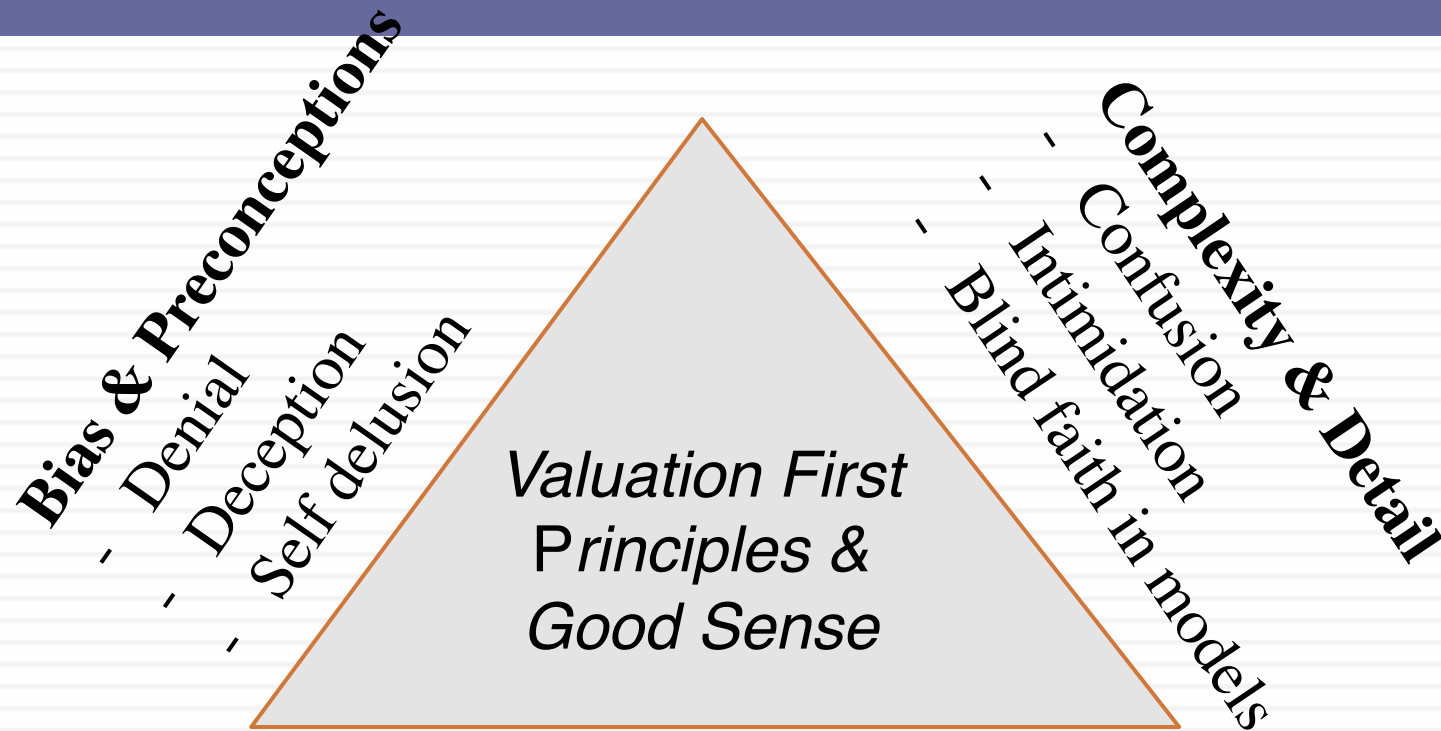


Misconceptions about Valuation

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- Myth 1: A valuation is an objective search for “true” value
 - ▣ Truth 1.1: All valuations are biased. The only questions are “how much” and in which direction.
 - ▣ Truth 1.2: The direction and magnitude of the bias in your valuation is directly proportional to who pays you and how much you are paid.
- Myth 2.: A good valuation provides a precise estimate of value
 - ▣ Truth 2.1: There are no precise valuations.
 - ▣ Truth 2.2: The payoff to valuation is greatest when valuation is least precise.
- Myth 3: . The more quantitative a model, the better the valuation
 - ▣ Truth 3.1: One’ s understanding of a valuation model is inversely proportional to the number of inputs required for the model.
 - ▣ Truth 3.2: Simpler valuation models do much better than complex ones.

