An Introduction to Valuation

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Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"   *Graffiti*
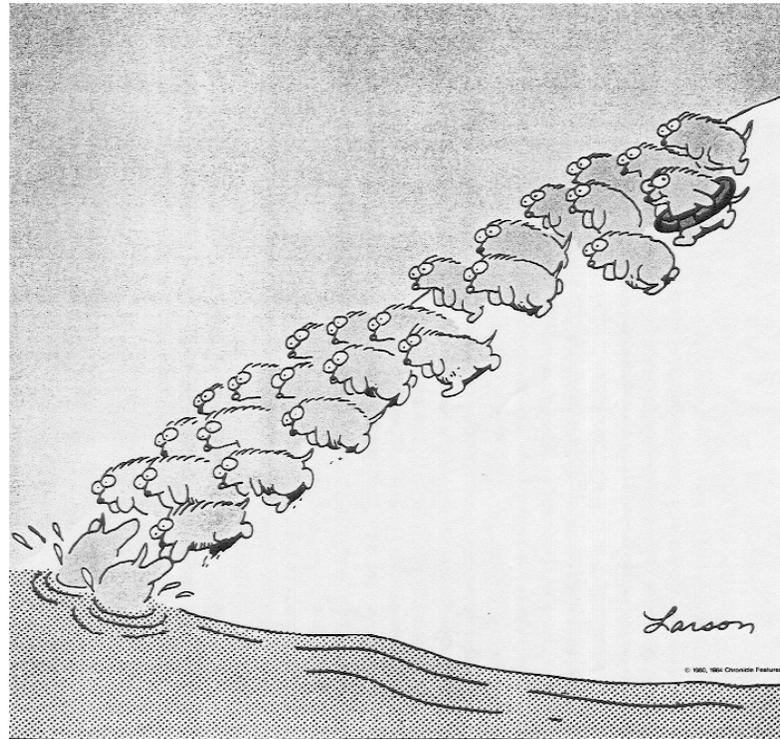
We thought we were in the top of the eighth inning,
when we were in the bottom of the ninth..   *Stanley Druckenmiller*

A philosophical basis for Valuation

"**Valuation is often not a helpful tool in determining when to sell hyper-growth stocks**", Henry Blodget, Merrill Lynch Equity Research Analyst in January 2000, in a report on Internet Capital Group, which was trading at $174 then.

- There have always been investors in financial markets who have argued that <u>market prices are determined by the perceptions </u>(and misperceptions) of buyers and sellers, and not by anything as prosaic as cashflows or earnings.

- <u>Perceptions matter</u>, but they cannot be all the matter.

- Asset prices cannot be justified by merely using the <u>"bigger fool"</u> theory.

Postscript: Internet Capital Group was trading at $ 3 in January 2001.

Misconceptions about Valuation

- 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.

I.   Value first, Valuation to follow
Sources of Bias

- We don't choose companies randomly to value:
- The information we use is always colored by the biases of those providing the information:
  - Annual reports and other data provided by the firm represent management's spin on events
  - Independent reports on the company (by analysts, journalists) will be affected by their biases.
  - If the stock is traded, the market price itself becomes a source of bias.
- Institutional factors can add to the bias by skewing recommendations in one direction or the other.
- Reward/punishment mechanisms may be tilted towards finding assets to be under or over valued.

Manifestations of Bias

- <u>Inputs to the valuation</u>: Our assumptions about margins, returns on capital, growth and risk are influenced by our biases.

- <u>Post-valuation tinkering</u>: The most obvious manifestation of bias occurs after we finish the valuation when we add premiums (synergy, control) and assess discounts (illiquidity) for various factors. If we are biased towards higher values, we tend to use premiums; if biased towards lower values, we discount.

- <u>Qualitative factors</u>: When we run out of all other choices, we tend to explain away the difference between the price we are paying and the value obtained by giving it a name (strategic considerations…)

What to do about bias…

- *Reduce institutional pressures*: Institutions that want honest sell-side equity research should protect their equity research analysts who issue sell recommendations on companies, not only from irate companies but also from their own sales people and portfolio managers.

- *De-link valuations from reward/punishment*: Any valuation process where the reward or punishment is conditioned on the outcome of the valuation will result in biased valuations.

- *No pre-commitments*: Decision makers should avoid taking strong public positions on the value of a firm before the valuation is complete.

