Dealing with Complexity

- In Discounted Cashflow Valuation
  - The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm’s statements about their value.
  - The Conservative Analyst: Don’t value what you cannot see.
  - The Compromise: Adjust the value for complexity
    - Adjust cash flows for complexity
    - Adjust the discount rate for complexity
    - Adjust the expected growth rate/length of growth period
    - Value the firm and then discount value for complexity

- In relative valuation
  - In a relative valuation, you may be able to assess the price that the market is charging for complexity:
  - With the hundred largest market cap firms, for instance:
    \[ PBV = 0.65 + 15.31 \text{ ROE} - 0.55 \text{ Beta} + 3.04 \text{ Expected growth rate} - 0.003 \times \text{Pages in 10K} \]
5. Be circumspect about defining debt for cost of capital purposes...

- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.

- Defined as such, debt should include
  - All interest bearing liabilities, short term as well as long term
  - All leases, operating as well as capital

- Debt should not include
  - Accounts payable or supplier credit

- Be wary of your conservative impulses which will tell you to count everything as debt. That will push up the debt ratio and lead you to understate your cost of capital.
You are valuing a distressed telecom company and have arrived at an estimate of $1 billion for the enterprise value (using a discounted cash flow valuation). The company has $1 billion in face value of debt outstanding but the debt is trading at 50% of face value (because of the distress). What is the value of the equity to you as an investor?

a. The equity is worth nothing (EV minus Face Value of Debt)
b. The equity is worth $500 million (EV minus Market Value of Debt)

Would your answer be different if you were told that the liquidation value of the assets of the firm today is $1.2 billion and that you were planning to liquidate the firm today?
But you should consider other potential liabilities when getting to equity value

- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
  - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
  - You should not be counting these items as debt in your cost of capital calculations....

- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
  - Value of contingent liability = Probability that the liability will occur * Expected value of liability
In recent years, firms have turned to giving employees (and especially top managers) equity option or restricted stock packages as part of compensation. If they are options, they usually are long term and on volatile stocks. If restricted stock, the restrictions are usually on trading.

These equity compensation packages are clearly valuable and the question becomes how best to deal with them in valuation.

Two key issues with employee options:
- How do options or restricted stock granted in the past affect equity value per share today?
- How do expected grants of either in the future affect equity value today?
The Easier Problem: Restricted Stock Grants

- When employee compensation takes the form of restricted stock grants, the solution is relatively simple.
- To account for restricted stock grants in the past, make sure that you count the restricted stock that have already been granted in shares outstanding today. That will reduce your value per share.
- To account for expected stock grants in the future, estimate the value of these grants as a percent of revenue and forecast that as expense as part of compensation expenses. That will reduce future income and cash flows.
The Bigger Challenge: Employee Options

- It is true that options can increase the number of shares outstanding but dilution per se is not the problem.

- Options affect equity value at exercise because
  - Shares are issued at below the prevailing market price. Options get exercised only when they are in the money.
  - Alternatively, the company can use cashflows that would have been available to equity investors to buy back shares which are then used to meet option exercise. The lower cashflows reduce equity value.

- Options affect equity value before exercise because we have to build in the expectation that there is a probability of and a cost to exercise.

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A simple example...

- XYZ company has $100 million in free cashflows to the firm, growing 3% a year in perpetuity and a cost of capital of 8%. It has 100 million shares outstanding and $1 billion in debt. Its value can be written as follows:
  
  \[
  \text{Value of firm} = \frac{100}{0.08 - 0.03} = 2000 \\
  \text{Debt} = 1000 \\
  = \text{Equity} = 1000 \\
  \text{Value per share} = \frac{1000}{100} = $10
  \]

- XYZ decides to give 10 million options at the money (with a strike price of $10) to its CEO. What effect will this have on the value of equity per share?
  
  - None. The options are not in-the-money.
  - Decrease by 10%, since the number of shares could increase by 10 million
  - Decrease by less than 10%. The options will bring in cash into the firm but they have time value.
I. The Diluted Share Count Approach

- The simplest way of dealing with options is to try to adjust the denominator for shares that will become outstanding if the options get exercised. In the example cited, this would imply the following:
  
  Value of firm = 100 / (.08-.03) = 2000
  Debt = 1000
  = Equity = 1000
  Number of diluted shares = 110
  Value per share = 1000/110 = $9.09

- The diluted approach fails to consider that exercising options will bring in cash into the firm. Consequently, they will overestimate the impact of options and understate the value of equity per share.
II. The Treasury Stock Approach

- The treasury stock approach adds the proceeds from the exercise of options to the value of the equity before dividing by the diluted number of shares outstanding.