The Bermuda Triangle of Valuation



Approaches to Valuation

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- Intrinsic valuation, relates the value of an asset to its intrinsic characteristics: its capacity to generate cash flows and the risk in the cash flows. In its most common form, intrinsic value is computed with a discounted cash flow valuation, with the value of an asset being the present value of expected future cash flows on that asset.
- Relative valuation or Pricing, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.
- Contingent claim valuation, uses option pricing models to measure the value of assets that share option characteristics.

Basis for all valuation approaches

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- The use of valuation models in investment decisions (i.e., in decisions on which assets are under valued and which are over valued) are based upon
 - ▣ a perception that markets are inefficient and make mistakes in assessing value
 - ▣ an assumption about how and when these inefficiencies will get corrected
- In an efficient market, the market price is the best estimate of value. The purpose of any valuation model is then the justification of this value.

Discounted Cashflow Valuation (DCF)

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- What is it: In discounted cash flow valuation, the value of an asset is the present value of the expected cash flows on the asset.
- Philosophical Basis: Every asset has an intrinsic value that can be estimated, based upon its characteristics in terms of cash flows, growth and risk.
- Information Needed: To use discounted cash flow valuation, you need
 - to estimate the life of the asset
 - to estimate the cash flows during the life of the asset
 - to estimate the discount rate to apply to these cash flows to get present value
- Market Inefficiency: Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets.

Advantages of DCF Valuation

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- Since DCF valuation, done right, is based upon an asset's fundamentals, it should be less exposed to market moods and perceptions.
- If good investors buy businesses, rather than stocks (the Warren Buffet adage), discounted cash flow valuation is the right way to think about what you are getting when you buy an asset.
- DCF valuation forces you to think about the underlying characteristics of the firm, and understand its business. If nothing else, it brings you face to face with the assumptions you are making when you pay a given price for an asset.
- If you buy into the notion of value being driven by a company's cash flows, you are immunized (to the extent that you have a long time horizon) from what the market thinks about your investment..

Disadvantages of DCF valuation

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- Since it is an attempt to estimate intrinsic value, it requires far more explicit inputs and information than other valuation approaches
- These inputs and information are not only noisy (and difficult to estimate), but can be manipulated by the analyst to provide the conclusion he or she wants. The quality of the analyst then becomes a function of how well he or she can hide the manipulation.
- In an intrinsic valuation model, there is no guarantee that anything will emerge as under or over valued. Thus, it is possible in a DCF valuation model, to find every stock in a market to be over valued. This can be a problem for
 - equity research analysts, whose job it is to follow sectors and make recommendations on the most under and over valued stocks in that sector
 - equity portfolio managers, who have to be fully (or close to fully) invested in equities

When DCF Valuation works best

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- At the risk of stating the obvious, this approach is designed for use for assets (firms) that derive their value from their capacity to generate cash flows in the future.
- It works best for investors who
 - have a long time horizon, allowing the market time to correct its valuation mistakes and for price to revert to “true” value or
 - are capable of providing the catalyst needed to move price to value, as would be the case if you were an activist investor or a potential acquirer of the whole firm
 - are not easily swayed or affected by market movements that are contrary to their “value” views

Relative Valuation (Pricing)

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- What is it?: The value of any asset can be estimated by looking at how the market prices “similar” or “comparable” assets.
- Philosophical Basis: The intrinsic value of an asset is impossible (or close to impossible) to estimate. The price of an asset is whatever the market is willing to pay for it (based upon its characteristics)
- Information Needed: To do a relative valuation, you need
 - an identical asset, or a group of comparable or similar assets
 - a standardized measure of value (in equity, this is obtained by dividing the price by a common variable, such as earnings or book value)
 - and if the assets are not perfectly comparable, variables to control for the differences
- Market Inefficiency: Pricing errors made across similar or comparable assets are easier to spot, easier to exploit and are much more quickly corrected.

