world, if you have a company with an enterprise value of \$5bn and you take out \$2bn in debt, what is the new enterprise value? What is the enterprise value if you subsequently use the \$2bn to pay out a dividend? What is the enterprise value if instead of paying out the dividend you invest the \$2bn in a new project with an NPV of \$3bn?

- When you answer enterprise value related question, remember the Enterprise Value and Equity Value chart we showed above

- Issuing the \$2bn in debt increases cash by \$2bn but also increases debt by \$2bn. Cash and debt net out. Thus firm value remains the same at \$5bn.
- Paying out a dividend of \$2bn eliminates cash on the balance sheet and, in doing so, eliminates \$2bn in equity value. Thus firm value remains the same at \$5bn.
- Using the \$2bn to invest in a project with an NPV of \$3bn increases the enterprise value of the firm by the investment amount (\$2bn) and the investment's NPV (\$3bn). Thus firm value is \$10bn.

12. What is the difference between common stock and preferred stock? How do they trade relative to each other?

- Preferred stock, similar to debt, is guaranteed a dividend. Common stock is not. Preferred stock also has a priority over the company's assets versus common stock. As a result, preferred stock trades at a premium. Another key difference is that common stock has voting rights, whereas preferred stock does not.

13. What is the calculation for EPS? Does that include preferred stock? What about convertible bonds?

- Net Earnings-Per-Share (EPS) is the portion of a company's net earnings allocated to each share of common stock. It is calculated by dividing net earnings by common shares outstanding adjusted for the assumed conversion of all potentially dilutive securities.
- EPS does not include preferred stock.
- Securities having a dilutive effect may include convertible debentures, warrants, options, and convertible preferred stock.

14. How do you calculate fully diluted shares in order to calculate fully diluted EPS?

- Fully diluted EPS is net income / fully diluted shares. Fully diluted shares include convertible debt, outstanding options, warrants or stock appreciation rights.
- Bankers normally use the Treasury Stock Method ("TSM") to calculate fully diluted shares and additional equity value.
- TSM assumes that the proceeds from options and warrants exercised are used to repurchase outstanding ordinary shares in order to mitigate dilution
- For example, the ordinary share price is traded at \$50 and there are 1,000 shares of options with an exercise price of \$45 (you can buy the shares at \$45 per share and the shares are traded at \$50 per share in the market). In this scenario the option is "in the money" (you earn money or profit if you exercise) and is expected to be exercised.

Under TSM, the additional shares (diluted shares) are: $1,000 * (\$50 - \$45) / \$50 = 100$ shares

- The additional equity is $100 * \$50$ or $1,000 * (\$50 - \$45) = \$5,000$

15. What happens to EPS when a company repurchases its stock?

- All else remaining the same (i.e. earnings level stays same, debt level is not increased, etc.), EPS will increase as total number of shares outstanding decreases. If debt had been issued to repurchase stock, EPS change depends on interest expense relative to net income, vs. shares repurchased relative to shares outstanding.

16. If a company with EPS of \$1.00 pays all cash to buy another company with EPS of \$0.50, why is the EPS of the combined company not \$1.50?

- The earnings can be added, but the shares cannot. The exchange ratio of the shares will determine the denominator and EPS could be \$1.50, or accretive or dilutive.

17. What is Cash EPS? Why is it used on some industries?

- Cash EPS is a measure of financial performance that looks at the cash flow generated by a company on a per share basis. The higher a company's cash EPS, the better it is considered to have performed over the period.
- $\text{Cash EPS} = \text{Operating Cash Flow} / \text{Diluted Shares Outstanding}$
- Cash EPS is used in industries that rely heavily on stock options (like technology) because of SEC requirements that firms expense stock options. As a result, Net Income is decreased by a non-cash expense which is adjusted under Cash EPS.

18. Credit ratios: what is an interest coverage ratio? What is a leverage ratio? What do you use them for?

- By definition, interest coverage ratio is $\text{EBIT} / \text{net interest expenses}$. In practice, an $\text{EBITDA} / \text{net interest expenses}$ are more widely used and it is one of the conventions credit rating agencies are looking at. Interest coverage ratio is one of indicators about a company's ability to pay back debt. Creditors have a high comfort level with companies with a higher interest coverage ratio that can easily service debt interest payments.
- Any ratio used to calculate the leverage of a company is to get an idea of the company's methods of financing or to measure its ability to meet financial obligations. There are several different ratios, but the main factors looked at include debt, equity, assets and interest expenses

- The most well known leverage ratio is the Net debt / EBITDA. For example, if a company has \$50m total debt, \$10m cash and \$20m EBITDA, the ratio is 2.0x $(\$50m - \$10m) / \$20m$
- Another often used leverage ratio is debt-to-equity ratio. For example, if a company has \$10m in debt and \$20m in equity, it has a debt-to-equity ratio of 50% $(\$10m / \$20m)$.

19. What are other credit ratios?

- Another important debt ratio is debt service coverage ratio (DSCR) or cash coverage ratio. DSCR is the ratio of cash available for debt servicing to interest, principal and lease payments. It is a popular benchmark used in the measurement of a company's ability to produce enough cash to cover its debt (including lease) payments. The higher this ratio is, the easier it is to obtain a loan
- The calculation is

$$\text{DSCR} = (\text{Annual Net Income} + \text{interest expenses} + \text{Amortization/Depreciation} + \text{other non-cash and discretionary items (such as changes in net working capital, net Capex investment)} + \text{additional debt}) / (\text{Principal Repayments} + \text{Interest payments} + \text{Lease payments})$$

20. Why might a company be trading at a lower EV/EBITDA multiple than its competitors of the same size in the same industry?

- This question is designed to test your knowledge of what impacts market cap and EBITDA. Some answers could be:
- Differences in cash items below the EBITDA line: capital expenditure and tax (different tax regimes)
- Different growth profiles of industry sub sectors
- Different growth profiles of the company itself (one is a up and coming leader, the other one is a declining incumbent)
- Difference in stock liquidity (i.e. one company has very thin free float)
- Potential takeover premium
- Management instability

21. If you have a company with negative EBITDA but positive gross margin, how would you value that company?

- A negative multiple is meaningless and should use EV / Sales multiples instead. It is common in high technology companies which produce negative EBIT and EBITDA during its high growth period
- Alternatively, you should use fundamental valuation method, i.e. DCF to value the company

22. How would you adjust the enterprise value for a company with significant unfunded pension liabilities? Would the firm's new EV/EBITDA multiple be comparable to other firms? What adjustments would you make to EBITDA to create a comp?

- Unfunded pension liabilities are debt-like because a company with a pension deficit must find extra funding to get rid of the liabilities. The EV/EBITDA multiples of two firms excluding unfunded pension liabilities are not comparable even they have same borrowing and market capitalisation but with different scale of pension deficit obligations.
- As a result, when you use EV/EBITDA as a comparable between firms, you should always adjust the EV by adding unfunded pension liabilities. It means the EV = Market capitalisation + total borrowing debt + pension liabilities (deficit) – cash & cash equivalents – investment in associates

23. In a world with taxes, if you issue debt for \$100 and pay it out as a dividend how does it affect your enterprise value?

- Enterprise value is discounted un-levered cashflow to the firm as a whole.
- If there is no tax there is no impact on the enterprise value. When the company issues debt, both debt and cash are going up, there is no effect. Paying dividend is cash getting out so equity down but offset by increased net debt so there is no effect either
- However, in a tax environment, there will be tax shield related to the additional debt. When new debt is issued the company has to pay higher interest which will offset net income, as a result lower tax. The tax shield is $\text{Debt} \times \text{interest rate} \times \text{tax rate}$. Tax shield will add more value on the company.

24. What metrics can you use to measure a company's risk? It's growth? It's profitability?

- Growth in sales, earnings, EBITDA, assets
- Profitability: gross margin, EBIT/EBITDA margins, profit margin
- Risk: depends on what definition of "risk" is. Could be volatility of sales and earnings, looking at the beta, level of debt, nature of the industry (i.e. technology industry is more volatile), etc.

25. What are the two methods of valuing a traditional option? What factors are considered? What is the difference between a put and a call?

- The two methods are Black-Scholes and the binomial model.
- The inputs are:
 - Current Share Price
 - Exercise Price
 - Time To Maturity
 - Risk Free Rate
 - Variance of Return on the Stock
- A call is an option to buy, a put is an option to sell.

26. What is an “exchange ratio” in a merger?

- Exchange ratio represents the number of acquiror shares a target receives for one target share
- The ratio is calculated by dividing the offer price per share for the target’s stock by the acquiror stock price and usually expressed out to 4 decimal places, i.e. x.xxxx

2. Valuation Questions

1. How would you value a company?

- There are five common valuation methodologies.
 - Trading Multiples (the range the stock has been trading in during the past 52-weeks). If we trust the market we should assume this is a reasonable place to start our analysis.
 - Public Comparables looks at peer companies to determine how the market values companies in the same or similar businesses using multiples including P/E and EV/EBITDA.
 - Precedent Transactions looks to see how much acquirer recently paid for similar businesses.
 - Discounted Cash Flow (DCF), also called Intrinsic Value, seeks to find a present value of all future cash flows of the firm that are available to stakeholders. This can be done using WACC or APV.
 - Discounted Dividend Model (DDM) valuing a company's equity value by the sum of its future cash flows discounted by the required rate of return. Future cash flows include dividends and the equity value of the company when it is sold. The DDM valuation is the intrinsic value of the company. If the company pays no dividend during the valuation period, then the expected future cash flow is the sale price of the company only
 - Asset Value, also called liquidation or breakup value, examines what you can sell the company's assets for (including real estate).
- In addition, valuation can be framed through: Leveraged Buyout looks at what a financial sponsor could pay considering a target IRR and the debt capacity of the firm.
- If there is no financial available and bankers also use industry specific multiples to value a company, e.g. EV/subscribers, EV/stores, EV/length of networks, etc.
- Merger Consequences Analysis is actually an affordability analysis (what can an acquirer pay) rather than an analysis of the value of a target.

2. What kind of valuation methodology you should use if you are doing an IPO for a client?

- Mainly trading multiples and can cross check with DCF
- Trading multiples includes currently peer group EV/EBITDA and P/E multiple
- Historical 5-10 year peer group trading multiples can be used as well
- No transaction comparables and LBO needed in an IPO situation

3. What approach you would use to value a target company?

- A football field is the common method to value a company
- Within a football field, you can use current trading multiples (EV/EBITDA, P/E, etc.), comparable transaction multiples (EV/Last 12 month EBITDA, etc.), DCF, LBO and sum-of-the-parts
- The final valuation range will be based on the value range derived by above different methodologies
- For a public listed company, bankers often get the share price range based on above approach and compare to what the current trading share price. Then they will propose different strategic views

4. How do you value a company's break-up value (assume the company has different divisions)?

- Sum-of-the-parts valuation methodology (SOTP)
- First of all, value each division of the company through different methodologies to get a football field range, i.e. same approach in question 3
- Next, add value of different division to get the valuation for the whole company (SOTP)
- Third, do the same valuation exercise on the company as a whole and also get valuation range
- Compare SOTP and the whole company's value to reach your conclusion; break-up value does exist if SOTP has a significant valuation range than the whole company's valuation

5. Which of the valuation methods will tend to lead to the highest valuation?

- Precedent Transactions tend to lead to the highest valuations because it includes not only the stand alone value of the business but also synergies expected in the transaction as well as any premium paid for achieving control.
- DCF, on the other hand, will factor in management's sometimes optimistic forecasts for future growth. In fact, some would put DCF as the highest valuation if management has particularly rosy scenarios and includes synergies.
- Trading Multiples will tend to lead to the lowest valuations because they involve the market's expectations.
- In recent times, LBO has decreased its ranks of valuation analysis due to the difficult debt market and higher equity return requirement by the financial investors.