- In the example cited, this would imply the following:
  
  \[
  \text{Value of firm} = \frac{100}{0.08 - 0.03} = 2000
  \]
  
  \[
  \text{Debt} = 1000
  \]
  
  \[
  \text{Equity} = 1000
  \]
  
  \[
  \text{Number of diluted shares} = 110
  \]
  
  \[
  \text{Proceeds from option exercise} = 10 \times 10 = 100
  \]
  
  \[
  \text{Value per share} = \frac{1000 + 100}{110} = \$10
  \]

- The treasury stock approach fails to consider the time premium on the options. The treasury stock approach also has problems with out-of-the-money options. If considered, they can increase the value of equity per share. If ignored, they are treated as non-existent.
III. Option Value Drag

- **Step 1:** Value the firm, using discounted cash flow or other valuation models.
- **Step 2:** Subtract out the value of the outstanding debt to arrive at the value of equity. Alternatively, skip step 1 and estimate the value of equity directly.
- **Step 3:** Subtract out the market value (or estimated market value) of other equity claims:
  - Value of Warrants = Market Price per Warrant * Number of Warrants: Alternatively estimate the value using option pricing model
  - Value of Conversion Option = Market Value ofConvertible Bonds - Value of Straight Debt Portion of Convertible Bonds
  - Value of employee Options: Value using the average exercise price and maturity.
- **Step 4:** Divide the remaining value of equity by the number of shares outstanding to get value per share.
Valuing Equity Options issued by firms... The Dilution Problem

- Option pricing models can be used to value employee options with four caveats –
  - Employee options are long term, making the assumptions about constant variance and constant dividend yields much shakier,
  - Employee options result in stock dilution, and
  - Employee options are often exercised before expiration, making it dangerous to use European option pricing models.
  - Employee options cannot be exercised until the employee is vested.
- These problems can be partially alleviated by using an option pricing model, allowing for shifts in variance and early exercise, and factoring in the dilution effect. The resulting value can be adjusted for the probability that the employee will not be vested.

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To value employee options, you need the following inputs into the option valuation model:

- Stock Price = $10, Adjusted for dilution = $9.58
- Strike Price = $10
- Maturity = 10 years (Can reduce to reflect early exercise)
- Standard deviation in stock price = 40%
- Riskless Rate = 4%

Using a dilution-adjusted Black Scholes model, we arrive at the following inputs:

- \( N(d_1) = 0.8199 \)
- \( N(d_2) = 0.3624 \)
- Value per call = \( 9.58 \times 0.8199 - 10 \times e^{-0.04 \times 10} \times 0.3624 = 5.42 \)
Using the value per call of $5.42, we can now estimate the value of equity per share after the option grant:

\[
\text{Value of firm} = \frac{100}{(0.08 - 0.03)} = 2000 \\
\text{Debt} = 1000 \\
\text{Equity} = 1000 \\
\text{Value of options granted} = \$ 54.2 \\
\text{Value of Equity in stock} = \$945.8 \\
\text{Value per share} = \frac{\text{Value of Equity in stock}}{\text{Number of shares outstanding}} = \frac{\$945.8}{100} = \$ 9.46
\]

Note that this approach yields a higher value than the diluted share count approach (which ignores exercise proceeds) and a lower value than the treasury stock approach (which ignores the time premium on the options).
To tax adjust or not to tax adjust...

- In the example above, we have assumed that the options do not provide any tax advantages. To the extent that the exercise of the options creates tax advantages, the actual cost of the options will be lower by the tax savings.

- One simple adjustment is to multiply the value of the options by (1 - tax rate) to get an after-tax option cost.
Option grants in the future...

- Assume now that this firm intends to continue granting options each year to its top management as part of compensation. These expected option grants will also affect value.

- The simplest mechanism for bringing in future option grants into the analysis is to do the following:
  - Estimate the value of options granted each year over the last few years as a percent of revenues.
  - Forecast out the value of option grants as a percent of revenues into future years, allowing for the fact that as revenues get larger, option grants as a percent of revenues will become smaller.
  - Consider this line item as part of operating expenses each year. This will reduce the operating margin and cashflow each year.
When options affect equity value per share the most...

- Option grants affect value more
  - The lower the strike price is set relative to the stock price
  - The longer the term to maturity of the option
  - The more volatile the stock price

- The effect on value will be magnified if companies are allowed to revisit option grants and reset the exercise price if the stock price moves down.

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NARRATIVE AND NUMBERS:
VALUATION AS A BRIDGE

Tell me a story..
Valuation as a bridge

**Number Crunchers**

**Favored Tools**
- Accounting statements
- Excel spreadsheets
- Statistical Measures
- Pricing Data

**The Numbers People**

**Illusions/Delusions**
1. Precision: Data is precise
2. Objectivity: Data has no bias
3. Control: Data can control reality

**Story Tellers**

**Favored Tools**
- Anecdotes
- Experience (own or others)
- Behavioral evidence

**The Narrative People**

**Illusions/Delusions**
1. Creativity cannot be quantified
2. If the story is good, the investment will be.
3. Experience is the best teacher

A Good Valuation
Step 1: Survey the landscape

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of
  - Your company (its products, its management and its history.
  - The market or markets that you see it growing in.
  - The competition it faces and will face.
  - The macro environment in which it operates.
Higher income for drivers, relative to traditional taxis.