Advantages of Relative Valuation

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- In sync with the market: Relative valuation is much more likely to reflect market perceptions and moods than discounted cash flow valuation. This can be an advantage when it is important that the price reflect these perceptions as is the case when
 - ▣ the objective is to sell an asset at that price today (IPO, M&A)
 - ▣ investing on “momentum” based strategies
- With relative valuation, there will always be a significant proportion of securities that are under valued and over valued. Since portfolio managers are judged based upon how they perform on a relative basis (to the market and other money managers), relative valuation is more tailored to their needs
- Relative valuation generally requires less explicit information than discounted cash flow valuation.
- In relative valuation, you are playing the “incremental” game, where you hope to make money by getting the next increment (earnings report, news story etc.) right.

Disadvantages of Relative Valuation

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- A portfolio that is composed of stocks which are under valued on a relative basis may still be overvalued, even if the analysts' judgments are right. It is just less overvalued than other securities in the market.
- Relative valuation is built on the assumption that markets are correct in the aggregate, but make mistakes on individual securities. To the degree that markets can be over or under valued in the aggregate, relative valuation will fail
- Relative valuation may require less information in the way in which most analysts and portfolio managers use it. However, this is because implicit assumptions are made about other variables (that would have been required in a discounted cash flow valuation). To the extent that these implicit assumptions are wrong the relative valuation will also be wrong.

When relative valuation works best..

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- This approach is easiest to use when
 - ▣ there are a large number of assets comparable to the one being valued
 - ▣ these assets are priced in a market
 - ▣ there exists some common variable that can be used to standardize the price
- This approach tends to work best for investors
 - ▣ who have relatively short time horizons
 - ▣ are judged based upon a relative benchmark (the market, other portfolio managers following the same investment style etc.)
 - ▣ can take actions that can take advantage of the relative mispricing; for instance, a hedge fund can buy the under valued and sell the over valued assets

Asset Based Valuation: A Detour

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- In contrast to valuing a business as a going concern (based on cash flows) or by looking at how other businesses that look it are priced (relative valuation), you sometimes may value a business by valuing its assets.
- Asset based valuation may be used in the context of
 - ▣ Liquidation valuation, where you are valuing the assets for sale
 - ▣ Accounting valuation, where you are valuing individual assets for accounting reasons (fair value or goodwill estimation)
 - ▣ Sum of the parts valuation, to either see if a company is cheap as an investment or a good target for acquisition/ restructuring
- To value the individual assets, though, you have to either use expected cash flows (intrinsic valuation) or base it on the pricing of similar assets (relative valuation).
- Asset based valuation is easiest to do when assets are separable and have stand alone earnings/cash flows.

What approach would work for you?

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- As an investor, given your investment philosophy, time horizon and beliefs about markets (that you will be investing in), which of the the approaches to valuation would you choose?
 - a. Discounted Cash Flow Valuation
 - b. Relative Valuation
 - c. Neither. I believe that markets are efficient.

