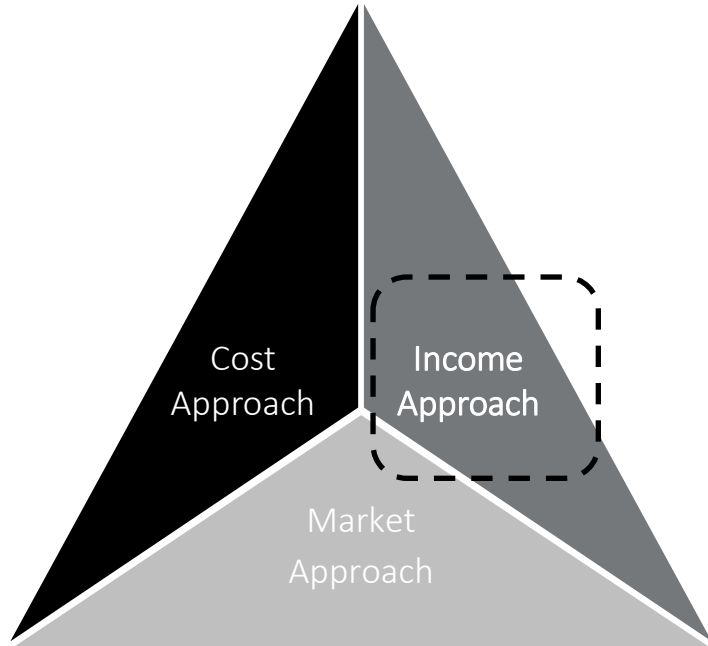


DCF Method of Valuation and Common Errors in DCF

DCF – Introduction



Income approach

- **Discounted Cash Flow Method (DCF):** Discounts forecasted cash flows to the present using a relevant discount rate.
- The discount rate, WACC or Cost of Equity (depending on the cash flows being used), reflect the return expectations which a capital provider would expect, from a market participant basis, from the business depending on the inherent risks in the cash flows.

DCF – Introduction

The DCF Method is based on the premise that the **value** of the business/ enterprise/asset is the **present value** of the **future economic benefits/ income** (i.e) cash flows to be derived by the owners of the business. This method analyses discretely three factors which directly determine value