6. Which method of valuation is most robust? What are the pluses/minuses of each method?

- Discounted Cash Flow is the theoretical intrinsic value of the firm: looking at the actual, unlevered cash flows. It is an objective calculation that is always attainable. It takes into account the synergies and tax benefits of the capital structure and shows the maximum an acquirer should be willing to pay. DCF is limited by the extreme subjectivity of its inputs. There is high sensitivity to changes in growth and profitability forecasts, as well as discount rates. Another limitation is that most DCFs in banking are done with WACC, which doesn't allow for varying debt levels and costs.
- Trading Multiples or Public Comparables have as their advantage that they focus on companies with similar operations and financial situations allowing for relative, market oriented comparisons. Their disadvantages are that they rely on publicly available information, are subject to changes in market conditions, and are often not "pure" comparables because of differences in businesses even in the same industry.
- Precedent Transactions requires identifying similar transactions or firms and then using various ratios to see how much the target firm should be worth. Acquisition Comparables have the same drawbacks as Public Comparables exacerbated by the possible lack of comparability in synergies and control premiums. Market conditions at the time of the transaction and any special conditions should be taken into consideration.
- Leveraged Buyout is essentially a DCF with special conditions.

7. What is unlevered free cash flow (FCF)?

- FCF represents the cash that a company is able to generate after laying out the money required to maintain or expand its asset base. Unlevered FCF excludes the net cash flow from financing activities. FCF is important because it allows a company to pursue opportunities that enhance shareholder value. Without cash, it's tough to develop new products, make acquisitions, pay dividends, and reduce debt.

8. Why does DCF use unlevered cash flow?

- DCF uses unlevered cash flows because these are cash flows that are generated by the firm's real assets. Financing is considered in subsequent steps when discounting using either WACC or using the APV method. Therefore if we were NOT using unlevered cash flows, when discounting these cash flows using WACC we would be "double-counting" the refinancing effect.

9. How do you calculate unlevered free cash flow (FCF) starting from Net Income?

- $\text{Net income} + \text{Interest expense} \cdot (1-t) + \text{depreciation} - \text{Capex} - \text{investment in working capital} = \text{FCF to firm} - \text{interest expense} \cdot (1-t) - \text{principal repayments} = \text{FCF to equity}$

10. How do you calculate unlevered free cash flow (FCF) starting from EBITDA?

- $\text{EBITDA} \times (1-t) + \text{depreciation} \times t - \text{Capex} - \text{investment in working capital} = \text{FCF to firm}$
 $\text{interest} - \text{principal repayments} = \text{FCF to equity}$

11. What is a Terminal Value? How do you calculate it?

- Terminal value (TV) refers to the value at the end of a given projection period.
- Terminal Value can be calculated in four ways (the first two are by far the most common):
 - Perpetuity Growth, also called the Gordon Growth model, takes the last year's normalized net cash flow in the terminal year, multiplies it by $1 + \text{growth rate}$ and then divides by the discount rate minus the perpetual growth rate. $(\text{CF} \times (1+g)/(k-g))$. Perpetuity Growth is, of course, highly sensitive to its input assumptions. The perpetual growth is usually calculated as being somewhere between inflation and GDP growth (2-5%).
 - EBIT or EBITDA multiple. Assumes that the perpetual value will be in line with the multiple of the terminal year, or often even the current year. Using multiples takes out the uncertainty of determining future growth rates. Additionally, multiples are more relevant when anticipating sale of company to public markets – they project investors' willingness to pay relative to earnings. They must be used with particular care in cyclical industries.
 - P/E multiple of the net income of the terminal year, assuming the company will be worth the same multiple of its future earnings going forward. This approach is complicated by the difficulty of determining the appropriate P/E in the future.
 - Liquidation Value in the terminal year.

12. What percent of total DCF value is usually in the Terminal Value? What proportion did the Terminal Value contribute to the Enterprise Value? Why? What concerns are there?

- The amount of the enterprise PV in the terminal value depends on the length of the forecast period and the growth rate of the cash flows. The longer the forecast period, the smaller the percentage in the terminal value. At the same time, the more growth that is assumed, the farther the value is pushed into the future.
- Terminal value is usually the majority of the total value, and often three quarters of the value. The larger the terminal value becomes as a percentage of total value, the more sensitive a DCF valuation is to its assumptions, hence the difficult in using it with high growth firms.

13. What is WACC? How would you calculate it?

- WACC is the Weighted Average Cost of Capital. It is the tax-affected, capital structure weighted, opportunity cost of capital.
- WACC is used as the discount rate for assigning present values to future, unlevered free cash flows to all stakeholders. In capital budgeting, it is used to find the NPV for a project.
- $WACC = \text{Debt} / (\text{Debt} + \text{Equity}) * \text{Return on Debt} * (1 - \text{tax rate}) + \text{Equity} / (\text{Debt} + \text{Equity}) * \text{Return on Equity}$
- $\text{Return on Debt} = \text{Yields implied by the trading price of a company's outstanding debt}$
 $\text{Return on Equity} = \text{Risk Free Rate} + \text{Beta} * (\text{Market Premium} - \text{Risk Free Rate})$
- $\text{Capital Structure} = \text{Debt} / (\text{Debt} + \text{Equity})$: Since capital structures change over time, it is usually not based on a company's current structure, but rather some target capital structure, often derived from examination of the industry average.

14. Why do you have a (1-T) in WACC?

- Interest paid on a firm's borrowings can be deducted from taxable income (the interest tax shield) and must be accounted for.

15. What is Beta? How and why would you "un-lever" it?

- Beta is a measure of systematic risk: the sensitivity of a security's return in relation to the market. If a stock has a beta of more than 1, it means that it is more volatile, or "swings" more than the market. If a stock has a beta of 1, it moves in unison with the market (an S&P 500 index fund, for example, move close to identically as the market as a whole). If the beta is less than 1, the stock moves less than the market. For example, a portfolio which has a beta of 0.5 will tend to participate in broad market moves, but only half as much as the market overall.
- Stocks with higher betas have higher risk and also tend to have higher returns over time. Basically, a stable blue-chip would have a beta of close to 1, where a semiconductor firm might have a beta of more than 1.
- For firms or divisions that are not publicly traded, beta can be estimated from the betas of comparable firms. In order to account for differences in leverage, however, the betas of the comparable firms need to be unlevered, averaged, and then re-levered using the capital structure of the firm the beta is being estimated for.
- Beta can be unlevered using the following equation:

$$BU = BL / (1 + (1-t)*(D/E))$$

- And re-levered using this one:

$$BL = BU (1 + (1-t)*(D/E))$$

16. Walk me through a DCF valuation. How do you estimate costs of financial distress?

- Step 1. Look at the financial statements to obtain information regarding EBITDA, depreciation, capital expenditures (Capex), changes in net working capital (NWC), book value of debt and equity, etc.
- Step 2. Determine the future free cash flow. Free cash flow (FCF) is the net cash flow available to stakeholders after paying for future investments.
 - FCF can be calculated as EBITDA – D&A – taxes + depreciation – Cap Ex - increase in net working capital. (To get to FCF just for equity holders, also subtract interest and principal repayments.)
 - FCF can also be calculated as Net Income + interest expense * (1-t) + D&A – Capex – increase in net working capital. (To get to FCF just for equity holders, also subtract interest expense (times 1-t) and principal repayments.)
- Step 3. Determine the discount rate. The discount rate is determined differently in the two ways to calculate the DCF: the Adjusted Present Value (APV) method and the Weighted Average Cost of Capital (WACC) method. The difference lies on how the tax shield effect is accounted for when calculating NPV. Because interest expense is tax deductible, companies gain some benefit by issuing debt for their financing needs. WACC accounts for this benefit directly in the discount rate while APV accounts for this benefit in the cash flow calculations while holding the discount rate the same as an all-equity financed firm.

Taking into account the tax shield, the WACC is calculated as:

$$WACC = R_d(1 - t) \frac{D}{V} + R_e \frac{E}{V}$$

where R_d is the required return on debt and R_e is the required return on equity. D , E and V are the market values of debt, equity and the total value of the firm, respectively. t is the corporate tax rate.

In the APV method, the discount rate will just be the rate for the all-equity financed firm, which can be calculated using CAPM.

- Step 4. Determine the terminal value. When we assume that the company is an ongoing concern, we need to make an assumption about all future cash flows beyond the point we have data. We therefore can take the last time period's cash flow (the last year for which we have data) and assume an annual average growth rate for the cash flow.

The terminal value in that time period is therefore

$$FCF \cdot (1+g) / (r-g)$$

where g is the assumed terminal average growth rate of cash flows, and r is the company's discount rate. In the WACC method, it is the WACC. In the APV method, it is the unadjusted firm discount rate. What is an appropriate value of g to use?

- Step 5. Calculate the company's net present value.
 - Using the WACC method, we can discount the FCFs and the terminal value by the calculated WACC to obtain the NPV. Using the APV method, we need to add the PV of change in the financing decisions to the NPV of an all equity firm. We therefore need to add the tax shield to the cash flows and terminal value and discount them using the discount rate for the all-equity firm.
 - Financial distress occurs when a company has difficulty or is unable to pay back loans/interest. Financial distress is costly. Investors know that levered companies may fall into financial distress and they worry about it. That worry is reflected in the current market value of the levered company's securities. Thus the value of the company can be broken down into three parts:
 - Value of company = value if all-equity-financed + PV(tax shield) – PV(costs of financial distress)
 - Therefore the cost of financial distress can be estimated from the difference between the sum of the value of an all equity company and the PV of tax shield and the current value of the company.

17. How do you perform a public comparable valuation? How do you choose a comparable peer group?

- Identify peer companies. You would do this by looking at companies with similar operations (products/services, customers/clients, distribution, and geography) and financial aspects (size). You would get this information from the following sources:
 - Previous analyses of other bankers – public filings (especially fairness opinions)
 - Annual reports and company presentations, competition section (10-K or IPO prospectus)
 - Research reports, credit rating reports, Bloomberg
 - Industrial classification screen from database (Capital IQ), Factset
- Good comparables have similar operational and financial aspects. That is, they are comparable in terms of size, risk, and growth. In particular, they are from the same or

similar businesses, are in the same size range (market cap, revenues), have similar growth expectations, and similar capital structures.

- Once you have identified your peer group then you need to get their financials:
 - 10K or annual report from latest fiscal year
 - 10Q or quarterly reports from latest quarter (or more recent press release with financial details)
 - Research and EPS estimates (Thomson Financial First Call, Reuters Estimates, Factset, Capital IQ)
 - Share price (and latest dividends)

18. What are some common ratios used to compare equity performance?

- Price / EPS
- Market Value / Net Income
- Market Value / Book Value
- Price to Earnings / Growth Rate ("PEG Ratio") – applying growth to a multiple

19. What are some common ratios used to compare enterprise performance?

- EV / EBITDA
- EV / EBIT
- EV / Sales (generally only appropriate for volume driven businesses or those with negative earnings)

20. Discuss APV vs. WACC.

- WACC and APV are slightly different valuation methodologies for doing a DCF. Bankers essentially use WACC in most situations, in practice.
- WACC is based on a firm's current capital structure. It explicitly adjusts for the capital structure by incorporating tax shields into the discount rate, which can be seen clearly in the WACC formula. WACC's limitation is that it gives less accurate results when the business risk and debt ratio are expected to change.
- APV looks at tax shields separately from other effects. This allows risk and debt to change over time by treating financing effects separately. This is important for highly leveraged, complex, or changing capital structures. The APV discount rate is

calculated by using the CAPM to determine the return on equity based on the firm's unlevered beta.