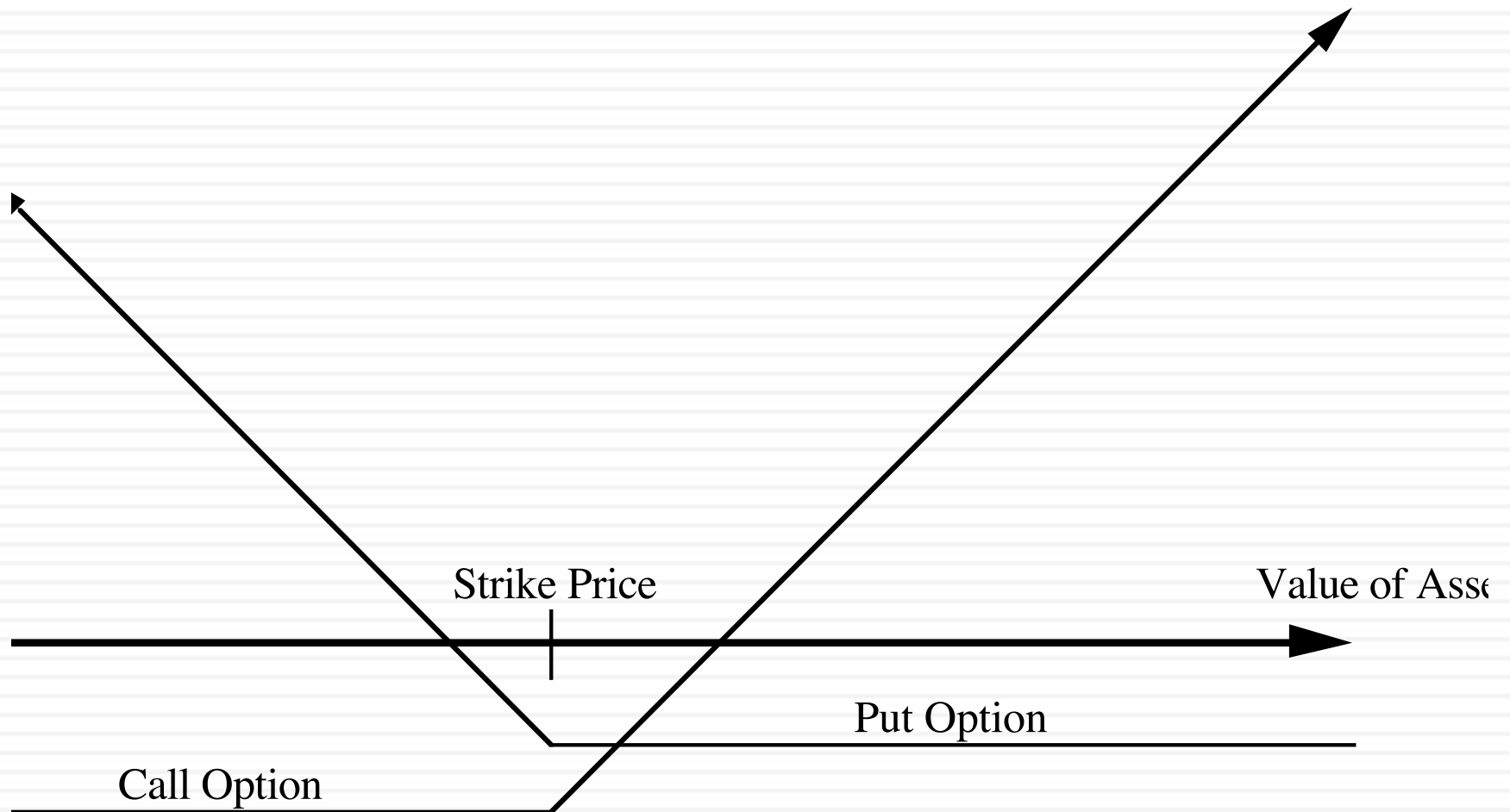
Contingent Claim (Option) Valuation

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- Options have several features
 - They derive their value from an underlying asset, which has value
 - The payoff on a call (put) option occurs only if the value of the underlying asset is greater (lesser) than an exercise price that is specified at the time the option is created. If this contingency does not occur, the option is worthless.
 - They have a fixed life
- Any security that shares these features can be valued as an option.

Option Payoff Diagrams

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Direct Examples of Options

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- Listed options, which are options on traded assets, that are issued by, listed on and traded on an option exchange.
- Warrants, which are call options on traded stocks, that are issued by the company. The proceeds from the warrant issue go to the company, and the warrants are often traded on the market.
- Contingent Value Rights, which are put options on traded stocks, that are also issued by the firm. The proceeds from the CVR issue also go to the company
- Scores and LEAPs, are long term call options on traded stocks, which are traded on the exchanges.