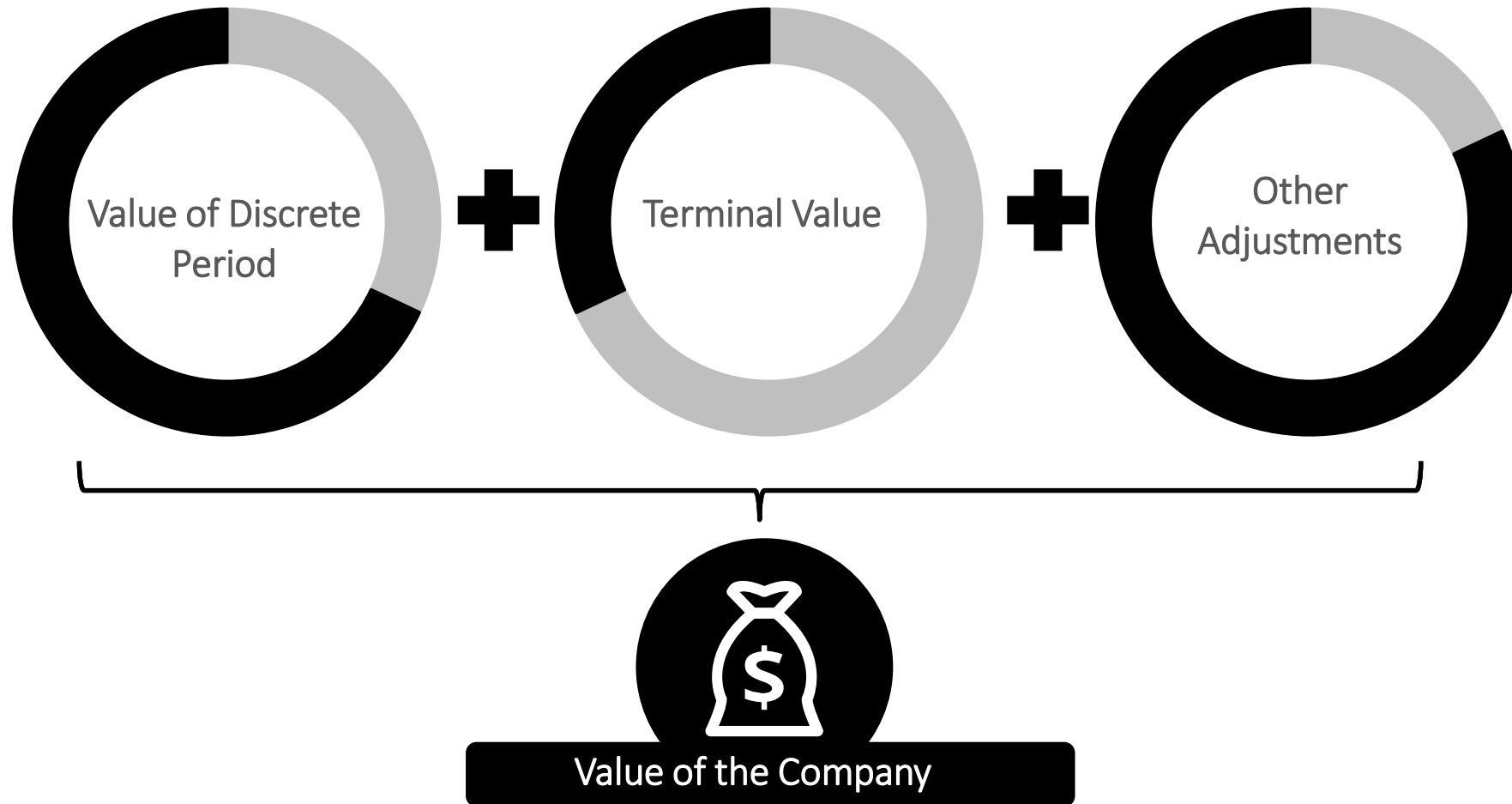
- The amount of ***cash expected*** to be generated;
- The ***timing*** of the cash flow; and
- The ***riskiness*** of the projected cash flows

This method entails analysis of the