21. How do you value a private company?

- Valuation for a private company is the same as the valuation of a public company with some complications, particularly as it relates to DCF. Because a private company has no publicly traded equity, a beta cannot be directly computed.
- To find R_e :
 - Estimate the total value of the private company based on comparables (use average EV/EBITDA).
 - Deduct the value of debt to get estimated "market" value of equity.
 - Get the average levered beta from the comparables and un-lever it.
 - Re-lever the beta for the private company based on target D/E.
 - Calculate R_e based on CAPM.
- To find R_d :
 - Some private companies have publicly traded debt - so look up trading yields to estimate R_d .
 - Alternatively, estimate what the credit rating of the private company would be based on comparables (look at credit statistics).
 - For estimated credit rating, use current market yields for similarly rated companies to determine R_d .
 - Finally, estimate R_d through dividing interest expenses (on P&L) by total debt (Balance Sheet)

- Calculate WACC as normal.

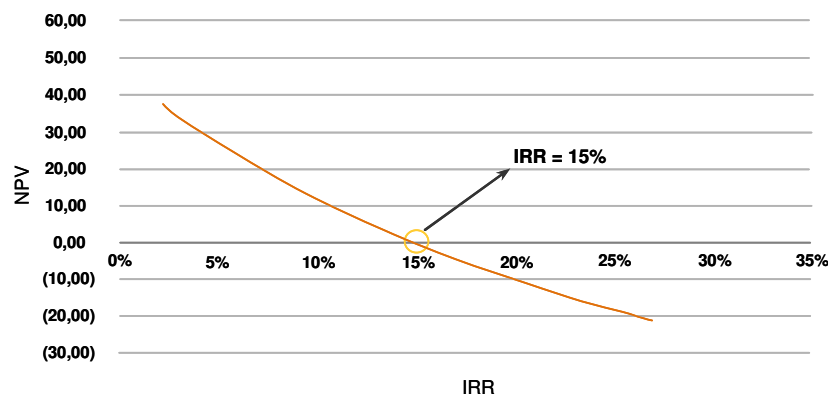
22. Why are some stock options relevant to valuation?

- Unexercised, in-the-money options represent implicit equity value not reflected in the current market cap but that should be included.

23. Explain the difference between WACC and IRR.

- WACC is the cost of capital of the firm. It is a combination of cost of equity and cost of debt

- IRR is a target rate of return for the firm, which is not related to its capital structure. IRR is the annualized effective compounded return rate that can be earned on the invested capital. In more familiar terms, the IRR of an investment is the interest rate at which the costs of the investment lead to the benefits of the investment. This means that all gains from the investment are inherent to the time value of money and that the investment has a zero net present value at this interest rate.
- The IRR can be illustrated as below:



24. For a stable, mature company, if you use an EBITDA multiple to calculate Terminal Value, will the multiple be high or low?

- Low or industry average.

25. Walk me through how would you would calculate your Present Value. What is your beta? What rate would you use to discount yourself? Give me an idea of the projections for your cash flows.

- This is a very open question, which not only requires understanding of DCF but also some creativity. You will also need to explain your future career path, so this could potentially be a tricky one. Sample answer could be:
- Project your future earnings until retirement age. Take you expected salary, growing faster until 35-40 and then gradually maturing as you become senior and your position more stable.
- Discount rate: based on your "riskiness". If you work for government, take the risk free rate as your earnings are basically guaranteed. Working for a bank, add a premium.
- Terminal value: take your pension earnings and calculate the perpetuity value of those cash flows. Or, take average life expectancy and discount those cash flows from retirement age to expected death age. Since earnings are guaranteed by the government, used the risk free rate.

26. What levers on a DCF can be manipulated to change its outcome?

- Cashflow: EBITDA, Capex, change in working capital, tax rate
- Terminal value: terminal growth rate or exit multiples
- Valuation forecast: forecast length, WACC (i.e. risk free rate, risk premium, debt premium, etc.)

27. How would you value an asset management company?

- Multiples: an asset management company is not a manufacturing business and EBITDA is less meaningful. Typically asset management companies earn fees or the size of assets they manage so a multiple of assets under management would make sense.

28. How would you value a supermarket?

- Multiples of other supermarket companies: key issue is to adjust for potential difference of leasing vs owning the supermarkets (use EBITDAR multiples, not EBITDA)
- DCF

29. How do you value a diversified industrial conglomerate?

- A method called “sum-of-the-parts” (“SOTP”) can be used. Under SOTP, each division of the business is valued by one of the following valuation methods and then we add up the value of each division. The valuation for each division include:
 - Multiples: use EV/EBITDA or P/E for its each division business and add them up
 - Fundamental: do DCF for each business division and add them up
- We can also use LBO to value the company. However, the cashflow underpin the LBO is based on the consolidated level, which means the cashflow is the sum of all the divisions

30. How would you find the appropriate discount rate for an internet based retailer?

- Risk free rate: Medium to long term government bond
- Levered beta: first of all, use betas for current traded companies in the same sector (e-commerce) to de-lever to asset beta. Then relieve the asset beta based on assumed target company capital structure to get re-levered beta
- Risk premium: the difference between average return from traded companies and the risk free rate

- Point out the different in growth of internet companies vs. traditional “brick and mortar” retail business.

31. Of the three valuation methods, which one is most appropriate for a biotech firm?

- One could argue that a biotech company would typically not be profitable in its early stages, and future cashflows are highly unpredictable. Therefore comparable multiples would probably be a better estimate.

32. How do you treat deferred taxes in a DCF?

- Deferred tax is not included in the DCF cashflow calculation and only cash tax (tax paid by cash) is taken into account.

33. How would you find the cost of equity for an Indonesian company? What drives the cost of equity rate?

- The dimensions within cost of equity include risk free rate, levered beta and risk premium
- Risk free rate: 10 year Indonesian government bond
- Levered beta: first of all, use betas for current traded Indonesian companies in the same sector to de-lever to asset beta. Then re-lever the asset beta based on assumed target company capital structure to get re-levered beta
- Risk premium: the historical difference between average return from traded Indonesian companies and the risk free rate

34. You have a cable company and a law firm; describe some of the differences between them, particularly with respect to valuation and capital structure.

- A cable company would have higher debt levels (because it is an asset based business), have higher capital expenditure requirements (to upgrade and expand the network).
- A law firm will not have many assets (maybe just a few buildings) as it is a people business. They would not have much Capex and typically would have higher margins. You would expect staff costs to be significantly higher. Because a law firm doesn't have many assets, it would probably have little or no debt at all.

35. What does net debt include? Does it include minority interest?

- Net debt includes: long-term and short-term financial debt; capitalised operating leases (normally 6-7x of operating lease or rent expense from P&L)
- Net debt DOES NOT include minority interest, which is part of equity value.

3. Merger and Acquisitions Questions

1. Why would two companies merge? What major factors drive mergers and acquisitions?

- Mergers are driven by three main factors: revenue synergies, cost synergies, and strategic concerns.
 - Revenue synergies include gaining access to new markets for existing products, broadening of product lines, gaining market share in the same market, cross selling products to customers, locking in customers through vertical integration, creating network effects, or enhancing brand recognition.
 - Cost synergies include economies of scale and scope and reduced overhead costs like administration, IT, and rent.
 - Strategic concerns include preventing competitors from entering a market, defending against being acquired, and diversification.

2. What are the criteria to consider when advising a client on whether to make an acquisition or not?

- The most fundamental consideration is whether the transaction increases shareholder value ($NPV > 0$). Primary considerations are financial and strategic.
- Financial considerations include EPS accretion/dilution, ability to finance the acquisition, impact on margins, tax implications, and cost of capital concerns.
- Strategic considerations include growth in market share, industry trends, vertical integration, leadership and management concerns, technology, and the regulatory and political environment.

3. What is the typical M&A transaction process?

- Assess goals & objective of M&A
- Consider impact on acquirer: valuation, deal structure, financing, tax implications, post-merger integration
- Evaluate impact on regulatory & competitive environment

4. Company A wants to buy Company B for \$400m cash, the maximum they think it is worth. Under what circumstances might Company A agree to pay \$430m in a stock transaction rather than a cash one?

- Alternative 1: If Company A and B agree to convert the deal from cash deal to stock deal and Company A and B have different perspectives on the value of Company A. Company A expects that the post-merger value of Company A would be lower than Company B does.

- Alternative 2: Company A uncovers more additional synergies.
- Alternative 3: Company A faces unexpected increase in profit and expects that Company B would record in loss. So the merger would bring more than \$30m in tax benefits to Company A. For example, Company A has \$400 m in earnings before tax and Company B has a \$200m loss in earnings before tax then Company would get \$60m in tax benefits (assuming a tax rate of 30%).
- Alternative 4: If Company A and B agree to convert deal from cash deal to stock deal and shareholders of Company B expects to get capital gains by selling Company B, the Company B shareholders' marginal tax rate would change from 30% (ordinary income marginal tax rate) to 20% (capital gains tax rate for the selling stock at the market). So there is a room for further negotiation.

5. What is a fairness opinion? Why are past prices important in compiling one?

- A fairness opinion is a professional opinion issued by an investment bank used for guidance in a merger, takeover, or acquisition. Past prices of relevant companies in similar transactions give you a benchmark to determine fair value for a company.

6. What are some common hostile takeover defence tactics?

- Massive share repurchase (spend cash, decrease available shares)
- Poison Pill (allows target to issue new shares that can be redeemed at a premium after the takeover thus diluting the shares of the acquirer.)
- White knight (find another buyer)
- Leverage buyout
- Restrictive charter
- Tiered board election
- Greenmail (buy shares back from acquirer at a premium – not preferred)

7. If I have a company with three divisions whose stock price is depressed because of the underperformance of one of the divisions, what are five things I could do to improve the stock price?

- Spin off the division
- Reduce costs of that division
- Shut down the division
- Restructure the company

- Modify accounting methods for the third division (i.e. alter depreciation schedule or inventory recognition method – not preferred)

8. What are the pros/cons on a stock vs. cash acquisition?

- There are three ways in which a firm can use equity in a transaction. The first is to use cash balances that have been built up over time to finance the acquisition. The second is to issue stock to the public, raise cash and use the cash to pay for the acquisition. The third is to offer stock as payment for the target firm, where the payment is structured in terms of a stock swap – shares in the acquiring firm in exchange for shares in the target firm.
- A variety of factors need to be considered including competing bidders, taxes, the relative pricing of the securities, dilution, and regulatory issues.
- The question of which of these approaches is best utilized by a firm cannot be answered without looking at the following factors:
 - The availability of cash on hand: Clearly, the option of using cash on hand is available only to those firms that have accumulated substantial amounts of cash. Large cash deals also raise financing and capital structure issues (i.e., too much debt vis-à-vis equity).
 - The perceived value of the stock: When stock is issued to the public to raise new funds or when it is offered as payment on acquisitions, the acquiring firm's managers are making a judgment about what the perceived value of the stock is. In other words, managers who believe that their stock is trading at a price significantly below value should not use stock as currency on acquisitions, since what they gain on the acquisitions can be more than what's lost in the stock issue. On the other hand, firms that believe their stocks are overvalued are much more likely to use stock as currency in transactions. The stockholders in the target firm are also aware of this, and may demand a larger premium when the payment is made entirely in the form of the acquiring firm's stock.
 - Stock deals are tax advantageous to sellers because capital gains taxes are deferred until the acquired shares are sold.

