Relative Valuation (Pricing)

- <u>What is it?</u> The "value" of any asset can be estimated by looking at how the market prices "similar" or "comparable" assets.

- <u>Philosophical Basis</u>: 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)

- <u>Information Needed</u>: 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

- <u>Market Inefficiency</u>: 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

- <u>In sync with the market</u>: 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, <u>there will always be a significant proportion of securities</u> 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 <u>requires less explicit information than discounted cash flow valuation</u>.

- In relative valuation, <u>you are playing the "incremental" game</u>, where you hope to make money by getting the next increment (earnings report, news story etc.) right.

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Disadvantages of Relative Valuation

- 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 they 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.

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When relative valuation works best..

- □ 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. A long-only investor cannot.

And there are some investments that can only be priced

	To value	To price
Assets	Can be valued based upon expected cashflows, with higher cashflows & lower risk = higher value.	Can be priced against similar assets, after controlling for cash flows and risk.
Commodity	Can be valued based upon utilitarian demand and supply, but with long lags in both.	Can be priced against its own history (normalized price over time)
Currency	Cannot be valued	Can be priced against other currencies, with greater acceptance & more stable purchasing power = higher price.
Collectible	Cannot be valued	Can be priced based upon scarcity and desirability.

Asset Based Valuation: A Detour

- 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

  - <u>Liquidation valuation</u>, where you are valuing the assets for sale
  - <u>Accounting valuation</u>, where you are valuing individual assets for accounting reasons (fair value or goodwill estimation
  - <u>Sum of the parts valuation</u>, 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?

☐ 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.

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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 Asse

Put Option

Call Option

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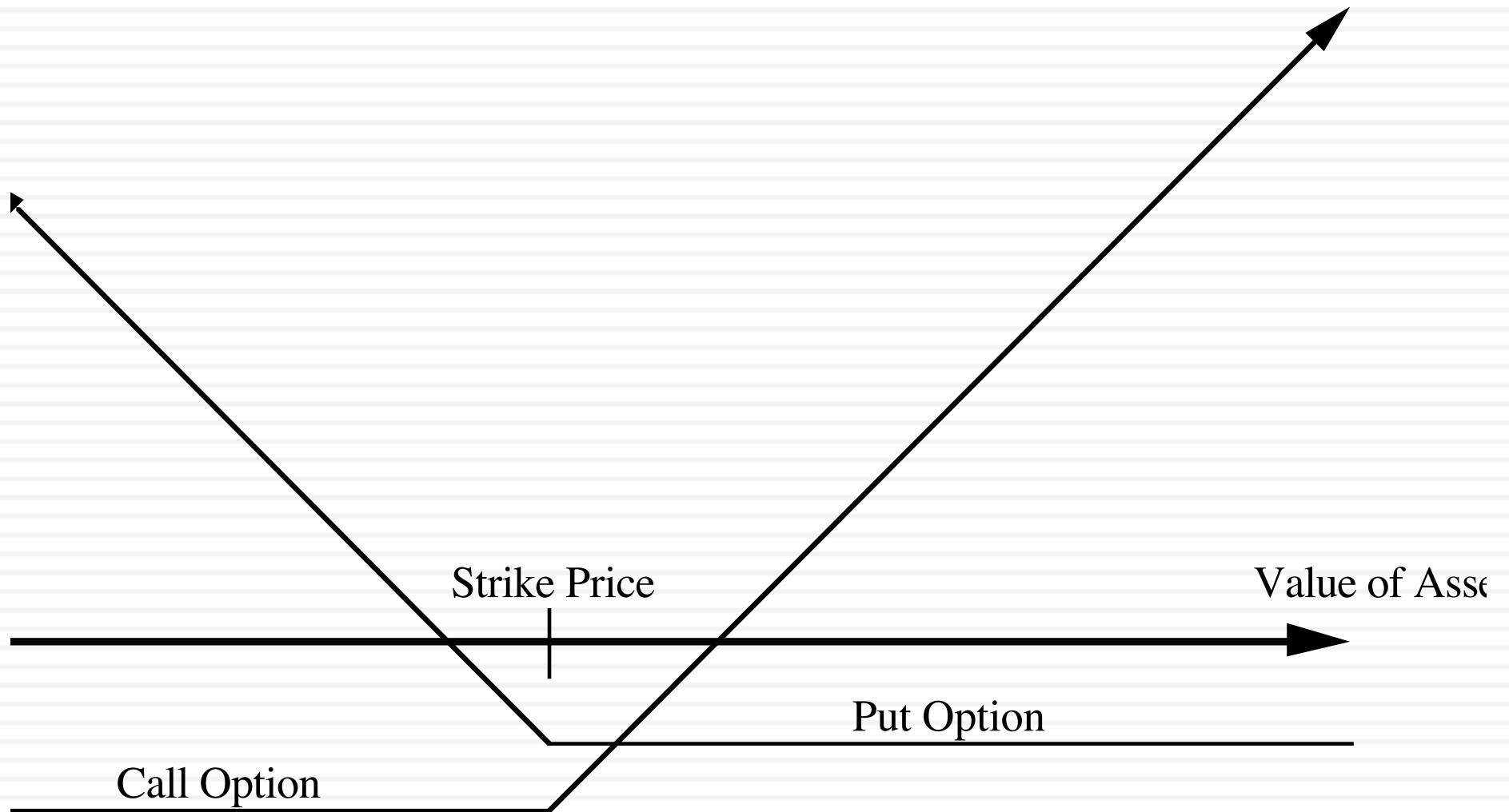
Direct Examples of Options