projections - revenues, expenses, working capital investments, capital expenditures and asset efficiency, capital structure



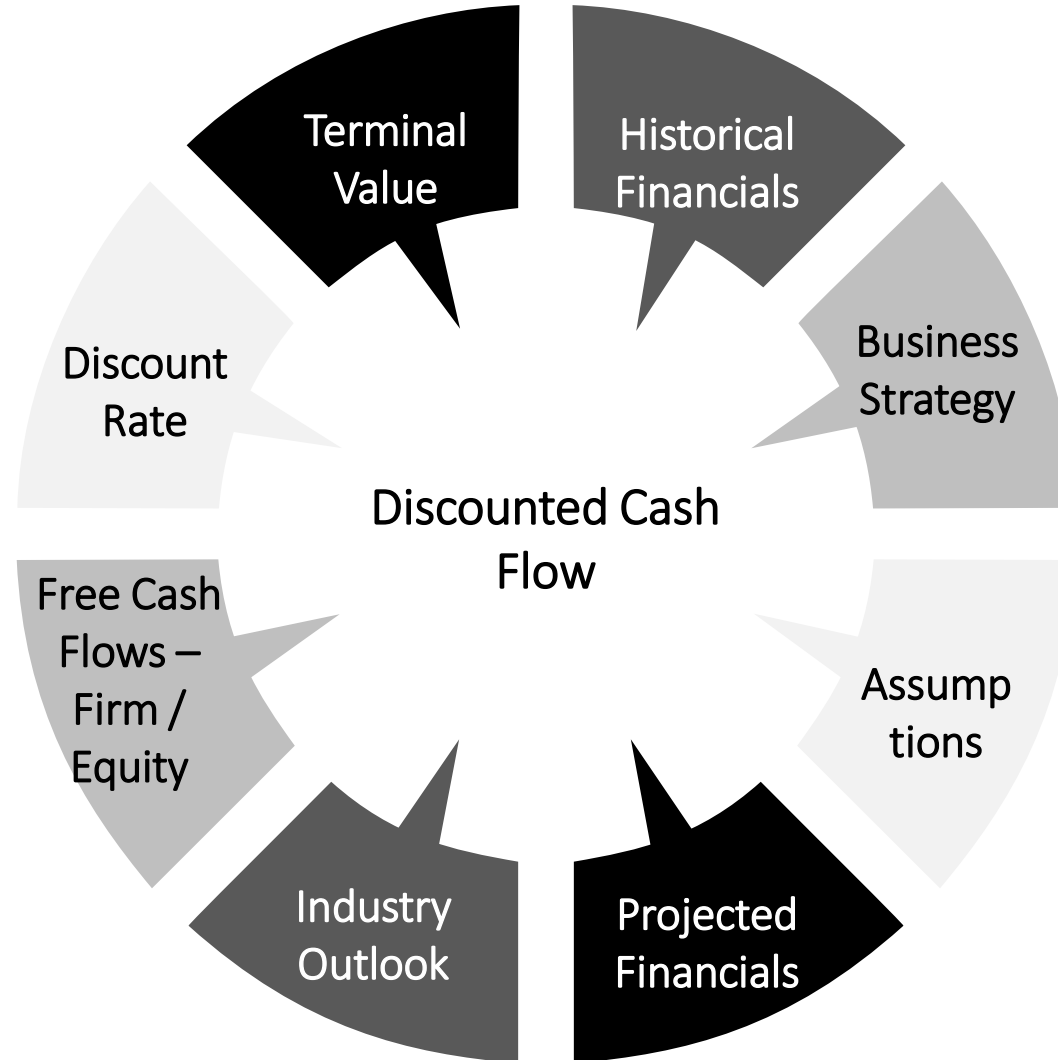
DCF is based on the concept of time value of money