9. What are the pros and cons of a purchase of a target's assets as opposed to a target's equity?

- There are two key issues: taxes and risk.
- A stock purchase is preferred by sellers because the buyer pays the taxes in the future on the assets. The seller also transfers all real and contingent risk to the buyer.

- An asset purchase is more favourable to the buyer for tax purposes because it is taxable for the seller but deductible for the buyer because of depreciation. It also allows the buyer to pick and choose what it wants to acquire, including avoiding some liabilities (such as environmental damages or pending litigation) to minimize risk.

10. Who would pay more to acquire a company - a financial buyer or a strategic buyer? Why?

- Strategic buyers are often willing and able to pay more for a company than financial buyers. Strategic buyers may be able to realize synergistic benefits almost immediately due to economies of scale that may exist through the combined purchasing power of the new entity and the elimination of duplicate functions. The better the fit (i.e., the more realizable the synergies are), the more they will want the business and the greater the premium they will pay.

11. What advantages do financial buyers have?

- PE firms have greater ability to take on debt because their cost of debt is lower.
- Because PE firms seek to maintain management in place, they often create incentives for insiders to favour them over strategic buyers.

12. If a company with higher P/E multiple acquires a company with lower P/E multiples, is the transaction accretive or dilutive?

- If a company with a higher P/E acquires a company with a lower P/E the transaction is accretive. That is to say, the acquisition increase the acquiring company's EPS because the price paid to acquire the earnings is less.

13. In calculating merger consequences, what factors impact the new company's EPS? / Give me 3 factors which impact the new company's EPS.

- In the numerator, pro forma earnings are a function of acquirer's net income, target's net income, synergies, interest on liquidated debt minus interest on new debt, and preferred dividends paid out to target shareholders.
- In the denominator, pro forma shares are a function of acquirer's existing shares plus new shares issued in the transaction.
- If you are asked to give 3 factors which impact the new EPS, you can group the above elements:
 - Operation: both acquirer's and target's net income, synergies
 - Financing: interest expenses depending on the financing structure
 - New shares issued

14. How do you calculate a breakeven offer price under a 100% stock transaction?

- Multiply the acquirer's P/E ratio by the target's EPS.

15. Why do accretive mergers still sometimes see a falling stock price?

- There can be a variety of reasons including multiple contractions, the impact of leverage, or new business risks.
- Also the share price reflects the expectations from investors. As a result, some investors do not expect the merger will make the new business do better

16. Name three alternatives for a company to consider as alternatives to a merger or acquisition.

- Outsourcing
- Joint Venture / Partnerships
- Corporate Restructuring

17. Talk me through a sell-side M&A process

- Internal process
 - Approval from compliance after the money laundering check, etc.
 - Internal fee discussion and team building
- Engagement letter signed by clients
- Non disclosure agreement signed by the banks
- Document preparation
 - Timetable
 - Information Memorandum (IM)
 - Operating and / or financing modelling
 - Management presentation
 - Potential buyers approach materials
 - Vendor diligence consultant discussion and vendor diligence documents preparation if applicable
- Auction process

- Sending out IM and models if applicable
 - Preparing data room documents
 - Further due diligence documents (legal, tax, financial, technical, etc.)
- End of first round
 - Discuss bids received and select bidders going to the second round
 - Amend timetable if necessary
 - Open dataroom for due diligence
- Second round and due diligence
 - Q&A
 - Management presentation
 - Site visiting if necessary
- End of second round
 - Selecting final buyer
 - Final negotiation
- Announcement

18. What's likely to yield greater synergies, a diversification acquisition or a consolidation acquisition?

- A consolidation acquisition is more likely to generate synergies because the consolidated entity can cut duplicated functions and pull resources together (IT, HR, production sites, distribution network etc.). The increased size can also help the company obtain stronger bargaining power with suppliers and clients.

19. Talk to me about some hostile deals that have been initiated lately. When does a hostile deal make sense? What percent of hostile deals are completed by the buyers that started the process?

- A hostile takeover allows a suitor to bypass a target company's management unwillingness to agree to a merger or takeover. A takeover is considered "hostile" if the target company's board rejects the offer, but the bidder continues to pursue it, or the bidder makes the offer without informing the target company's board beforehand

- Examples include Microsoft / Yahoo, Kraft / Cadbury, etc. (check in Google for “hostile takeover news”)
- Typically a very small % of hostile takeover succeed

20. If your client is planning on selling his company one year from now, what actions would you recommend he take over the next 12 months to increase the price he receives for his firm?

- Boost revenues as much as possible, undertake a cost cutting programme to boost EBITDA and margins, make sure that extensive press coverage is obtained.
- Prepare a promising business plan and sound corporate strategy
- Identify potential buyers to increase competitiveness of the auction

21. What can be the potential market reaction on a merger?

- Once a merger happens, there will be complex market situation
- The target company is likely traded at the multiple the acquirer pays for. Acquirer's multiple depends on how investors perceive the merger, i.e. do the investors believe the synergies?
- What the merged company will be traded mainly likely depends on the synergy delivery

22. What is an engagement letter?

- An engagement letter is a document that the investment bank requires the client to sign to confirm key terms of the services they will provide
- It covers areas such as the scope of services provided, the fees, whether expenses are covered or not, etc.

23. What is an NDA?

- An NDA is a non-disclosure agreement. It basically a document that the bank has to sign (or any other party) to confirm that they will not release, use or share the data they received with others. For example, if a bank advises a public company, they might receive sensitive confidential information. The client will then require the bank to sign an NDA so that they can protect themselves from any leak.

24. What is “due diligence”?

- Due diligence is the process of gathering information in order to make a transaction. For example, if a company wants to buy another one, it will do some research about the industry, the company's financing performance, competitors, the management, etc. This process is called “performing due diligence”.

25. Why would a company do a transaction that is EPS dilutive? (i.e. a transaction where the earnings per share of the combined entity is lower than that of the acquirer standalone)

- Expected to be accretive in a few years due to projected future growth
- Defensive transaction i.e. the business might be hurt even more if the company doesn't make the transaction and a competitor buys the company, for example

4. Capital Structure and Financing Questions

1. Issuing equity versus debt?

- Growth firms often issue equity while traditional firms issue debt.
- Companies with predominantly tangible assets are more likely to issue more debt than companies with predominantly intangible assets, because of the lower bankruptcy cost.
- Debt: When a company has sufficient earnings to utilize the tax shield over the life of the debt, the company will choose to issue debt for the tax deduction. The interest payments, however, can be a problem for a new company without stable cash flow.
- Equity: If highly leveraged, no one will buy debt. In good markets, equity can be issued at a premium. It is a currency for acquisition and does not legally require payouts to holders. It is, however, dilutive for other owners and has a higher cost than debt.
- Market Signalling: Academic studies have found that the announcement of equity issuing tends to drive down the stock price. Under the assumption that managers in the company have more information than investors. When managers expect to have higher earnings in the future, issuing debt is a better choice due to coverage ratio, tax benefit and financial flexibility. Conversely, if the manager expects that earnings will go down, issuing equity is a better choice since the low coverage ratio and inability to take the advantage of tax benefit.
- EPS (earnings per share) is a good measure when choosing between debt or equity financing. Although debt financing saves taxes, newly created interest expenses reduce net income. For equity financing, although there is no interest expense, there is possible dividend expense. More importantly, due to the increase in total number of shares outstanding, equity financing has a dilutive effect on earnings.

2. What are the three traditional reasons for doing an IPO?

- Capital constrained (need the money to keep running businesses)
- Opportunity constrained (need the money to enter new markets)
- People constrained (need the money to keep / attract talent)

3. What issues should be examined when considering an IPO?

- Valuation
- Accretion / Dilution (EPS)
- Ownership
- Coverage ratios

- Trading comparables
- Market timing
- Legal issues

4. If you are pitching to be an underwriter for an IPO, what would the table of contents of the pitch book look like? In many cases, clients will provide a RFP (Response For Proposal) and the banks will be required to provide all information on the questions clients ask in RFP

- Introduction / Executive Summary
- Industry overview (trends)
- Company positioning, performance ("Equity Story")
- Proposed timeline
- Preliminary valuation considerations – summary financial overview, precedent transactions
- Comparables
- Overview of your firm / biographies

5. What is the transaction process of a typical IPO?

- Beauty Contest (a "beauty contests" means a situation where banks all present to the same company to compete for business)
 - 7% fee, bank may undercut
 - Banks trying to convince client that they can raise a specific amount of money
 - Client chooses bank(s) (Book runner, ECM keep track of shares allocated) to lead, then lead bank chooses syndicates (help sell offer)
- Due diligence/Valuation
 - Management
 - Financials
 - Market
- Filings
 - Prospectus

- Announcement of intent to do IPO
 - Work with lawyers and syndicates
- Road show
 - Sell securities to institutional investors
 - Research goes on separate road show to institutional investors
 - Offering date

6. Why IPOs are generally underpriced?

- There are two general reasons that are given to explain the under-price of IPOs.
- The first is conservatism: issuers want their stock to go up on the first day and thus leave a good taste in the mouth of investors.
- The second is compensation to the initial owners for the risk they are taking, relative to subsequent owners, for buying first.

7. Why does a secondary offering of shares tend to decrease the stock price?

- Issuing new shares signals that the management believes that the stock is overvalued. If the company believed that it needed the cash for a successful project, it would have issued debt, thus keeping all of the upside within the existing shareholder base rather than expanding (and diluting) it by adding new shareholders.
- A firm might still prefer to issue equity instead of debt if management believes the stock is overvalued, if predictable cash flows are enough of a concern that the firm does not want to risk adding debt, or to pay down debt (maybe to improve a credit rating).

8. If a company has a market cap of £900 million and issues £100 million in new equity, what percent of the company do the new equity owners own?

- $900+100 = 1000$. $100/1000 = 10\%$.

9. What implications are there for cash dividend versus stock repurchase? Why and when would you use one versus the other?

- The main advantage of stock repurchase over dividends is that the former is a one-time distribution. An increase in dividends is promised to the shareholders, such that the company would be paying the dividend on a regular basis in the future.
- There are two important implications of "expected regular dividend" and "one-time distribution." One is that if a regular dividend is lowered, then investors interpret this

act as a bad sign, and thus the price of the stock tends to fall. Because of this built-in expectation, dividend is a burden on the company, as the company feels obligated to satisfy its shareholders' expectations. On the other hand, stock repurchase is a one-time deal, and thus, shareholders don't expect it to continue in any regular fashion in the future.