Indirect Examples of Options

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- Equity in a deeply troubled firm - a firm with negative earnings and high leverage - can be viewed as an option to liquidate that is held by the stockholders of the firm. Viewed as such, it is a call option on the assets of the firm.
- The reserves owned by natural resource firms can be viewed as call options on the underlying resource, since the firm can decide whether and how much of the resource to extract from the reserve,
- The patent owned by a firm or an exclusive license issued to a firm can be viewed as an option on the underlying product (project). The firm owns this option for the duration of the patent.
- The rights possessed by a firm to expand an existing investment into new markets or new products.

Advantages of Using Option Pricing Models

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- Option pricing models allow us to value assets that we otherwise would not be able to value. For instance, equity in deeply troubled firms and the stock of a small, bio-technology firm (with no revenues and profits) are difficult to value using discounted cash flow approaches or with multiples. They can be valued using option pricing.
- Option pricing models provide us fresh insights into the drivers of value. In cases where an asset is deriving its value from its option characteristics, for instance, more risk or variability can increase value rather than decrease it.

Disadvantages of Option Pricing Models

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- When real options (which includes the natural resource options and the product patents) are valued, many of the inputs for the option pricing model are difficult to obtain. For instance, projects do not trade and thus getting a current value for a project or a variance may be a daunting task.
- The option pricing models derive their value from an underlying asset. Thus, to do option pricing, you first need to value the assets. It is therefore an approach that is an addendum to another valuation approach.
- Finally, there is the danger of double counting assets. Thus, an analyst who uses a higher growth rate in discounted cash flow valuation for a pharmaceutical firm because it has valuable patents would be double counting the patents if he values the patents as options and adds them on to his discounted cash flow value.

In summary...

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- While there are hundreds of valuation models and metrics around, there are only three valuation approaches:
 - ▣ Intrinsic valuation (usually, but not always a DCF valuation)
 - ▣ Relative valuation
 - ▣ Contingent claim valuation
- The three approaches can yield different estimates of value for the same asset at the same point in time.
- To truly grasp valuation, you have to be able to understand and use all three approaches. There is a time and a place for each approach, and knowing when to use each one is a key part of mastering valuation.



VALUATION: LECTURE NOTE PACKET 1

INTRINSIC VALUATION

The essence of intrinsic value

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- In intrinsic valuation, you value an asset based upon its intrinsic characteristics.
- For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.
- Discounted cash flow valuation is a tool for estimating intrinsic value, where the expected value of an asset is written as the present value of the expected cash flows on the asset, with either the cash flows or the discount rate adjusted to reflect the risk.

The two faces of discounted cash flow valuation

3

- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \dots + \frac{E(CF_n)}{(1+r)^n}$$

where the asset has a n-year life, $E(CF_t)$ is the expected cash flow in period t and r is a discount rate that reflects the risk of the cash flows.

- Alternatively, we can replace the expected cash flows with the guaranteed cash flows we would have accepted as an alternative (certainty equivalents) and discount these at the riskfree rate:

$$\text{Value of asset} = \frac{CE(CF_1)}{(1+r_f)} + \frac{CE(CF_2)}{(1+r_f)^2} + \frac{CE(CF_3)}{(1+r_f)^3} \dots + \frac{CE(CF_n)}{(1+r_f)^n}$$

where $CE(CF_t)$ is the certainty equivalent of $E(CF_t)$ and r_f is the riskfree rate.

Risk Adjusted Value: Two Basic Propositions

4

- If the value of an asset is the risk-adjusted present value of the cash flows:

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \dots + \frac{E(CF_n)}{(1+r)^n}$$

$$\text{Value of asset} = \frac{CE(CF_1)}{(1+r_f)} + \frac{CE(CF_2)}{(1+r_f)^2} + \frac{CE(CF_3)}{(1+r_f)^3} \dots + \frac{CE(CF_n)}{(1+r_f)^n}$$

1. The “IT” proposition: If IT does not affect the expected cash flows or the riskiness of the cash flows, IT cannot affect value.
2. The “DUH” proposition: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
3. The “DON’T FREAK OUT” proposition: Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.