DCF – Fundamental Approach

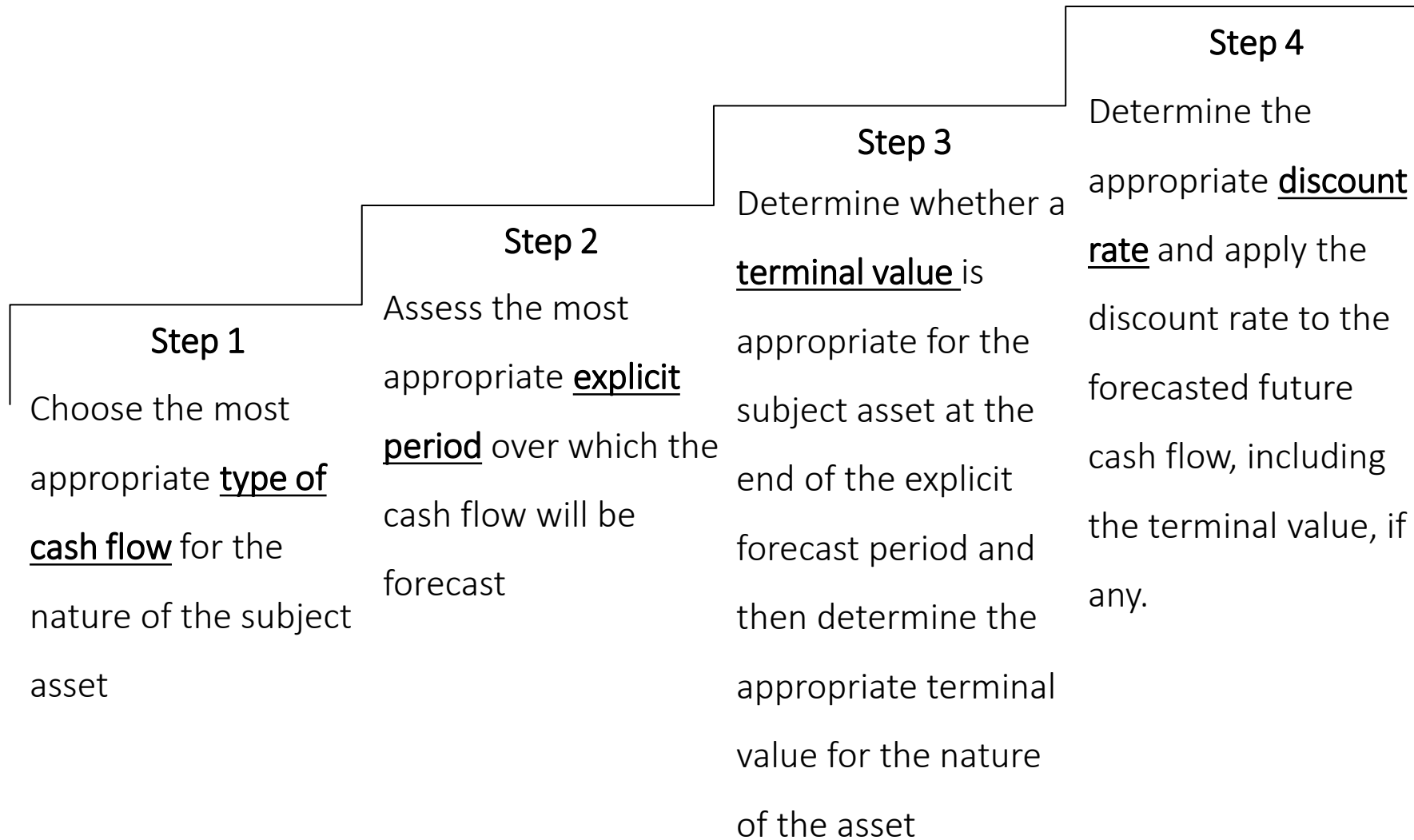


DCF Overview

In this technique, the value of an asset is calculated on the basis of present value of expected future cash flows to be received from that asset.