- A share repurchase tends to increase stock prices because it signals that management thinks the firm's stock is undervalued. Other effects are an increase in net debt from the use of cash, increasing the tax shield. In addition there is a decrease in the shares outstanding leading to an increase in EPS.
- Paying dividend suggests that the company must, at least, have "excess" cash to do so. Thus, the question come down to: what should a company do with its "excess" cash? A company with excess cash has two alternatives: either invest the positive NPV projects (internal expansion or acquisitions) or distribute it to shareholders. The choice between these two alternatives is simple: if the company has projects with $NPV > 0$, then it should invest in these projects as they would create value to shareholders. Otherwise, the company should distribute the "excess" cash to shareholders in the form of dividends.
 - Thus, when a company increases its regular cash dividend it is typically saying one of two things. One, using the "burden" argument outlined above, the company must be saying (or signalling) that it expects to be profitable in the future and thus the increase in dividend is not "burden." The second scenario, using the "good projects" argument above, is that the investors may interpret the move as a signal that the company does not have profitable projects and thus it is distributing "excess" cash. Obviously, if the market believes the first argument, then stock prices tend to increase; prices decline if they believe that the company is facing the second scenario.
- Taxes: Institutional investors do not pay taxes on dividends but individuals do. Individuals can defer capital gains taxes.

10. Describe the difference between issuing a bond at par, discount or a premium.

- Issued at par when the coupon rate equals the market rate.
- Issued below par (at a discount) when the coupon rate is lower than the market rate (yield). The price of the bonds will be bid down because investors will be receiving an inferior rate.
- Issued at a premium when the coupon rate is greater than the market rate (yield), which will raise the price of the bond.

11. What is LIBOR and why does it matter?

- The London Interbank Offered Rate is the rate that the most creditworthy international banks charge each other for large loans and serves as a basis for other Eurodollar loans to less creditworthy corporate and government borrowers. For instance, a developing country may have to pay 3 point over LIBOR when it borrows.

12. What major factors affect the yield on a corporate bond?

- Corporate bond yields trade at a premium, or spread, over the interest rate on comparable US Treasury bonds. How large this spread is depends on the company's credit risk: the riskier the company, the higher the interest rate the company must pay to convince investors to lend it money, and therefore, the wider the spread over US Treasuries.

13. How would you value a bond, and what interest rate would you use?

- A bond value is equal to the present value of its future cash flows (coupon payments and principle repayment) discounted at the prevalent market interest rate. The discount interest rate is dependent on treasury rate plus premium for default/operational risk of issuing entity.

14. What are some different forms of debt?

- Bonds: publicly traded debt
- Convertible bonds (bonds that can convert into equity)
- Term loans or Bank loans: non-public debt issued by banks
- Mezzanine debt: junior form of debt, more expensive
- Pay-In-Kind (PIK): most junior form of debt, most expensive
- Many contracts, like leases, are debt-like without actually being debt

15. What type of debt is the most expensive? What type is the least expensive? Aside from cost why might a company choose one type of debt over another?

- Senior debt is the cheapest debt for a company to issue and is based on LIBOR + some rate. It guarantees debt holders priority to assets when the firm is in distress. It also tends to have more covenants as it is issued by banks, insurance companies, and other financial institutions.
- Unsecured debt most expensive to issue as it does not secure any assets to debt holders if the firm is in distress. Unsecured debt holders receive what remains after senior debt holders are paid in full. Unsecured debt tends to have fewer, if any, covenants, is purchased in the public market, and is based on the 10 year Treasury.

16. How do you price a convertible bond?

- The owner of a convertible bond owns a bond and a call option on the firm's stock. The owner must give up the bond to exercise the option. The price of the bond is the higher of the bond value and the conversion value.
 - Bond Value at Maturity: Provided the firm maintains a minimum value, then the bond will be worth its face value
 - Conversion at Maturity: If converted, the value increases in proportion to the value of the firm

17. What is riskier, equity or debt?

- Equity is riskier because it is completely unsecured. In the case of a bankruptcy, all holders of debt have priority over equity holders. That being said, debt holders have no upside potential whereas equity owners do – the reward for being unsecured.

18. How can a company reduce its Debt/EBITDA ratio? How can you do it without increasing EBITDA or paying down debt?

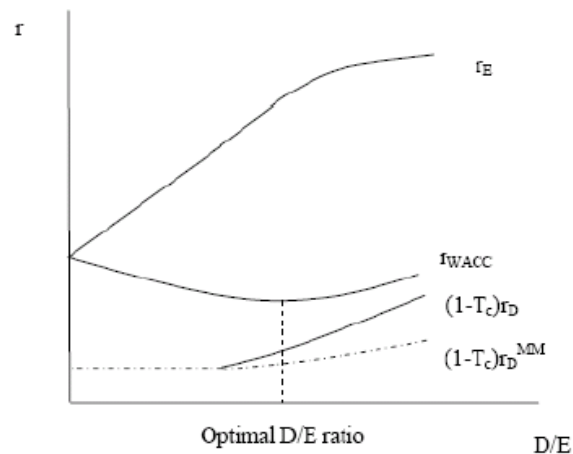
- Restructure debt to decrease interest expense and hence increase earnings, or reduce debt by either expending cash or issuing equity to pay it down.
- To do so without paying down debt or increasing EBITDA, you could do with leases and sale-lease back structures.

19. Draw the relationship between WACC and leverage and explain your drawing.

- Plotted on the y-axis against leverage on the x-axis, WACC has a U-shape that decreases gradually as leverage increases, passes through an optimal point, and then begins to increase. The decrease is caused by the effects of the interest tax shield as incremental debt (and therefore interest) is added, per the WACC formula:

$$r_{WACC} = \frac{D}{D+E} (1-T_c) r_D + \frac{E}{D+E} r_E$$

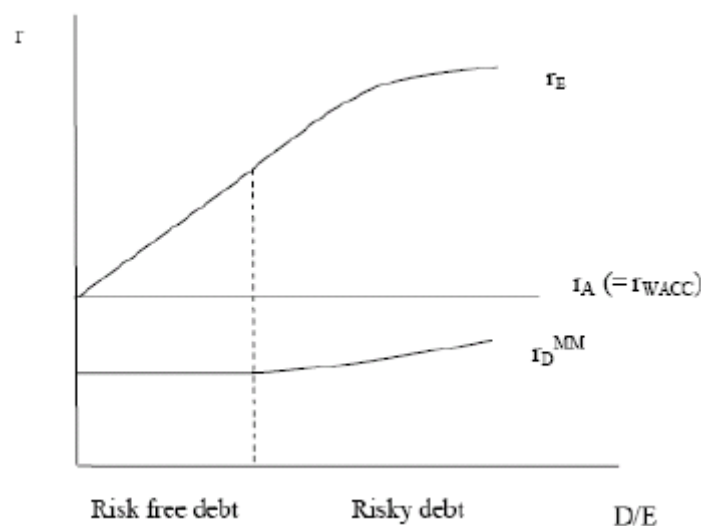
- Past the optimal point, however, WACC increases due to the costs of financial distress that are incurred as the firm's high leverage increases its probability of default.



- The smaller the r_{WACC} , the larger the value of the firm. The value of the firm is maximized when r_{WACC} is minimized, hence its optimality.
- To fully understand these effects, consider Modigliani and Miller Proposition II in a world without taxes or bankruptcy costs:

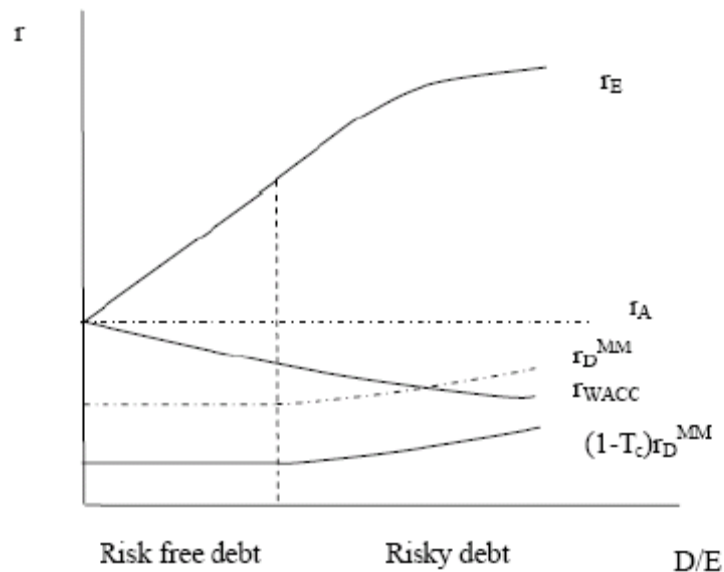
$$r_A = \frac{D}{D+E} r_D + \frac{E}{D+E} r_E$$

- In this world, $r_A = r_{WACC}$ the line is flat, leading to no preference between a firm that is entirely equity financed versus a firm that entirely debt financed.



- The reason that r_D^{MM} starts to rise above r_F is that the debt is now risky in the sense that it has a beta. If the risk of bankruptcy was entirely diversifiable then it would not rise. However, bankruptcy usually occurs in recessions so the debt has market risk and a positive beta.

- Through the introduction of taxes, the line taxes on an upward vector, indicating the increasing tax shields. In this world, there is no incentive to be anything but debt financed:



20. What factors should be considered in determining capital structure?

- WACC minimizing D/E
- Tax considerations
- Dilution
- Perception / Signalling
- Strategic concerns

21. Why do an IPO over private placement?

- IPO: access to a wider investor market; high profile, good for brand, better liquidity of stock, pricing and valuation transparency

22. You're a private company and an investment bank comes to you about taking your company public. What issues do you need to consider?

- Pricing of the IPO and capital needed
- Timing and preparation efforts required
- Equity financing vs. debt financing
- % of ownership that you have to give up

- Additional disclosure requirements
- Bankers' fees

23. What are three ways an auto manufacturer might raise \$500m in capital? Which is the most appropriate? Why? What if it's a biotech firm that needs to raise the capital rather than an auto manufacturer?

- Debt, equity through IPO or private placement.
- Debt is the most appropriate for an auto manufacturer because they have a larger asset base, lower risk, and can raise more cheap debt
- If it is a biotech firm it is better to raise equity as debt would be difficult to obtain and IPO gives you access to a broader investor base.

24. Which could take on more debt: a cable company or a business services company?

- A cable company can raise more debt because it has a larger asset base.

25. What is the lowest credit rating a company can have before being considered junk?

- The minimum is BBB-. (Standard & Poor's: BBB-, Moody's: Baa3)

26. What is staple financing?

- Staple financing is a pre-arranged financing package offered to potential bidders in an acquisition. It is arranged by the investment bank selling the company. The name is derived from the fact that the financing details are stapled to the back of the acquisition term sheet. A good way to think about it is to think about car dealers: they sell you the car, and they also will have some financing package in place – all of this to make the sale more attractive

5. Private equity and LBO Questions

1. What deal metric is most important for Private Equity (PE) firms in evaluating deals?

- PE firms use IRR to measure performance on an investment. IRR is the break-even discount rate of return when net present value of cash flows is equal to zero. Because the flow of cash over the course of an investment will include occasional calls for additional invested capital as well as occasional dividends, the IRR gives a rate that can be compared across firms. IRR captures both time-weighted and cash flow metrics.

