Valuation and DCFs

Brown Socially Responsible Investment Fund
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Valuation Overview

- Valuation is an essential concept to understand for almost any finance interview and especially investment banking
- You are expected to speak on these 3 main points when it comes to valuation:
  - **How** do you value a company, i.e. what are the key methodologies, metrics, and multiples to use?
  - **What** does a valuation tell you, and how can you interpret the results?
  - **Why** do valuations matter, and what do they mean in the real world?

Quick Primer on Valuation / Performance Metrics

- **Equity Value** = (# of Shares Outstanding) * (Share Price)
  - also known as market capitalization
- **Enterprise Value** = Equity Value + Debt + Noncontrolling Interests - Cash & Cash Equivalents
  - Noncontrolling Interests: companies that you own more than 50% of but less than 100%
- **EBITDA**: Earnings Before Interest, Taxes, Depreciation and Amortization

Types of Valuation

- **Relative Valuation**
  - Comparing one company to the value of similar companies
  - Methods: public company comparables (aka public comps), precedent transactions
- **Intrinsic Valuation**
  - Examining the true, inherent value of an asset
  - Methods: Discounted Cash Flow **(DCF)**

Relative Valuation

- In both public comps and precedent transactions, you're going to compile a set of companies/transactions that meet the following criteria
  - Geography (US? China? Europe?)
  - Industry (Technology? Enterprise Software Specifically?)
  - Financial (Revenue or EBITDA above, below, or between certain numbers)
  - **For comps**: time since transaction
- After compiling this set, you're going to find the valuation metrics of these companies (either currently or at the time of purchase)
  - Metrics like Enterprise Value / EBITDA, EV / Revenue
  - With this set of metrics, you can explain that you will take the 25th percentile, median, and 75th percentile to find a range of a valuation

Valuation Statistics - Ralcorp Holdings	Ralcorp Holdings - Range of Valuation Multiples / Premiums						Ralcorp Holdings - Implied Per Share Value Range				
Methodology Name	Minimum Multiple	25th Pecentile Multiple	Median Multiple	75th Pecentile Multiple	Maximum Multiple	Applicable Ralcorp Holdings Figure	Minimum Multiple	25th Pecentile Multiple	Median Multiple	75th Pecentile Multiple	Maximum Multiple
Public Company Comparables:											
Year 1 EV / Revenue:	0.7 x	0.7 x	1.7 x	1.9 x	2.0 x	$ 4,049	$ 4.13	$ 6.48	$ 74.58	$ 87.08	$ 98.70
Forward Year 1 EV / Revenue:	0.6 x	0.7 x	1.4 x	1.8 x	1.8 x	$ 4,721	7.90	11.93	11.93	106.57	107.07
Forward Year 2 EV / Revenue:	0.6 x	0.7 x	1.4 x	1.7 x	1.8 x	$ 4,907	6.35	11.89	72.44	101.51	108.80
Year 1 EV / EBITDA:	7.0 x	8.8 x	9.0 x	13.4 x	14.5 x	$ 672	38.40	59.65	61.77	112.20	124.95
Forward Year 1 EV / EBITDA:	7.1 x	9.1 x	9.8 x	10.6 x	13.8 x	$ 862	63.62	92.58	102.68	114.33	162.18
Forward Year 2 EV / EBITDA:	6.7 x	8.8 x	9.3 x	9.8 x	13.3 x	$ 913	62.62	95.46	104.32	111.43	166.03

Relative Valuation Interview Questions

What are the three main types of valuation?

Public company comparables, precedent transactions, and discounted cash flow analysis.

Public comps and precedent transactions are examples of relative valuation while DCFs are considered intrinsic valuation.

If you're creating a set of comparable companies for Uber, what companies would you analyze?

Lyft is one of the obvious answers, and also other companies that contribute to our "gig economy", like GrubHub, Etsy, Fiverr.

Know (at a high level) how to break down a business model and come up with companies that are similar.

Discounted Cash Flow Analysis

- A DCF is the valuation of a company based on the **present value of its projected future cash flows**
- Time value of money
    - NPV = (Cash Flow) / ((1 + Discount Rate)$^{\text{Time}}$)
    - Our discount rate is weighted average cost of capital (**WACC**), which we will explain later
- Cash flows are generally projected from 5-10 years (near future)
- But, companies don't just stop operating after 5-10 years, and we need to calculate a **terminal value** (distant future) for the company

Discounted Cash Flow Steps

1. **Project** a company's Free Cash Flows over a 5-10 year period.
2. **Calculate** the company's Discount Rate, usually using WACC (Weighted Average Cost of Capital).
3. **Discount and sum up** the company's Free Cash Flows.
4. **Calculate** the company's Terminal Value.
5. **Discount** the Terminal Value to its Present Value.
6. **Add** the discounted Free Cash Flows to the discounted Terminal Value."