The drivers
Anyone with a car in one of Uber's covered cities can apply to be a Uber driver. If you pass the Uber screens, you are given a Uber iPhone and are in the system.

The customers
Uber subscribers download its app to their phones and when they need a ride, use the app. They can track the car as it approaches them on their devices.

Convenience, comfort and /or cost savings, relative to traditional cab

Pricing & payment
Uber set the prices for rides, with premium prices for rides during peak demand times. Customers pay Uber for the rides, using their credit cards and don't pay Uber drivers.

Safety & Secure transactions

Splitting the proceeds
Uber splits the ride receipts with the driver, keeping a percentage of the receipts for itself (revenues to Uber). While this percentage has historically been 20%, Uber had reduced it in some cities, when faced with competition from Lyft and Hailo.

Stronger competition from Lyft, Hailo & others will reduce Uber's split

From revenues to profits
From these revenues, Uber covers its expenses. These include R&D, technology development, customer acquisition costs (including rebates to new customers), marketing and the employees/infrastructure it needs in each of the cities that it operates in.

Regulatory & legal issues with offering service will increase costs.

Reinvest to grow
While Uber does not own the cars that its drivers operate, it still has to invest in technology (R&D) and acquisitions to grow. That reinvestment is likely to be modest initially, but will scale up as the company grows.

Local companies may need to be acquired to gain foothold in some markets.

Fare quotes, based on distance, car type & demand period

Even with Uber's 20% cut, drivers make more than they do from status quo.

Uber has a low-cost model that should allow it to keep a large percent of its revenues as profits.

Should be kept low because Uber does not invest in cars or other expensive infrastructure.
Step 2: Create a narrative for the future

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of your company (its products, its management), the market or markets that you see it growing in, the competition it faces and will face and the macro environment in which it operates.
  - Rule 1: Keep it simple.
  - Rule 2: Keep it focused.
  - Rule 3: Stay grounded in reality.
The Uber Narrative

In June 2014, my initial narrative for Uber was that it would be

1. An urban car service business: I saw Uber primarily as a force in urban areas and only in the car service business.

2. Which would expand the business moderately (about 40% over ten years) by bringing in new users.

3. With local networking benefits: If Uber becomes large enough in any city, it will quickly become larger, but that will be of little help when it enters a new city.

4. Maintain its revenue sharing (20%) system due to strong competitive advantages (from being a first mover).

5. And its existing low-capital business model, with drivers as contractors and very little investment in infrastructure.
Step 3: Check the narrative against history, economic first principles & common sense

"IT" IS POSSIBLE
This could happen, but you are not sure what "this" is, when it will happen and what it will look like when it does.

Gauge market potential & test products

"IT" IS PLAUSIBLE
This is something that you can make a reasoned argument could happen, though you have no tangible evidence for it happening (yet).

Product success & Financial results

IT IS PROBABLE
This is something that you expect to happen, with some basis or evidence for that expectation. There can be substantial uncertainty in your expectations.

Probability of occurrence

Cannot assess

Low

Increasing

VALUATION RESPONSE
Value as an option, with the value increasing with the size of the possible market and the exclusivity of your firm’s access to that market.

VALUATION RESPONSE
Show as expected growth, adjusting for risk in your expected return. Value will increase with size of the market and your firm’s competitive advantages.

VALUATION RESPONSE
Show in base year numbers and expected cash flows, adjusting for risk in your expected return.

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The Impossible, The Implausible and the Improbable

**The Impossible**
- Bigger than the economy
  - Assuming growth rate for company in perpetuity > growth rate for economy
- Bigger than the total market
  - Allowing a company’s revenues to grow so much that it has more than a 100% market share of whatever business it is in.
- Profit margin > 100%
  - Assuming earnings growth will exceed revenue growth for a long enough period, and pushing margins above 100%
- Depreciation without cap ex
  - Assuming that depreciation will exceed cap ex in perpetuity.

**The Implausible**
- Growth without reinvestment
  - Assuming growth forever without reinvestment.
- Profits without competition
  - Assuming that your company will grow and earn higher profits, with no competition.
- Returns without risk
  - Assuming that you can generate high returns in a business with no risk.

**The Improbable**

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Uber: Possible, Plausible and Probable

Possible
Car ownership market
*Option value*

Plausible
Suburban car service & rental market
*Higher growth rate*

Probable
Urban taxi market
*In Total Market size, Revenues & Earnings*