- *Self-Awareness*: The best antidote to bias is awareness. An analyst who is aware of the biases he or she brings to the valuation process can either actively try to confront these biases when making input choices or open the process up to more objective points of view about a company's future.

II. It is only an estimate: Sources of Uncertainty

- Estimation Uncertainty: Even if our information sources are impeccable, we have to convert raw information into inputs and use these inputs in models. Any mistakes or mis-assessments that we make at either stage of this process will cause estimation error.

- Real Uncertainty:
  - Firm-specific Uncertainty: The path that we envision for a firm can prove to be hopelessly wrong. The firm may do much better or much worse than we expected it to perform, and the resulting earnings and cash flows will be very different from our estimates.
  - Macroeconomic Uncertainty: Even if a firm evolves exactly the way we expected it to, the macro economic environment can change in unpredictable ways. Interest rates can go up or down and the economy can do much better or worse than expected. These macro economic changes will affect value.

Responses of Uncertainty:
The healthy ones..

- <u>Better Valuation Models</u>: Building better valuation models that use more of the information that is available at the time of the valuation is one way of attacking the uncertainty problem. Even the best-constructed models may reduce estimation uncertainty but they cannot reduce or eliminate the very real uncertainties associated with the future.

- <u>Valuation Ranges</u>: A few analysts recognize that the value that they obtain for a business is an estimate and try to quantify a range on the estimate. Some use simulations and others derive expected, best-case and worst-case estimates of value.

- <u>Probabilistic Statements</u>: Some analysts couch their valuations in probabilistic terms to reflect the uncertainty that they feel. Thus, an analyst who estimates a value of $ 30 for a stock which is trading at $ 25 will state that there is a 60 or 70% probability that the stock is under valued rather than make the categorical statement that it is under valued.

Responses to uncertainty:
Unhealthy ones..

- <u>Passing the buck</u>: Some analysts try to pass on responsibility for the estimates by using other people's numbers in the valuation. If the valuation turns out to be right, they can claim credit for it, and if it turns out wrong, they can blame others (management, other analysts, accountants) for leading them down the garden path.

- <u>Giving up on fundamentals</u>: A significant number of analysts give up, especially on full-fledged valuation models, unable to confront uncertainty and deal with it. All too often, they fall back on more simplistic ways of valuing companies (multiples and comparables, for example) that do not require explicit assumptions about the future. A few decide that valuation itself is pointless and resort to reading charts and gauging market perception.

What to do about uncertainty..

- You can reduce estimation uncertainty but you <u>cannot do much about real uncertainty</u> (other than treat it as risk and build it into your discount rates)

- In general, analysts should try to focus on making their best estimates of <u>firm-specific information</u> – how long will the firm be able to maintain high growth? How fast will earnings grow during that period? What type of excess returns will the firm earn?– and steer away from bringing in their views on macro economic variables.

III. Is bigger better?
Sources of Complexity

- <u>The tools are more accessible</u>: Computers and calculators have become far more powerful and accessible in the last few decades. With technology as our ally, tasks that would have taken us days in the pre-computer days can be accomplished in minutes.

- <u>There is more information for us to work with</u>: On the other side, information is both more plentiful, and easier to access and use. We can download detailed historical data on thousands of companies and use them as we see fit.

Cost of complexity

- <u>Information Overload</u>: More information does not always lead to better valuations. In fact, analysts can become overwhelmed when faced with vast amounts of conflicting information and this can lead to poor input choices. The problem is exacerbated by the fact that analysts often operate under time pressure when valuing companies.

- <u>Black Box Syndrome</u>: The models become so complicated that the analysts using them no longer understand their inner workings. They feed inputs into the model's black box and the box spits out a value. In effect, the refrain from analysts becomes "The model valued the company at $ 30 a share" rather than "We valued the company at $ 30 a share".

- <u>Big versus Small Assumptions</u>: Complex models often generate voluminous and detailed output and it becomes very difficult to separate the big assumptions from the small assumptions.

The principle of parsimony

- <u>The basic principle</u>: When valuing an asset, we want to use the simplest model we can get away with.

- Don't go looking for trouble and estimate inputs that you do not have to. You can mangle simple assets using complicated valuation models.

- All-in-one valuation models that try to value all companies, by definition, will be far more complicated than they need to be, since they have to be built for the more complex company that you will run into.