2. What is a leveraged buyout?

- A leveraged buyout is the takeover of a company by using minimal equity and borrowed funds most often secured by the target company's assets.
- The debt tax shield is the "magic" that makes it all work – simply by borrowing the money a higher rate of return is earned.
- Debt is paid down using the cash flow of the acquired company. Management may use an LBO to retain control by converting a company from public to private. A group of investors may also borrow funds from banks, using their own assets as collateral, to take over another firm. In almost all leveraged buyouts, public shareholders receive a premium over the current market value for their shares. When a company that has gone private in a leveraged buyout offers shares to the public again, it is called reverse leveraged buyout.
- The return is created through increasing the total enterprise value by internal growth or acquisitions and / or to pay down debt and thereby increase the value of the equity at exit

3. What are different types of LBOs?

- Three major types of transactions
 - A public company taken private (this is usually the takeover segment of the LBO market)
 - Divestitures from selling off divisions of a corporation
 - Private market transactions involving companies whose stocks are not listed (includes "secondary buy-out", i.e., sales of portfolio companies from one sponsor to another sponsor or corporation)

4. What multiples are traditionally stated as financial parameters for an LBO?

- Debt/EBITDA – 4.0-5.0x (up to 6-9x before the recent credit crunch)
- EBITDA/Interest - > 2x

- Equity contribution – 20-35% traditionally (although ~45-55% during credit crunch)

5. Why lever up a firm?

- A major reason for leveraged buyouts is that a target company is for some reason perceived to be undervalued. Thus to gain control of the company, build up the management team, turn around the performance, and sell the company when it has gained a higher value (providing investors with a large premium).
- LBOs are typically accomplished by either financial sponsors (e.g., KKR) or company management, whereas M&A deals are led by companies in the industry (strategic buyers).

6. What are criteria for finding a good LBO candidate?

- Strong, predictable, steady cash flows
 - Typically found in mature businesses with low cyclicality
 - Needed to be able to make interest payments and not default
- Positive industry fundamentals with growth prospects
- Leading market share and strong competitive position or located in niche segment
- Limited capital expenditures or development needs (low working capital)
- Good management
- Potential for value creation through
 - Revenue growth
 - Margin enhancement
 - Improved working capital management
 - Undervalued assets
 - Synergies from combining with other portfolio companies
 - Opportunity and ability to make add-on acquisitions
- Has a viable exit strategy selling to another financial or strategic buyer, or IPO

7. If you buy a company for £100 and sell it for £100 two years later, how can you make money?

- Issue yourself dividend payments between purchase and sale

- Pay down debt during the two years, increasing your equity stake
- List some various types of exit strategies from an LBO
- IPO
- Spin-offs; break up assets
- Flip/Sell to strategic buyer or financial sponsor
- MBO

8. What is the transaction process of a typical LBO?

- Deal sourcing
- Deal screening – strategic due diligence; valuation
- Secure financing
- Documentation & filing
- Bid strategy: break-up fees; MACs (material adverse conditions); warranties; mechanics (tender offer vs. shareholders vote)

9. What are the typical types of financing structure for a LBO?

- Standard bank debt, also called “term loans”
- High yield bonds, also called unsecured debt or subordinated debt
- Mezzanine debt
- PIK debt
- Revolving or capital expenditure facilities

10. What is a PIK debt?

- PIK debt (payment in kind debt) is a type of debt whereby the interest is accrued rather than being paid out period after period, thus increasing the underlying principal until maturity or refinancing. For example, if you have a £100 PIK debt at 10% interest, you won't have to pay any interest next year but your new debt balance will be $(£100 \times 1.10) = £110$. The following year, it will be $(£110 \times 1.10) = £121$. This continues until the final maturity.
- PIK bond are typically unsecured (i.e. not backed by assets) and maturities usually exceed five years. Sometimes the PIK includes options or a similar equity sharing

mechanism to allow the lender to share in the future success of the business, making it a “hybrid security”.

11. How do you perform a LBO analysis? Walk me through the process of building an LBO model.

- Develop operating assumptions and projections for the standalone company to arrive at EBITDA and cash flow available for debt repayment over the investment horizon (typically 3 to 7 years).
- Determine key leverage levels and capital structure (senior and subordinated debt, mezzanine financing, etc.) that result in realistic financial coverage and credit statistics.
- Estimate the multiple at which the sponsor is expected to exit the investment (should generally be similar to the entry multiple).
- Calculate equity returns (IRRs) to the financial sponsor and sensitize the results to a range of leverage and exit multiples, as well as investment horizons.
- Solve for the price that can be paid to meet the above parameters (alternatively, if the price is fixed, solve for achievable returns).

12. Give me an example of Circular Reference in an LBO model.

- Interest expenses: if the calculation of interest payment is the average of opening and ending balance of senior debt and the extra cash is assumed to pay down debt each year.

13. What is the IRR with an equity investment of £100m and exit equity value of £300m after three years? Give me the calculation formula.

- A quick calculation of IRR is the same as CAGR calculation.
- Formula: $(£300/£100)^{(1/3)-1}$.

14. What are the key metrics and ratios?

- Cash Flow Measures:
 - EBITDA = Operating Cash Flow (Earnings before interest, taxes and depreciation and amortization)
 - Pretax FCF = EBITDA – CAPEX – change in working capital
 - After tax FCF = Pretax FCF – Cash Taxes
- Coverage Ratios:

- $\text{EBITDA} / \text{Interest Expense}$
- $(\text{EBITDA} - \text{CAPEX}) / \text{Interest Expense}$
- $(\text{EBITDA} - \text{CAPEX} - \text{Change in WC}) / \text{Interest Expense}$
- Leverage Ratios:
 - $\text{Senior Debt} / \text{EBITDA}$
 - $\text{Total Debt} / \text{EBITDA}$
 - $\text{Total Debt} / (\text{EBITDA} - \text{CAPEX})$
 - $\text{Total Debt} / (\text{EBITDA} - \text{CAPEX} - \text{Change in WC})$
 - $\text{Debt} / \text{Market Capitalization}$

15. How do you determine entry and exit multiple?

- Normally exit multiple equals entry multiple
- Entry multiple is typically based on historical trading multiples. If it is a cyclical sector, a mid-cycle multiple should be used, i.e. average multiple across the cycle (average of 5 to 10 years historical multiple)

In some circumstances, exit multiple could be lower or higher than entry multiple. For instance, if you take a public company private, a bid price normally includes a minimum 20% of premium. In this case, private equity is likely to over-pay. Then, depending on the exit strategy, its exit multiple might be lower than its entry. Vice versa, if a private equity acquired a business in a distressed situation, i.e. an unusual low price. Then its exit multiple could be higher than its entry.

16. What are the possible exit strategies for LBOs?

- IPO, which allows investors to liquidate ownership interest
- Recapitalization which allows equity holders to realize a return by taking a sizable dividend
- Sale to another strategic or financial buyer

6. Accounting Questions

1. How do the three main accounting financial statements relate?

- The profits that are reflected on the income statement get added to retained earnings on the balance sheet. Net Income from the income statement is the starting point of the cash flow statement. The total change in cash on the cash flow statement for a period should equal the change in cash on the balance sheet for the same period. Debt on the balance sheet is used to calculate interest expense on the income statement. Also, cash flow from operations is derived using the changes in balance sheet accounts.

2. What line item is usually found on all three financial statements?

- Net income

3. What is the difference between a balance sheet, income statement, and statement of cash flows?

- A balance sheet describes a firm's financial status at a specific time (end of fiscal year or quarter). An income statement represents a firm's operating result during a time period (a fiscal year or quarter).
- From another angle, a balance sheet tells a business's economic resources that creditors and shareholders can claim. An income statement summarizes a business's profitability (revenue minus expenses) within a time period.
- The statement of cash flows provides more accurate information about certain cash flows than can be inferred from income statements and balance sheets alone – particularly by highlighting the extent to which operations are generating or consuming cash.

4. What is a balance sheet? What are the major line items on it?

- The balance sheet is a snapshot that presents the financial position of a company at a given period of time. It lists the economic resources creditors and shareholders can claim.
- Assets: Resources that a company uses to operate its business
 - Current Assets: assets that are reasonably expected to be converted to cash within one year in the normal course of business. These are important because they fund day-to-day operations and pay ongoing expenses. Includes: cash, accounts receivable/payable, inventory.
- Liabilities: Claims that creditors have on the company's resources
 - Current Liabilities: a company's debts or obligations that are due within one year. Essentially these are bills that are due to creditors and suppliers within a short period of time.

- Shareholders' Equity: The "book value" of a company comes from two main sources: the first source is the original paid in capital, along with any additional investments. The second comes from the Retained Earnings accumulated over time through operations.

5. What is an income statement? What are the major line items on it?

- The income statement provides the results (profitability) of a business' operations during a specified period of time.
- Revenues: Source of income that arises from the sale of goods and/or services and is recorded when it is earned.
- Expenses: Costs incurred by a business over a specified period of time to generate the revenues earned during that same period of time. Commonly includes COGS and SG&A.
- Net Income: Revenue minus expenses.

6. What are the major line items on the statement of cash flows?

- The cash flow provides a summary of the inflows and outflows of cash during a specific time period.
- Cash Flow from Operations: Includes sales, dividends, interest, cash paid to suppliers, salaries, and taxes.
- Cash Flow from Investments: Includes purchase and sale of equipment and land.
- Cash Flow from Financing: Includes repayment of debt and payment of dividends.

7. If you had to use one of the three financial statements to value a company, which would you use and why?

- This is a classic interview question – though no one ever seems to actually be asked it. The point of the question is not the right answer, but rather to see your familiarity with the various financial statements and which ones provide which information. A one word answer is woefully inadequate for this question.
- Generally speaking, items from P&L are more often to be used to value a company because trading or transaction multiples are the common methods to be used. Balance Sheet is rarely to be used to value a company
- P&L: EBITDA for either trading or transaction multiples, i.e. EV/EBITDAR, P/E, etc.
- Cashflow statement: high level DCF: EBITDA, working capital movement and Capex, etc.
- Balance Sheet: P/B multiples

8. On which of the three financial statements would you find depreciation?

- Cash flow
- You can also find depreciation expense on P&L

9. What do you do if you understated depreciation by £100 and discovered the error in a period after the statements are issued? (Assuming 30% tax rate).

- Net Income decreases by £70. There is a £100 decrease by taking out the extra £100 in depreciation, but there is a corresponding depreciation tax shield of £30 that partially offsets the decrease.
- Shareholder's Equity decreases by £70 due to the decrease in Net Income. Net PPE decreases by £100 due to the increase in depreciation. The Accounting Equation ($A = \text{Liability} + \text{Shareholders' Equity}$) is balanced by creating a Deferred Tax Asset of £30.
- Cash flow remains the same as this is a non-cash transaction. Net Income is reduced by £70, £100 in depreciation is added back, and £30 in changes to deferred tax is subtracted, resulting in no change.

10. If a company decides to use a more accelerated depreciation method (taking £20 in depreciation expense per year instead of £10), walk me through how the three financial statements change?

- Same treatment as the example where an extra £100 is found

11. Describe how the disposal of a fixed asset in exchange for cash would be reflected on a GAAP/IAS statement of cash flows.

- In general, disposal of fixed assets is under "net cash flow from investing activities". The proceeds from the sale are recorded in the Statement of Cash Flows. The gain/loss is recognized on the Income Statement, and the removal of book value of the assets and accumulated depreciation thereof are booked on the Balance Sheet.

12. Walk me through the impact of an asset write-down on the financial statements.

- If net book value is greater than maximum of estimate future cash flows or sale value, then the asset is impaired. Calculated impairment loss is equal to net book value minus fair value (market value of asset). Loss is taken on income statement, reducing income, which in turn reduces shareholder equity through reduced retained earnings.