Calculating and Projecting Free Cash Flow (FCF)

- Two types of free cash flow:
  - **unlevered FCF (free cash flow to firm)**
  - levered FCF (free cash flow to equity)
- Operating Income = Revenue - COGS - Operating Expenses
- Unl. FCF = Operating Income * (1 - Tax Rate) + D&A + Non-cash Charges + Net Change in Working Capital - CapEx
- You're going to be making projections for revenue, operating margin, and almost everything else listed above based on historical data
- Key takeaways:
  - Free cash flow generally refers to the unlevered version
  - DCFs are heavily based on assumptions

Discount Rates and WACC

- Discount rates account for not just the time value of money, but the return investors may require
  - Higher risk generally results in a higher discount rate
  - Companies in emerging markets or more volatile industries may have higher discount rates (the reverse is also true)
- WACC is the discount rate you are generally going to use
  - If you are working with Levered Free Cash Flow, then use Cost of Equity as your discount rate
- Two components: cost of equity and cost of debt
  - Cost of Equity will be explained in next slide
  - Cost of Debt is interest rate on debt

Discount Rates and WACC (Cost of Equity)

- Cost of Equity = Risk-Free Rate + Equity Risk Premium * Levered Beta
- Risk-free rate is expected return on an essentially risk-less security, such as a 30-year U.S. treasury note
- Equity risk premium is the extra yield you could earn (over the risk-free rate) by investing in an index
- Beta is the riskiness of a company in comparison to the risk of the market
  - When the stock market goes up 10%...
    - Company with beta = 1 will go up 10%
    - Company with beta = 2 will go up 20%
- Levered/Unlevered Beta refers to whether or not the risk accounts for the debt of the company

$$B_U = B_L \,/\, [1 + ((1 - \text{Tax Rate}) \times \text{Debt/Equity})]$$

Unlevering and Relevering Beta

$$B_U = B_L / [1 + ((1 - \text{Tax Rate}) \times \text{Debt/Equity})]$$

- When we look to find a beta in a set of comparable companies, we need to first unlever beta
- This is because every company has a different capital structure, and we want to look at their inherent business risk for comparability purposes
- After finding a median from the set, we re-lever beta with the capital structure of the company of interest

WACC and DCF Checkpoint

- Weighted Average Cost of Capital = (% Equity) * (Cost of Equity) + (% Debt) * (Cost of Debt) * (1 - Tax Rate)
- This is now the discount rate which you will use

Thus far…

- We have projected the free cash flows for 5-10 years
- We have calculated the rate by which we will discount those free cash flows
- We can now discount the year-to-year free cash flows to get their present value

Terminal Value

- "Far future" value of the company
- Two methods of calculation:
- Multiples Method:
  - Assume the company gets sold for a certain multiple
  - Ex: company A has EBITDA of $500 Million, based on public comps they may be worth 10x EBITDA, or $5 Billion
- Perpetual Growth Method
  - Assume the company operates indefinitely
  - Terminal Value = Final Year FCF * (1 + Growth Rate) / (Discount Rate – Growth Rate)
  - Growth rate generally should be something very conservative, like growth rate of country's GDP

Putting It All Together

- You will now be combining your two 'buckets'
  - One of the summed up discounted cash flows
  - Another will be your terminal value, which will you discount by however many years your period is
- Adding up these two values gives you your estimated enterprise value

Walk me through a DCF.

A Discounted Cash Flow analysis values a company based on the present value of its cash flows and the present value of its terminal value.

First, you're going to project financials like revenue growth, operating margins, and change in working capital over a near-future period of 5-10 years.

Next, you'll be able to calculate yearly free cash flow, and you're going to discount each year's cash flow in order to account for the time value of money. The discount rate you generally use is WACC, or the weighted average cost of capital.

Then, you're going to calculate the terminal value of the company, using either the exit multiple method or the Gordon growth method, and you're also going to discount this to account for the time value of money.

In the end, you add up the sum of your discounted cash flows with your discounted terminal value in order to get the enterprise value.

How do you get from Revenue to Free Cash Flow?

First verify they are asking for unlevered free cash flow.

First, you can subtract operating expenses and cost of goods sold in order to get to operating income/EBIT (or just apply assumed EBIT margin).

Next, you apply your tax rate, multiplying by (1 - Tax Rate), add back depreciation and amortization, non-cash charges, and net change in working capital.

Lastly, you're going to subtract capital expenditures to get unlevered free cash flow.

For levered free cash flow, you just subtract net interest expense before applying your tax rate, and subtract mandatory debt repayments at the end.

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Interview Questions

What would have a greater impact, a 1% increase in revenue, or a 1% increase in discount rate?

The Discount Rate change will almost certainly have a bigger impact because that affects everything from the present value of Free Cash Flows to the present value of Terminal Value.

Should Cost of Equity be higher for a $5 billion or $500 million Market Cap company?

It should be higher for the $500 million company, because all else being equal, smaller companies are expected to outperform large companies in the stock market (and are therefore "riskier").

Interview Questions

1. What is the formula for unlevered beta?
2. Can beta ever be negative?
3. What is the beta of a coin flip?

1. Unlevered Beta = Levered Beta / (1 + (1-Tax Rate)*(debt/equity))

1. Yes, this would just mean that a company has a reverse relationship with the market

1. 0, coin flips are not tied to the markets in any way