Approaches to Valuation

- **Discounted cashflow valuation**, relates the value of an asset to the present value of expected future cashflows on that asset.
- **Relative valuation**, 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

- 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 Cash Flow Valuation

- **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 <u>life of the asset</u>
  - to estimate the <u>cash flows</u> during the life of the asset
  - to estimate the <u>discount rate</u> to apply to these cash flows to get present value

- **Market Inefficiency**: Markets are assumed to make <u>mistakes</u> in pricing assets <u>across time</u>, and are assumed to correct themselves over time, as new information comes out about assets.

# Discounted Cashflow Valuation: Basis for Approach

$$\text{Value of asset } = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} \ldots + \frac{CF_n}{(1+r)^n}$$

where CF_t is the _expected cash flow_ in period t, r is the discount rate appropriate given the riskiness of the cash flow and n is the life of the asset.

Proposition 1: For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.

Proposition 2: 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.

a. Going Concern versus Liquidation Valuation

In liquidation valuation, we value only investments already made

Figure 1.1: A Simple View of a Firm

Assets		**Liabilities**

Assets in Place
Existing Investments
Generate cashflows today

Investments already made

Debt

Borrowed money

Growth Assets
Expected Value that will be created by future investments

Investments yet to be made

Equity

Owner's funds
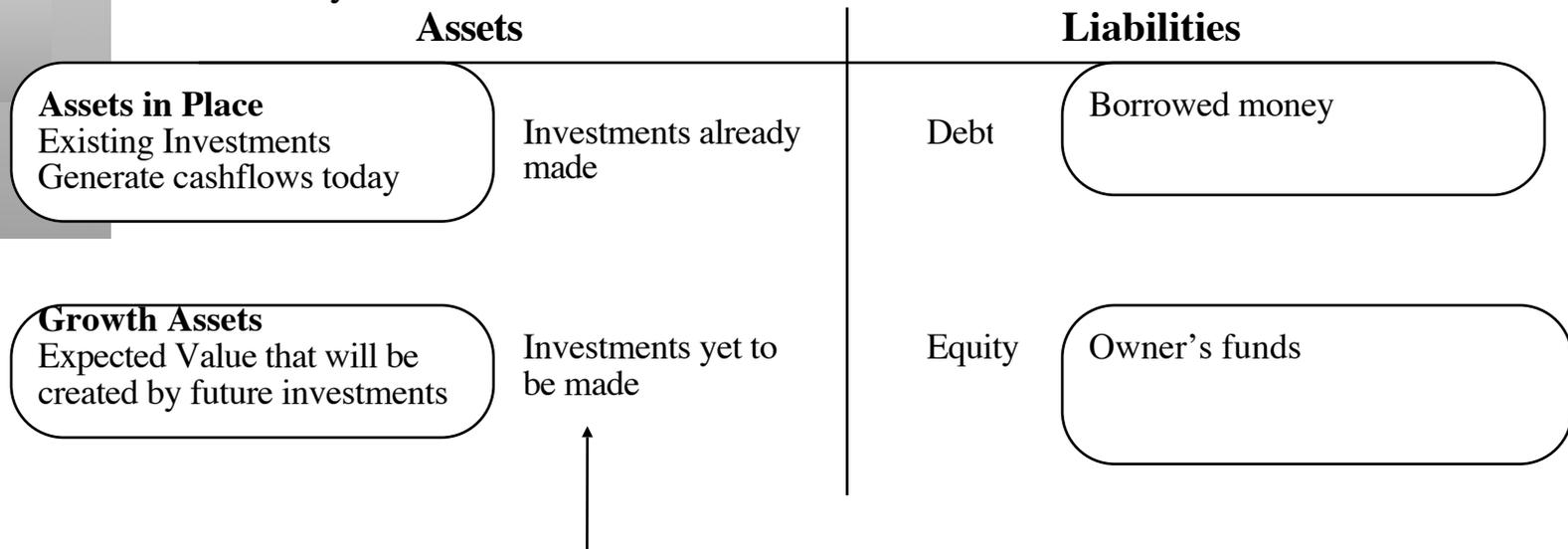
When valuing a going concern, we value both assets in place and growth assets

b. Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

Assets		Liabilities	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived(working capital) assets	Assets in Place	Debt	Fixed Claim on cash flows Little or No role in management *Fixed Maturity* *Tax Deductible*
Expected Value that will be created by future investments	Growth Assets	Equity	Residual Claim on cash flows Significant Role in management *Perpetual Lives*

Equity valuation: Value just the equity claim in the business

Equity Valuation

Figure 5.5: Equity Valuation

Assets	Liabilities
Assets in Place	Debt
Growth Assets	Equity

Cash flows considered are cashflows from assets, after debt payments and after making reinvestments needed for future growth