- ☐ <u>Listed options</u>, which are options on traded assets, that are issued by, listed on and traded on an option exchange.

- ☐ <u>Warrants</u>, 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.

- ☐ <u>Contingent Value Rights</u>, 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

- ☐ <u>Scores and LEAPs</u>, are long term call options on traded stocks, which are traded on the exchanges.

Indirect Examples of Options

- 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

- 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 <u>danger of double counting assets</u>. 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…

- ☐ 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 or Pricing
  - ◘ 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.

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Valuation: Lecture Note Packet 1 Intrinsic Valuation

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Updated: January 2022

The essence of intrinsic value

- In <u>intrinsic valuation</u>, you value an asset based upon its fundamentals (or intrinsic characteristics).

- For <u>cash flow generating assets</u>, the intrinsic value will be a function of the magnitude of the <u>expected cash flows</u> on the asset over its lifetime and the <u>uncertainty</u> 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.

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The two faces of discounted cash flow valuation

- 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:

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

where the asset has an 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:

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

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

Risk Adjusted Value: Two Basic Propositions

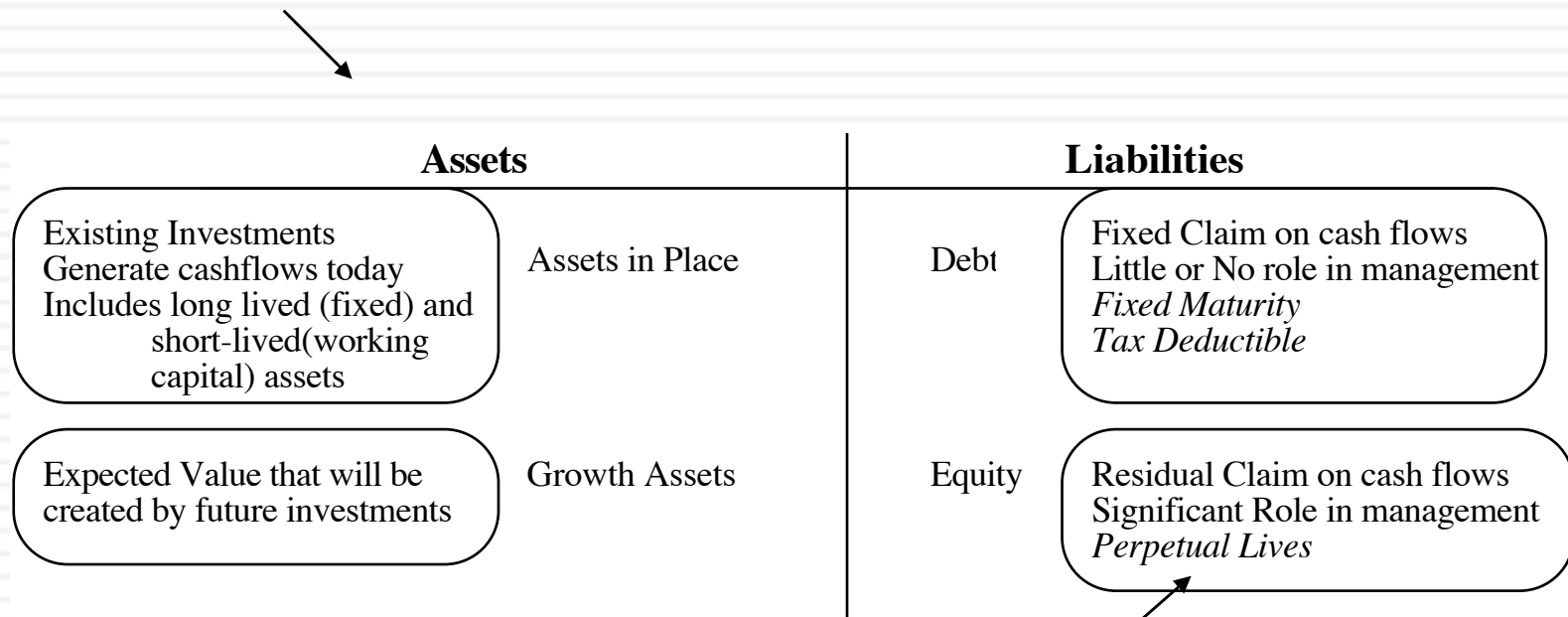- The value of an asset is the risk-adjusted present value of the cash flows:

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

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 "DON'T BE A WUSS" proposition: Valuation requires that you make estimates of expected cash flows in the future, not that you be right about those cashflows. So, uncertainty is not an excuse for not making estimates.

3. 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.

4. 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.

DCF Choices: 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

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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
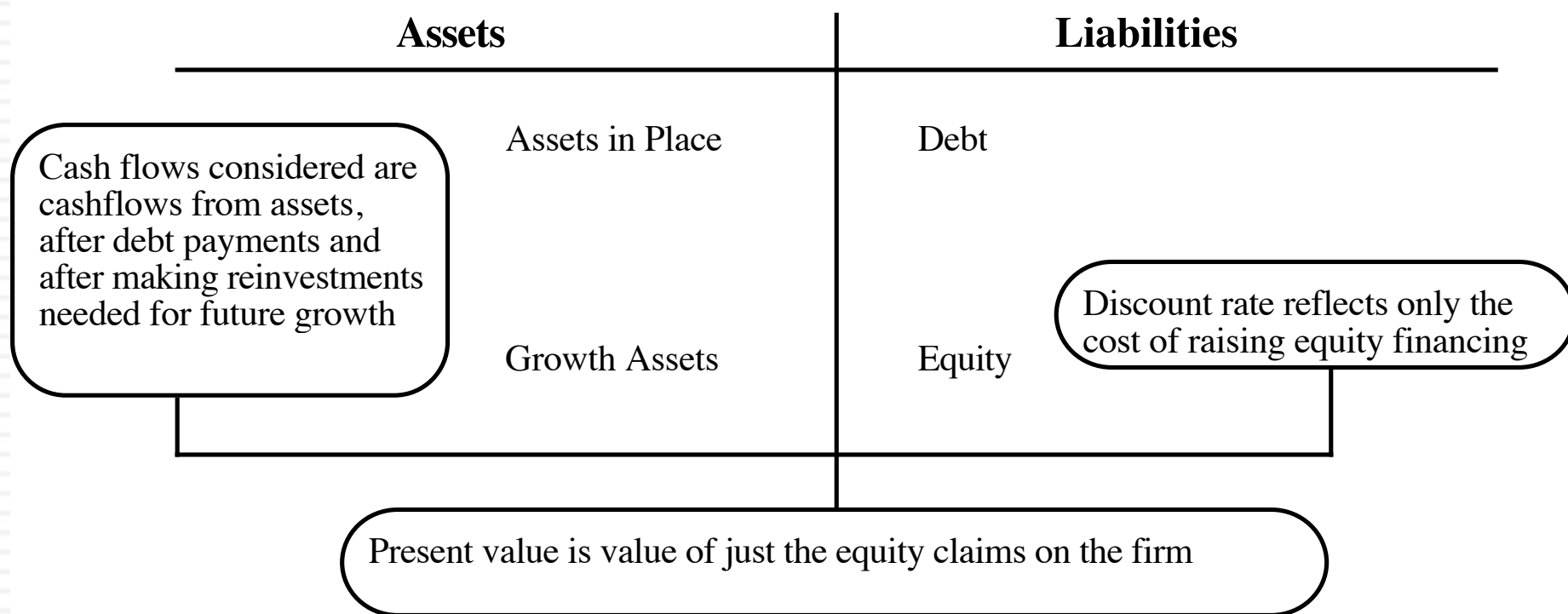
Firm Valuation