13. In the formula for Net Tangible Assets, are the values for assets and liabilities the market values or book values?

- Book values, per GAAP.

14. What is goodwill? How is it calculated? How does it affect net income?

- Goodwill is the excess of cash paid over the net identifiable assets of the target company as well as the “write-up” of the assets’ historical value. The acquiring company must recognize goodwill as an asset on its financial statements and present it as a separate line item on the balance sheet.
- Goodwill value = price paid in acquisition – fair market value of tangible assets.
- Goodwill represents the intangible assets a firm has. For example, the public image / reputation of a firm such as Coca-cola or Nike, and the possible financial value that the image / reputation may add, is considered as goodwill. Goodwill can be generated internally or through acquisition.
- Goodwill generated internally through the development of a firm is not recognized in the balance sheet. Goodwill can also be generated when an acquisition occurs.

15. What are deferred tax assets and liabilities? How do they arise? How do you treat them?

- Deferred tax assets (DTAs) arise from paying taxes to the IRS that have not yet been accounted for in accrual terms. Example: if you’ve received a prepayment for services not yet performed and have paid IRS taxes for the cash received, it would create a deferred tax asset because the revenue has not yet been booked on the income statement.
- Deferred tax liabilities (DTLs) arise from booking taxes in accrual terms prior to payment of tax to IRS. Example: the common practice of using accelerated depreciation (MACRs) for the tax books while using straight-line (or other slower depreciation method) depreciation for the income statement creates DTLs.

16. What is working capital?

- Working capital is the capital necessary for the company to keep operating. It is defined as current asset minus current liabilities; sometimes called “net working capital” or “net current assets.”
- The important point to remember in doing problems is that the cash flows associated with working capital are the changes in working capital. When working capital requirements go up, there is a negative cash flow (you need to provide funds); when working capital requirements go down there is a positive cash flow (funds freed up).

17. Using the indirect method, what are the four major adjustments you make to Net Income to arrive at Cash Flow from Operations?

- Add depreciation
- Subtract net increases in Accounts Receivable

- Subtract net increases in Inventory
- Add net increases in Accounts Payable

18. If a company changes from LIFO to FIFO, how would that impact its financial statements?

- The effects of inventory costing on financial statements depend on whether costs are increasing or decreasing.
- Assuming costs are increasing, LIFO to FIFO will increase COGS and thereby decrease Net Income. It will also reduce taxes and inventory. Cash flow increases. If costs are decreasing, the opposite is true.

19. What's the difference between operating and capital leases? Why would you capitalize an operating lease? How would you do it?

- Leases are forms of financing that appear off the balance sheet. For operating leases - those in which the risks and rewards of ownership are not transferred to the lessee - this is acceptable. For capital leases, those in which the risks and rewards of ownership are transferred to the lessee, this requires the lease to be reflected on the balance sheet given that it is essentially a form of debt.
- A lease is a capital lease if it does any of one of the four following things:
- transfers ownership at end of lease term (2) contains a bargain purchase option (3) extends for at least 75% of the asset's life or (4) pays out more than 90% of the fair market value of the asset over its term.
- Because the obligation associated with an operating lease is not on the balance sheet, an analyst may want to capitalize the lease – in other words, recast the financial statements to reflect the obligations of operating leases and the associated assets.
- To capitalize an operating lease (1) calculate the present value of the minimum operating lease payments at the current balance sheet date, (2) add the leasehold asset and leasehold obligation to the balance sheet, (3) remove rent expense from the income statement, (4) replace it with amortization and interest expense, (5) adjust cash flows by removing rent expense and adding back interest and amortization. Classify the repayment on the obligation as financing.
- As a short cut, ratings agencies often multiply operating lease payments by eight in order to come up with an estimate of their value if capitalized.

20. Where would you put a convertible bond on the balance sheet?

- Under Long Term Liabilities.

21. Why might a bond's cash payment and interest expense be different during a given period?

- A bond's cash payment is its coupon rate times its face value. A bond's interest expense is its market yield times the value of the balance sheet debt liability.
- The cash payment and interest expense will only be identical if the bond is issued at par because the yield and coupon rates are identical. If the bond is issued at a premium or discount, the rates will be different as will the face value and liability.

22. What is Return on Equity (ROE)?

- Formula of return on equity

$$\text{ROE} = \frac{\text{Net Income after tax}}{\text{Shareholder Equity}}$$

- ROE is used to compare companies in the same industry because a higher ROE with low capital investment is not necessary a better investment than a lower ROE company with high capital investment requirement.
- High ROE yields no immediate benefit. Since stock prices are most strongly determined by earnings per share (EPS), you will be paying twice as much (in Price/Book terms) for a 20% ROE company as for a 10% ROE company. The benefit comes from the earnings reinvested in the company at a high ROE rate, which in turn gives the company a high growth rate. As a result, ROE is presumably irrelevant if the earnings are not reinvested.
- The sustainable growth model shows us that when firms pay dividends, earnings growth lowers. If the dividend payout is 20%, the growth expected will be only 80% of the ROE rate.
- The growth rate will be lower if the earnings are used to buy back shares. If the shares are bought at a multiple of book value (say 3 times book), the incremental earnings returns will be only 'that fraction' of ROE (ROE/3).
- New investments may not be as profitable as the existing business. Ask "what is the company doing with its earnings?"
- Remember that ROE is calculated from the company's perspective, on the company as a whole. Since much financial manipulation is accomplished with new share issues and buyback, always recalculate on a 'per share' basis, i.e., earnings per share/book value per share.
- The DuPont formula, also known as the strategic profit model, is a common way to break down ROE into three important components. The formula is as below:

$$\text{ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Average stockholder equity}}$$

- Essentially, ROE will equal the net margin multiplied by asset turnover multiplied by financial leverage. Splitting return on equity into three parts makes it easier to understand changes in ROE over time. For example, if the net margin increases, every sale brings in more money, resulting in a higher overall ROE. Similarly, if the asset turnover increases, the firm generates more sales for every unit of assets owned, again resulting in a higher overall ROE. Finally, increasing financial leverage means that the firm uses more debt financing relative to equity financing. Interest payments to creditors are tax deductible, but dividend payments to shareholders are not. Thus, a higher proportion of debt in the firm's capital structure leads to higher ROE. Financial leverage benefits diminish as the risk of defaulting on interest payments increases. So if the firm takes on too much debt, the cost of debt rises as creditors demand a higher risk premium, and ROE decreases. Increased debt will make a positive contribution to a firm's ROE only if the matching Return on assets (ROA) of that debt exceeds the interest rate on the debt.

23. What are three possible explanations for a declining ROE?

- Net Income went down.
- More equity was issued.
- Other adjustments causing shareholder's equity going up.

24. What is minority interest?

- Minority interest is a parent company's claim to its subsidiary's earnings, contingent upon what percentage of the subsidiary is owned by the parent company.
- When the minority interest is significant in absolute amount, parent company's treatment of minority interests can affect its interest coverage, which is an indicator of a company's financial healthiness.
- Although real world treatment varies, the theoretically accurate accounting treatment for the parent company is:
 - Net earnings should exclude earnings from subsidiaries.
 - Dividend charges should also exclude those of subsidiaries as well.

25. Say you look at the financial statements of a firm for two consecutive years. Every line item on the income statement has the same value for both years, but the numbers on the lines in the cash flow statement are different for the two years. Speculate on a few things that may have happened to cause this outcome.

- Changes on balance sheet: capital expenditures (changes in assets), changes in working capital, differences in actual taxes paid.

- Changes in accounting standards

26. Imagine you run a hamburger restaurant. Describe the accounting entries for the sale of a hamburger? (Debits and Credits)

- Debit: Account receivable or cash
- Credit: Burger inventory
- Debit COGS
- Credit Sales

27. If I add £10 PPE to a company, walk me through the statements. Now add the depreciation.

- Fixed assets increase £10, debt increase £10 or cash decrease by £10 if paid by cash
- If you depreciate it, let us say, by 10 years, then each year, depreciation (expense) increases £1, accumulated depreciation also increases £1. Accumulated depreciation is the counter item of fixed assets and the net asset at year end will be £9. Extra expense of £1 will deduct earnings and decrease equity by £1 (assume no tax)

28. If £10 of accounts receivable is left out, how would you modify the financial statements? (Assuming everything balanced prior to finding error.)

- Account receivable will increase by £10 (balance sheet) and the counter item will decrease by £10 (let us say sales on P/L, as a result the current net profit will increase by £10 which will go through retained earnings on the equity on B/S)

29. What's the difference between a temporary difference and a permanent difference in taxes? Give an example of each.

- Differences between accounting book and tax income can arise from either permanent or temporary differences. Permanent differences are due to differences in the definition of income for accounting book and tax purposes. Temporary differences, in contrast, are the result of differences in the timing of income recognition for book and tax purposes. Because temporary differences will eventually reverse, they give rise to balance sheet entries that reflect their cumulative value
- One example of temporary difference is the tax difference caused by different depreciation years between accounting and tax rules. Another example is deferred compensation plan
- Permanent differences in taxes include penalties and fines, start-up costs, meals and entertainment, etc.

30. How do capital leases affect the balance sheet differently from operating leases? The Income statement? The statement of cash flows?

- A capital lease is a lease of business equipment which represents ownership and is reflected on the company's balance sheet as an asset. A capital lease, in contrast to an operating lease, is treated as a purchase from the standpoint of the person who is leasing and as a loan from the standpoint of the person who is offering the lease, for accounting purposes
- A lease must be treated as a capital lease if it meets one of the following four criteria: (1) the lease transfers ownership of the property to the lessee when the lease ends; (2) the lease has a purchase option at a price discounted from the regular market price; (3) the length of the lease is equal to 75 percent of the estimated economic life of the leased property, although this isn't applicable if the lease term begins during the final 25 percent of the estimated economic life; and (4) the present value of the minimum lease payments equals or exceeds 90 percent of the fair value of the leased property
- Under an operating lease, lease expense will go to P/L as one of expense items; cash payment will decrease cash balance at B/S and cashflow statement
- Under a capital lease, there is no lease expense or payment. On one hand the leased assets are treated as own assets, on the other hand, the company needs to borrow money to financing purchasing the assets, so same amount of debt will be incurred. On B/S, asset value and debt will be added on B/S on both asset and liability sides. Assets need to be depreciated, and as a result, depreciation expenses will go to P/L and accumulated depreciation will net off the total asset value on B/S. Under normal terms, the company needs to amortize the debt and repay debt in certain years, let us say 20 years. Then on B/S, both debt and cash will be decreased at same amount. Finally, we should consider interest payment and expenses on P/L, which will increase interest expenses and decrease cash payment

31. What is gross margin? Net margin? Operating margin?

- Gross margin is gross profit / revenue. Gross profit = revenue (net revenue) - cost of sales
- Operating margin is operating income / revenue. Operating income is also understood to be earnings before interest and taxes (EBIT). The formula is $EBIT = \text{Operating revenue} - \text{operating expenses}$. Also you can interpret it as $EBIT = \text{Gross profit} - \text{selling, general and administrative expenses} - D\&A - \text{other expenses}$
- Net margin is net income / revenue
- Name three items included under Other Comprehensive Income.
- Unrealized Gains and losses on available for sale securities

- Gains and losses on derivatives
- Gains and losses resulting from converting foreign currency subsidiaries to the parent currency
- Minimum pension liability adjustments
- Unrealized gains and losses from a foreign currency hedge of a net investment in a foreign operation

32. What are three ways retained earnings might go down?

- Retained earnings refers to the portion of net income which is retained by the corporation rather than distributed to its owners as dividends
- Retained earnings = previous retained earnings + current year net income – dividends
- Paying out dividend, net loss in current year or written down can incur retained earnings coming down

33. What happens if inventory turnover increases from 60 days to 75 days? What happens to COGS and Cash Flow statement?

- $\text{Inventory turnover days} = \text{Average Inventory} / \text{Cost of Goods Sold (COGS)} * 365$
- When this ratio increases, it might mean more stock stored which is caused by overstocking, obsolescence or deficiencies in the product line or marketing effort. However, in some cases company may keep a higher turnover day ratio, such as where higher inventory levels occur in anticipation of rapidly rising prices or shortages
- On P&L, the COGS will come down due to a higher turnover days and the inventory goes up. The higher inventory will lower the cashflow because lower volume of inventory will be cashed through the sales or higher change in working capital

34. If a company pays back its debt ahead of schedule, what is the impact on the income statement?

- There will be less interest expenses and as a result, the net income will increase
- The higher net income also means higher tax charged.