Discount rate reflects only the cost of raising equity financing

Present value is value of just the equity claims on the firm
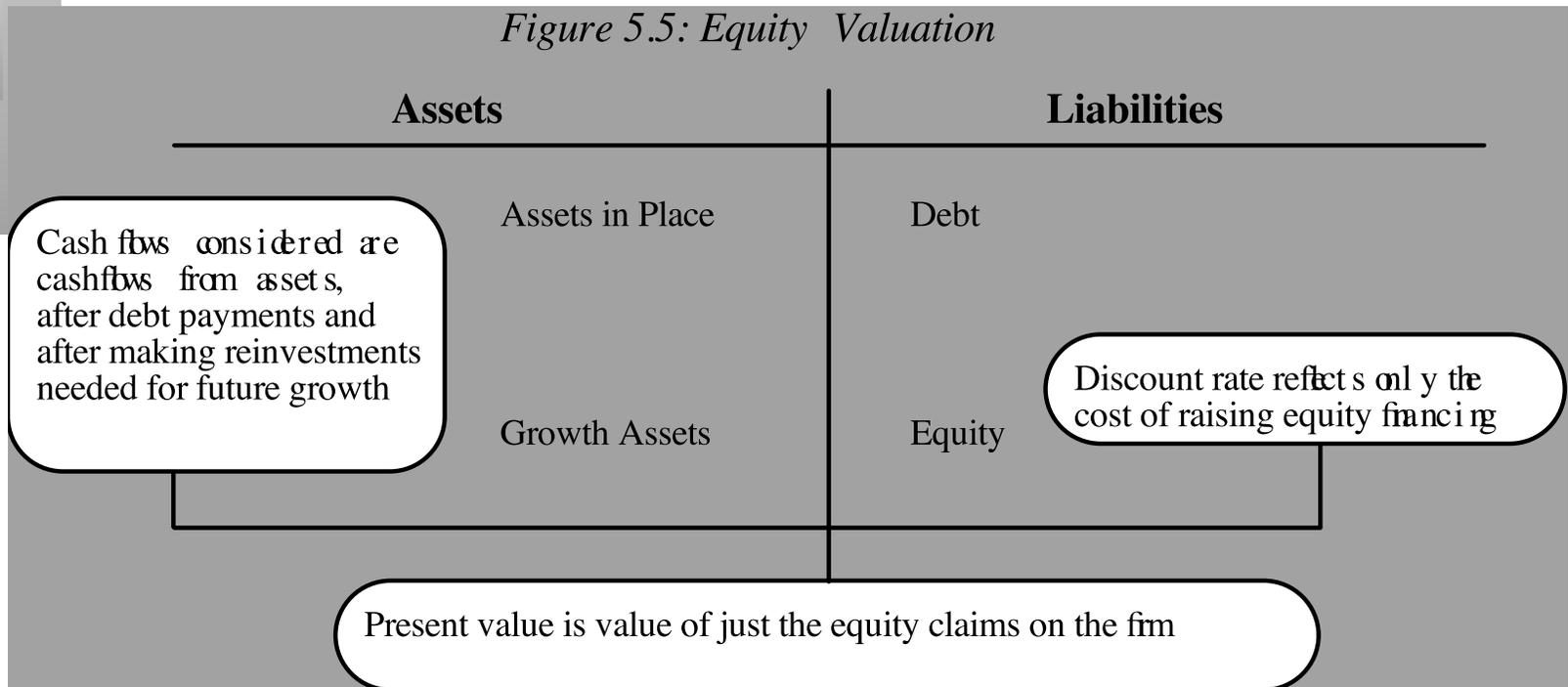
Firm Valuation

Figure 5.6: Firm Valuation

Assets	Liabilities
Assets in Place	Debt
Growth Assets	Equity

Cash flows considered are cashflows from assets, prior to any debt payments but after firm has reinvested to create growth assets

Discount rate reflects the cost of raising both debt and equity financing, in proportion to their use

Present value is value of the entire firm, and reflects the value of all claims on the firm

c. Three pathways to DCF value

- Classic DCF valuation: Discount cash flows (to firm or equity) back at the appropriate discount rate (cost of capital or equity). The present value of the cash flows is the value of equity or the firm. The effects of debt financing are built either into the cash flows (with equity valuation) or into the cost of capital (with firm valuation)

- Adjusted Present Value approach: Value the firm as if it were all equity funded and add the financial effects of debt to this value.