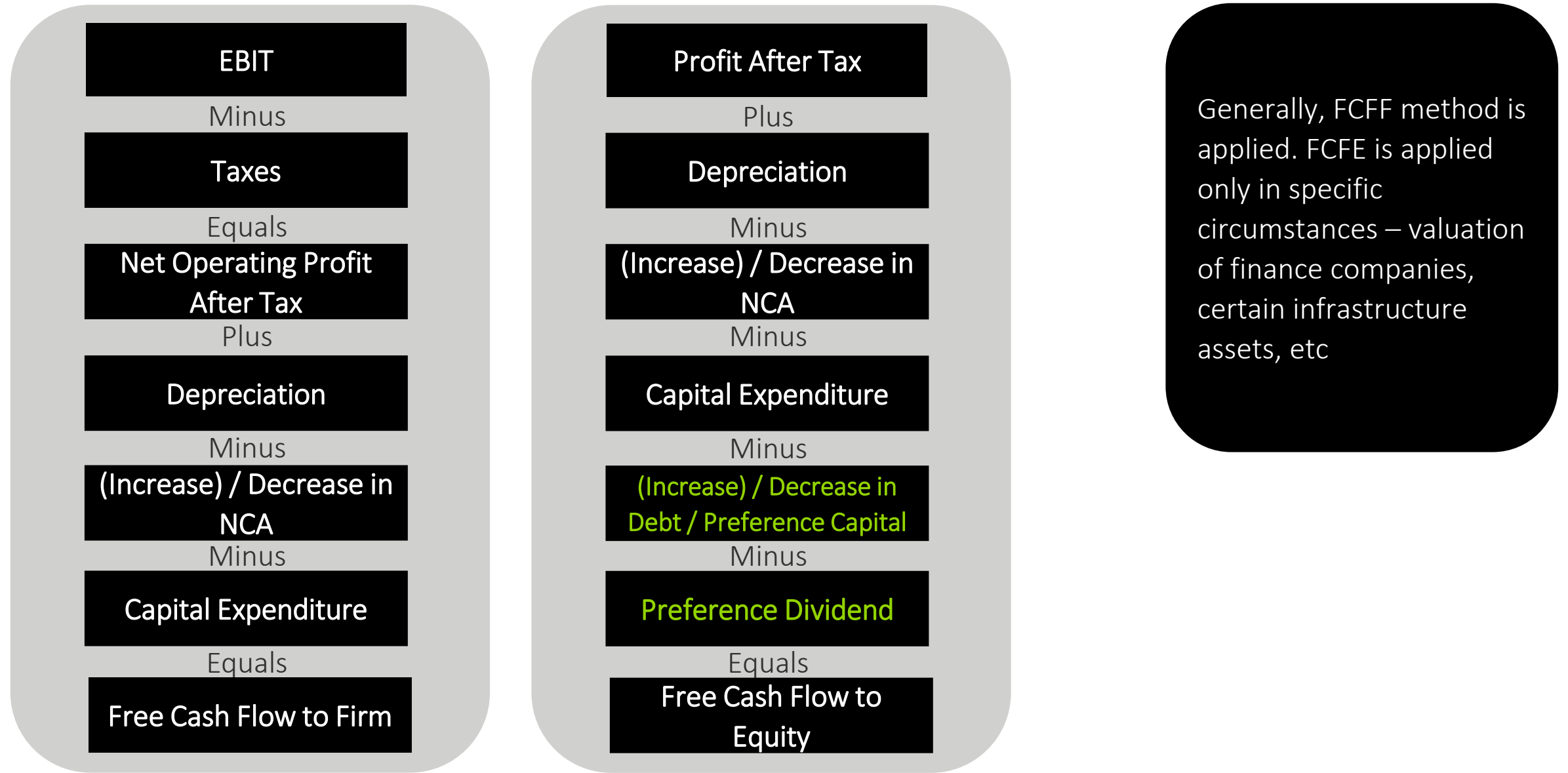
DCF Steps



Step 1 - Free Cash Flows – 2 Categories

Particulars	FCFF	FCFE
Cash flows available to	<u>All</u> the stakeholders - <u>equity</u> shareholders, <u>preference</u> capital holders and <u>lenders</u> .	<u>Only the equity shareholders</u>
Cash flows to service debt, Pref Capital	<u>Not reduced</u> while calculating FCFF.	<u>Reduced</u> in the calculation of FCFE.
Discount Rate	Weighted Average Cost of Capital ○ Reflect opportunity cost to <u>all</u> the capital providers ○ Weighted by their relative contribution to the total capital of the company.	Cost of Equity Reflect opportunity cost to <u>equity</u> shareholders.
Resultant Value	<u>Enterprise / Business Value</u>	<u>Operating Equity Value</u>
Arriving at Value of 100% Equity	Adjustments to be made for ○ Non-operating / surplus assets ○ Non-Convertible Debt ○ Redeemable Preference Capital ○ Contingent Liabilities ○ Equity Dilutants	Adjustments to be made for ○ Non-operating / surplus assets ○ Contingent Liabilities ○ Equity Dilutants