35. If convertible debt is converted, what is the impact on the balance sheet?

- Shareholder equity will increase and debt will decrease

7. MacroEconomics and Financial Markets Questions

1. What is the current Market Risk Premium?

- Banks traditionally put this at 4-6%.
- If you are valuing a company based on emerging markets, i.e. Russia, Brazil, China etc., you also need to take into account of country risk premium and the overall market risk premium will be higher. Normally 6-8% for a Russian Company from Bloomberg.

2. What are the four types of bond yield curves and what do they mean?

- Normal Yield Curve: As its name indicates, this is the yield curve shape that forms during normal market conditions, wherein investors generally believe that there will be no significant changes in the economy, such as in inflation rates, and that the economy will continue to grow at a normal rate. During such conditions, investors expect higher yields for fixed income instruments with long-term maturities that occur farther into the future
- The steep yield curve: Historically, the 20-year Treasury bond yield has averaged approximately two percentage points above that of three-month Treasury bills. In situations when this gap increases (e.g. 20-year Treasury yield rises relatively higher than the three-month Treasury yield), the economy is expected to improve quickly in the future. This type of curve can be seen at the beginning of an economic expansion (right after the end of a recession). Here, economic stagnation will have depressed short-term interest rates; however, rates begin to rise once the demand for capital is re-established by growing economic activity.
- The inverted yield curve is the least common, but perhaps most important bond yield curve. It generally signals a recession.

3. What relationship do a flat yield curve, long term rates and inflation have?

- A flat yield curve indicates that the market environment is sending mixed signals to investors, who are interpreting interest rate movements in various ways. During such an environment, it is difficult for the market to determine whether interest rates will move significantly in either direction farther into the future, therefore the normal "higher inflation" assumptions the further out you are on a yield curve that a normal yield curve brings cannot be made with a flat yield curve. A flat yield curve usually occurs when the market is making a transition that emits different but simultaneous indications of what interest rates will do in the future. When the yield curve is flat, investors can maximize their risk/return trade-off by choosing fixed-income securities with the least risk, or highest credit quality.

4. What did the FTSE at yesterday?

5. What's the price of a barrel of oil? What is the current gold price?

6. What's the yield on the 10-year bond / gilt? LIBOR?

7. What was on the front page of the Financial Times this morning?

8. What's happened in the markets during the past 6 months?

- Your topics can cover stock market, debt market, M&A market, etc.
- It does not matter how many topics you can raise, instead, you should be able to elaborate well on your opinions
- You give a few highlights in the market and discuss about them

9. What's the relationship between unemployment and inflation?

- There has been an inverse relation between rate of inflation and the rate of unemployment in an economy. Simply, the lower the unemployment in an economy, the higher the rate of increase in nominal wages. While it has been observed that there is a stable short run trade off between unemployment and inflation this has not been observed in the long run
- A simple explanation behind is that the more the entrepreneur extends the employment opportunity the more he has to pay to that particular factor of production and the more payment to factor of production the increase in the cost of producing a unit will be observed and in order to maintain the profitability of the product the entrepreneur will inflate the price of that product. A similar process will be observed through out the economy when the government intends to create job. The price of products or services, where the workforce is installed, will increase hence an increase in the rate of inflation will be visible through out the economy.
- It can be concluded from the aforesaid explanation that when a government intend to lower down the rate of unemployment it had to bear the increased rate of inflation in the national economy

10. If you buy a call option, what are you predicting?

- You predict that the price will rise above the strike price of the option

11. Is a strong dollar good or bad for U.S. corporations with operations abroad?

- Typically bad as they will have to convert international operations profits in US dollars in their financial statements.

12. What are sovereign wealth funds and why are they important?

- A sovereign wealth fund (SWF) is a state-owned investment fund composed of financial assets such as stocks, bonds, property, precious metals or other financial instruments. Sovereign wealth funds invest globally
- The investment strategy of Sovereign wealth funds can be characterized as maximizing long term return, with foreign exchange reserves serving short term currency stabilization and liquidity management. Many central banks in recent years possess reserves massively in excess of needs for liquidity or foreign exchange management. Moreover it is widely believed most have diversified hugely into assets other than short term, highly liquid monetary ones, though almost no data is available to back up this assertion. Some central banks have even begun buying equities, or derivatives of differing ilk (even if fairly safe ones, like Overnight Interest rate swaps)
- The size of SWFs (Assets under management) of SWFs was £3.8 trillion in 2008
- They are important because they represent significant pools of capital

8. Brainteasers

You can't really prepare for brainteasers. But there are a few common varieties worth examining briefly. At the end are some others that have been asked in the past.

1. The time is 11:08am. Exactly what angle does the large and small hand represent?

- Hour = 30 degrees
- Minutes = 6 degrees (= $360/60$)
- Hour hand movement as result of minutes = minutes / 2 (= minutes * $30/60$)
- Be cognizant of directions in which hands are placed and have moved.
- Each time the minute hand moves, it moves 6 degrees. 8 minutes is 48 degrees past 12 for the minute's hand. The hour hand has moved a little past 11. Since each minute mark on the clock represents $1/5$ of an hour, at 8 minutes it has gone $2/3$ of $1/5$. In other words, 4 minutes + $1/3$ of a minute remain. That's $4*6 + 6/3$ or 26, plus 48 it's 74.

2. If 50×50 can be calculated as $(50+10) \times (50-10) + 10 \times 10$, where 10 is a randomly chosen 'delta', what is 99×99 ?

- $(98 \times 100) + 1 \times 1 = 9801$

3. If you save £100 in a bank and it doubles in 4 years, what is the interest rate?

- ~ 18%
- General rule: 72 divided by rate of return equals the number of years required to double an investment's value. Similarly, 72 divided by number of years needed to double investment value equals the rate of return.

4. If the width of the page is 2mm, what is the width if I fold it 30 times?

- 2^{30}

5. What is the value of a firm with £100M in perpetuity, discount rate of 10% and growth of 5%?

6. What is 11 cubed?

- Try to do as follows: $10 \times 11 = 110$, and add the remaining 11: $110 + 11 = 121$. Similarly $121 \times 10 = 1,210$, add the remaining 121: $1,210 + 121 = 1,331$

7. What is $43/64$ in percentage terms?

- Simplifying, you could say $40/60 = 4/6 = 2/3$ or 66%.

8. What is the square root of 0.1? (No calculator)

- This one is a bit hard. 0.1 is equal to $1/10$ in fraction terms. So you need to find a number N so that $N * N = 10$. You know that $3 * 3 = 9$, so $3.3 * 3.3 = 10$. Therefore, the answer is 0.33

9. If you invested £10, and in 3 years the investment is worth £20, what is the annual growth rate?

- You can only do trial and error here. Start with 30%: that would be 13 after year 1, 17 in year 2, and 22 in year 3. Therefore you can guess it is slightly below 30%.

10. If I gave you £1 a day for 10 years or £1000 today which one will you choose?

- Here you are not really asked to come up with calculations, but rather to explain the concept of time value of money. You can get £1 a day for 10 years, which adds up to more than £1000. But you can also get the £1000 today and invest it at a rate of interest. The important point is to mention that it depends on the rate of interest, and show how you would calculate the "breakeven" rate of interest.

11. Now if I gave you £1 everyday for life and £1000, which one would you choose?

- Same as above

12. If I offered you £1M today and I took 10% of your annual lifetime earnings, would you take it?

- Same as above, but you need to estimate your earnings. Let's say you invest £1M in perpetuity at 5%, this is an NPV of $£1M / 0.05 = £20M$. Now you have to estimate whether 10% of your lifetime earnings is more than that or not.

13. You have £10K in credit card debt with 10% interest rate. You have £10K in stocks earning 10% per year. Do you liquidate your stocks to pay down the debt?

- Yes, probably, as the rate on the card is fixed, while the return on stocks is unpredictable.

14. Given two hourglass timers full of sand (one for 9 minutes, one for 7 minutes) how do you time 11 minutes?

- Make them start at the same time. When the 7 minute one is up, turn it around again, leaving the 9 minute timer continue to run (it will have 2 min left). When the 9 minute time is up, turn around the 7 minute timer back (it had been running for 2 minutes only, so turning it back will also take 2 minutes). Start the 11 minute timing NOW! When the 2 minutes are up, then start the 9 minute timer, and at the end you will have times $2+9=11$ minutes.

15. Why London's tube escalators have two up and one down (more escalators operating upward than downward)?

- Use your creativity, probably because people don't mind walking down but mind walking up (more tiring)

16. Why are manhole covers round?

- Because it's easier for people to pass through, or the cover is easier to push around as it is circle.

17. How many tennis balls could you fit in an airplane?

- Break the problem down and make assumptions
- What is the volume of a tennis ball? (estimate height, depth and length). What is the volume of an airplane? (estimate height, depth and length based on number of seat for example)

18. A mother is four times as old as her daughter. In 20 years she will be twice as old as her daughter. How old are mother and daughter now?

- This is simply an equation with 2 unknowns M for mother and D for daughters. Solve: $M = 4D$ and $M + 20 = 2D$
- $D = 10$ and $M = 40$

19. A farmer is standing on one side of the river and with him are a wolf, a goat and a box with cabbages. In the river there is a small boat. The farmer wants to cross the river with all the three items who are with him. There are no bridges and in the boat there is only room for the farmer and one item. But if he leaves the goat with the cabbages alone on one side of the river the goat will eat the cabbages. If he leaves the wolf and the goat on one side the wolf will eat the goat. Only the farmer can separate the wolf from the goat and the goat from the cabbage. How can the farmer cross the river with all three items, without one eating the other?

- First trip: Take the goat in the boat and leave the wolf with cabbage. Put the goat on the other side.
- Second trip: Take the wolf in the boat, go to the other side, and swap the wolf with the goat, so that the goat is in the boat and the wolf is on the other side. Go back to the other side with the goat.
- Third trip: Swap the goat with the cabbage so that the goat is back on the original side and the cabbage is on the boat. Cross the river again and put the cabbage with the wolf, come back to the other side empty
- Final trip: take the goat with you and cross the river, everything is safe!



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