  Value of business = Value of business with 100% equity financing + Present value of Expected Tax Benefits of Debt – Expected Bankruptcy Costs

- Excess Returns approach: The value can be written as the sum of capital invested and the present value of excess returns:

  - Value of business = Capital Invested today + Present value of excess return cash flows from both existing and future projects

Advantages of DCF Valuation

- Since DCF valuation, done right, is based upon an asset's fundamentals, it should be <u>less exposed to market moods</u> and perceptions.

- If good investors <u>buy businesses</u>, 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 <u>underlying characteristics of the firm</u>, 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.

Disadvantages of DCF valuation

- Since it is an attempt to estimate intrinsic value, it <u>requires far more inputs</u> and information than other valuation approaches

- These inputs and information are not only <u>noisy</u> (and difficult to estimate), but can be <u>manipulated</u> by the savvy analyst to provide the conclusion he or she wants.

- In an intrinsic valuation model, there is no guarantee that <u>anything will emerge as under or over valued</u>. 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

■ This approach is easiest to use for assets (firms) whose

- cashflows are currently positive and

- can be estimated with some reliability for future periods, and

- where a proxy for risk that can be used to obtain discount rates is available.

■ It works best for investors who either

- 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

Relative Valuation

- **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 value 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 <u>identical asset</u>, or a group of <u>comparable or similar assets</u>
  - a <u>standardized measure of value</u> (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, <u>variables to control for the differences</u>
- **Market Inefficiency**: Pricing errors made across similar or comparable assets are easier to spot, easier to exploit and are much more quickly corrected.

Choices with multiples

- <u>Equity or Firm</u>: Multiples can be scaled to just equity value (market price per share, market capitalization), to firm value (debt plus equity) or to the value of operating assets (debt plus equity minus cash)

- <u>Scaling variable</u>: The market value can be scaled to
  - Earnings: The choices can range from equity earnings (EPS, Net Income) to operating income (EBIT or EBITDA).
  - Book Value: The choices can include book value of equity or book value of capital (debt plus equity)
  - Revenues

- <u>Current, Trailing or Forward Values:</u> The values used for the scaling variable can be from the last financial year (current), the last four quarters (trailing) or some future period (forward).

Choosing the Comparable firms

- ■ <u>Identical firm(s):</u> Try to find one, two or a few companies that look very similar to the firm that you are valuing. In effect, you are looking for a twin firm that is traded by the market.

- ■ <u>Sector</u>: A far more common choice is to consider all firms in the sector that the firm operates in to be comparable firms.

- ■ <u>Valuation-based comparables</u>: Firms that look like your firm in terms of cash flow, growth and risk characteristics.

Making the comparison

- *Direct comparison*: In this approach, analysts try to find one or two companies that look almost exactly like the company they are trying to value and estimate the value based upon how these "similar" companies are priced.
- *Peer Group Average*: In the second, analysts compare how their company is priced (using a multiple) with how the peer group is priced (using the average for that multiple). Implicit in this approach is the assumption that while companies may vary widely across a sector, the average for the sector is representative for a typical company.
- *Peer group average adjusted for differences*: Recognizing that there can be wide differences between the company being valued and other companies in the comparable firm group, analysts sometimes try to control for differences between companies. In many cases, the control is subjective: a company with higher expected growth than the industry will trade at a higher multiple of earnings than the industry average but how much higher is left unspecified. In a few cases, analysts explicitly try to control for differences between companies by either adjusting the multiple being used or by using statistical techniques.

Advantages of Relative Valuation

- Relative valuation is <u>much more likely to reflect market perceptions</u> 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 a security at that price today (as in the case of an IPO)

  - investing on "momentum" based strategies

- With relative valuation, there will always be a <u>significant proportion</u> of securities that are <u>under valued and over valued</u>.

- Since portfolio managers are <u>judged</u> based upon how they perform <u>on a relative basis</u> (to the market and other money managers), relative valuation is more tailored to their needs

- Relative valuation generally <u>requires less information</u> than discounted cash flow valuation (especially when multiples are used as screens)

Disadvantages of Relative Valuation

- A portfolio that is composed of stocks which are <u>under valued on a relative basis may still be overvalued</u>, even if the analysts' judgments are right. It is just less overvalued than other securities in the market.