Step 1 - Measuring Free Cash Flows



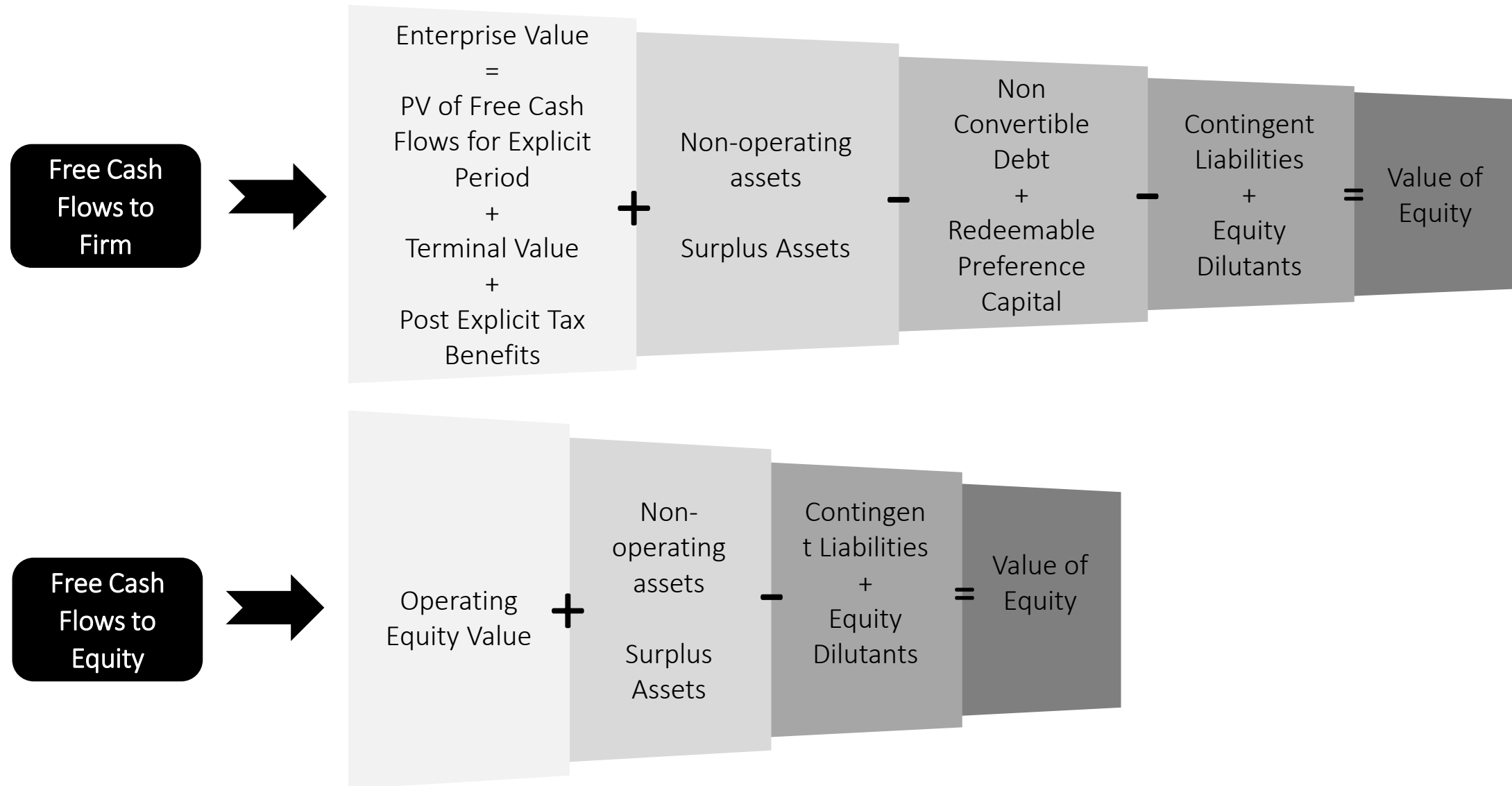
Step 1 - Measuring Free Cash Flows

- Pre-tax or post tax cashflows – For Impairment testing (disclosures) pre-tax cashflows considered
- Currency of cash flows – Relevant for determining inputs for discount rate
- Real vs Nominal cash flows – generally, nominal considered - Relevant for determining inputs for discount rate

Additional considerations

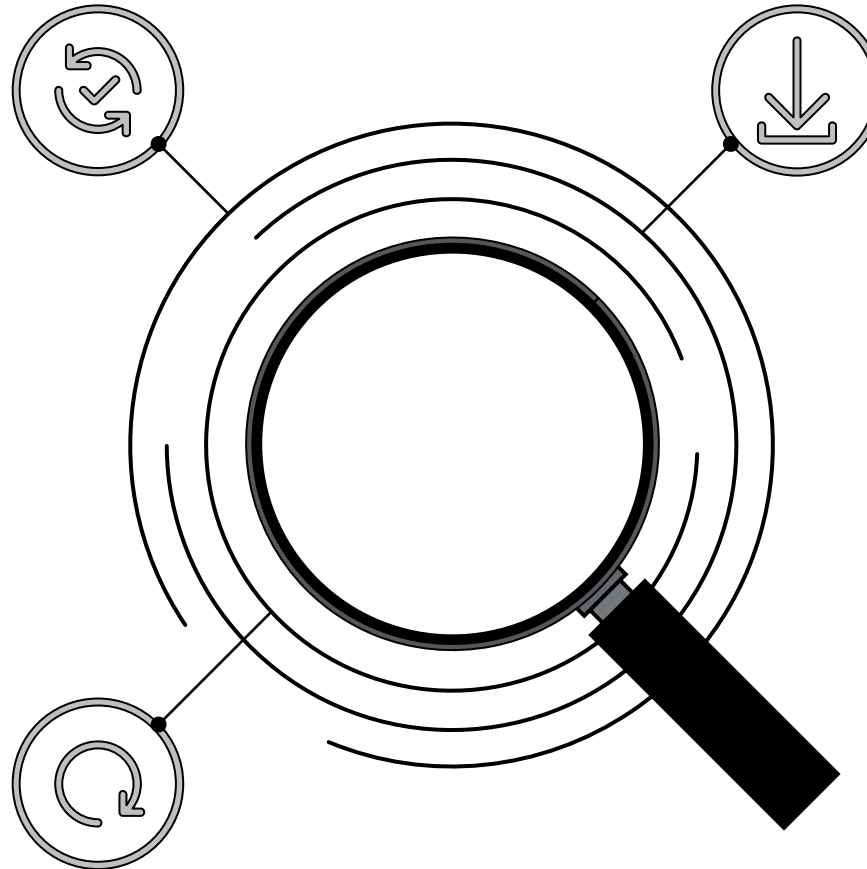
- Tax rate applied on EBIT is generally the marginal tax rate. Consider effective tax rate where company is unlikely to pay taxes for a reasonably long period of time.
- Non operating items – income from investments, interest income and other surplus assets – excluded from operating cash flows as valued separately
- Non-recurring cash flows - What is not maintainable for a CCM profit metric, is still a cash flow and needs to be adjusted in DCF. Eg VRS Costs incorporated in projections
- Unlike current tax, deferred tax and MAT credit created/reversed are non-cash items.