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.

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Firm Value and Equity Value

□ To get from firm value to equity value, which of the following would you need to do?

a. Subtract out the value of long term debt

b. Subtract out the value of all debt

c. Subtract the value of any debt that was included in the cost of capital calculation

d. Subtract out the value of all liabilities in the firm

□ Doing so, will give you a value for the equity which is

a. greater than the value you would have got in an equity valuation

b. lesser than the value you would have got in an equity valuation

c. equal to the value you would have got in an equity valuation

Cash Flows and Discount Rates

□ Assume that you are analyzing a company with the following cashflows for the next five years.

Year	CF to Equity	Interest Expense (1-t)	CF to Firm
1	$ 50	$ 40	$ 90
2	$ 60	$ 40	$ 100
3	$ 68	$ 40	$ 108
4	$ 76.2	$ 40	$ 116.2
5	$ 83.49	$ 40	$ 123.49
Terminal Value	$ 1603.0		$ 2363.008

□ Assume also that the cost of equity is 13.625% and the firm can borrow long term at 10%. (The tax rate for the firm is 50%.)

□ The current market value of equity is $1,073 and the value of debt outstanding is $800.

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Equity versus Firm Valuation

- ☐ Method 1: Discount CF to Equity at Cost of Equity to get value of equity
  - ◘ Cost of Equity = 13.625%
  - ◘ Value of Equity = $50/1.13625 + 60/1.13625^2 + 68/1.13625^3 + 76.2/1.13625^4 + (83.49+1603)/1.13625^5 = \mathbf{\$1073}$
- ☐ Method 2: Discount CF to Firm at Cost of Capital to get value of firm
  - ◘ Cost of Debt = Pre-tax rate (1- tax rate) = 10% (1-.5) = 5%

  Cost of Capital = 13.625% (1073/1873) + 5% (800/1873) = 9.94%
  - ◘ PV of Firm = $90/1.0994 + 100/1.0994^2 + 108/1.0994^3 + 116.2/1.0994^4 + (123.49+2363)/1.0994^5 = \$1873$
  - ◘ Value of Equity = Value of Firm - Market Value of Debt

    = $ 1873 - $ 800 = **$1073**

First Principle of Valuation

□ <u>Discounting Consistency Principle</u>: Never mix and match cash flows and discount rates.

□ Mismatching cash flows to discount rates is deadly.

▪ Discounting cashflows after debt cash flows (equity cash flows) at the weighted average cost of capital will lead to an upwardly biased estimate of the value of equity

▪ Discounting pre-debt cashflows (cash flows to the firm) at the cost of equity will yield a downward biased estimate of the value of the firm.

The Effects of Mismatching Cash Flows and Discount Rates

- Error 1: Discount CF to Equity at Cost of Capital to get equity value
  - PV of Equity = $50/1.0994 + 60/1.0994^2 + 68/1.09943 + 76.2/1.0994^4 + (83.49+1603)/1.0994^5 = \$1248$
  - Value of equity is overstated by $175.

- Error 2: Discount CF to Firm at Cost of Equity to get firm value
  - PV of Firm = $90/1.13625 + 100/1.13625^2 + 108/1.13625^3 + 116.2/1.13625^4 + (123.49+2363)/1.13625^5 = \$1613$
  - PV of Equity = $1612.86 - $800 = $813
  - Value of Equity is understated by $ 260.

- Error 3: Discount CF to Firm at Cost of Equity, forget to subtract out debt, and get too high a value for equity
  - Value of Equity = $ 1613
  - Value of Equity is overstated by $ 540

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