- Relative valuation is built on the <u>assumption that markets are correct in the aggregate</u>, 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 <u>implicit assumptions are made about other variables</u> (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..

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

Contingent Claim (Option) Valuation

- 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

Strike Price

Value of Asset

Put Option
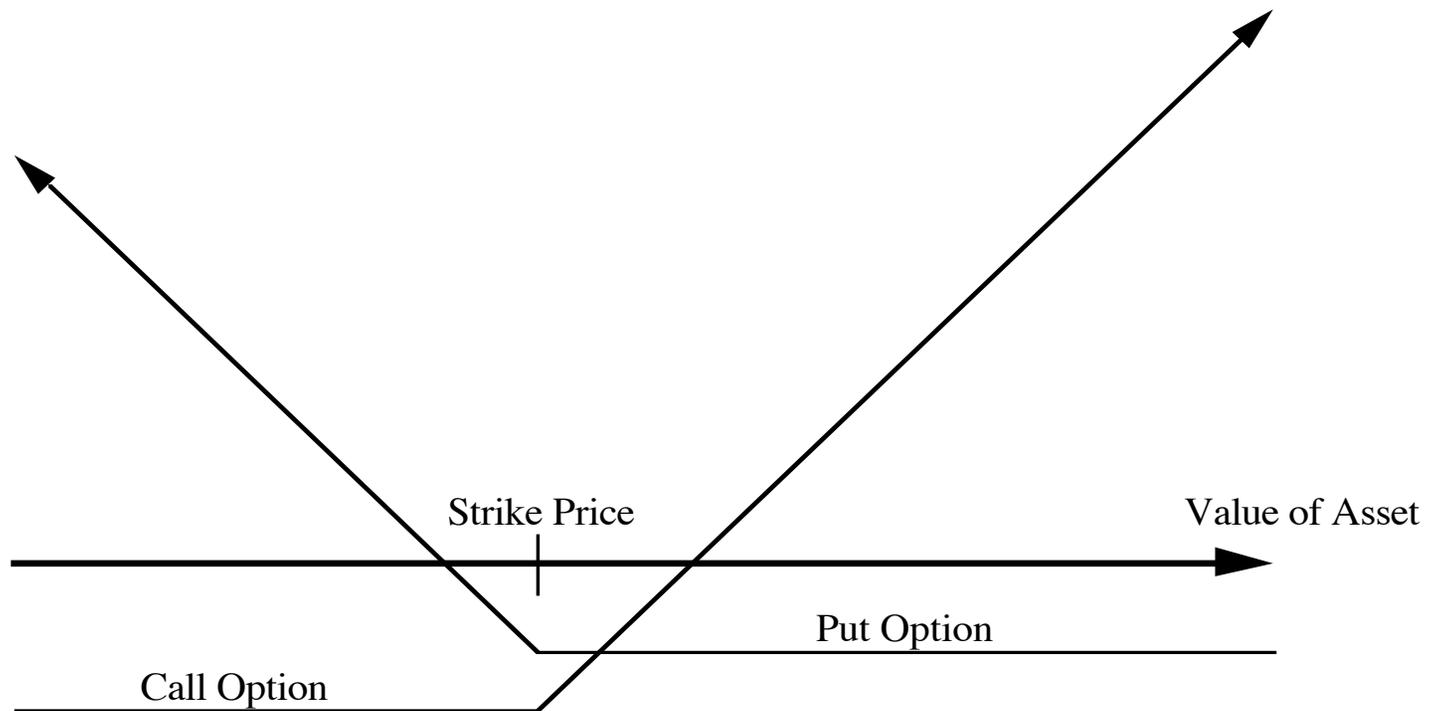
Call Option

Direct Examples of Options

- **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

- <u>Equity in a deeply troubled firm</u> - 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 <u>reserves owned by natural resource firms</u> 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 <u>patent</u> owned by a firm or an <u>exclusive license</u> 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 <u>rights possessed by a firm to expand an existing investment</u> into new markets or new products.

Advantages of Using Option Pricing Models

- 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 it value from its option characteristics, for instance, more risk or variability can increase value rather than decrease it.

Disadvantages of Option Pricing Models

- When real options (which includes the natural resource options and the product patents) are valued, <u>many of the inputs for the option pricing model are difficult to obtain</u>. 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, <u>you first need to value the assets</u>. 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.

What approach would work for you?

- 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?
- Discounted Cash Flow Valuation
- Relative Valuation
- Neither. I believe that markets are efficient.