Step 1 - Measuring Free Cash Flows



Step 2 – Explicit Period

Generally, Consider a period of 3 to 5 years subject to the pointers



Explicit Period – usually several years since the Valuation Date

- Length of explicit period – determining factors:
 - Limited life
 - ✓ Valuation of contract only for its current term
 - ✓ Depleting resources (Mines) – till resources are exhausted
 - ✓ Road project – BOT
 - ✓ Power project
 - Availability of reliable data on which to base the projections
 - Time required to achieve a stabilised level of growth and profits, after which a terminal value can be used
 - In the valuation of cyclical assets, the explicit forecast period should generally include an entire cycle, when possible.

- If limited life – seek projections for entire life
- Outer years of projections should generally have declining growth rates trending towards TvG
- Consider applying probabilities – drug innovation company

Step 3 – Terminal Value

- Businesses potentially have an infinite life. The value of a business is the present value of cash flows forever.
- Since we cannot estimate cash flows forever, we estimate cash flows for the explicit period and then estimate a terminal value, to capture the value at the end of the explicit period
- Once the business reaches a steady state we determine the terminal value, wherein the Business / Company is assumed :
 - To grow at a constant rate
 - Reinvest a constant proportion of its operating profits into business
 - Earn a constant return on its base level of invested capital

Step 3 – Determinants of Terminal Value and Terminal Growth Rate

- Natural limits (e.g. demographics, market share)
- Product life cycle / market stage
- Optimum capacity / potential utilisation
- Has the company reached a steady state? Stable level is when future operations are not expected to differ from current operations except as a result of normal growth.
- For cyclical assets, terminal value should consider the cyclical nature of the asset
- Whether there is a predetermined fixed capital amount expected to be received at the end of the explicit forecast period
- Whether there is future growth potential for the asset beyond the explicit forecast period, or whether the asset is deteriorating in nature
- Life of the asset after the explicit forecast period
- Tax attributes inherent in the asset at the end of the explicit forecast period and whether those tax attributes would be expected to continue into perpetuity
- The general thumb rule is that the terminal growth rate should not exceed the risk-free rate – Prof. Damodaran

Step 3 – Methods to calculate Terminal Value

1 >

Gordon Growth Model

- Capitalisation of the free cash flows using discount rate and terminal growth rate

2 >

Market approach/exit value

- Capitalization of earnings using an exit multiple

3 >

Salvage value/disposal cost

- Liquidation / realization of assets – based on forecast balance sheet.
- Generally more useful when assets are separable and marketable / more liquid in nature.

Step 3 – Methods to calculate Terminal Value

Gordon Growth Model

$$\text{Terminal Value} = \text{CF} * (1 + g) / (r - g)$$

where,

CF = Maintainable cash flow for the terminal value

g = Terminal value growth rate

r = Discount rate

- Generally, normalized cash flows for the period immediately preceding the terminal value capitalization date is considered a reasonable base level to which a sustainable growth rate is applied.
- Margins considered for terminal value should exclude one-time items
- Generally, marginal tax rate is applied for the terminal value profitability and benefit of unexpired tax losses is captured separately
- **Present Value factor for Terminal Value:**
 - TV Growth applied - Mid period factor
 - Exit Multiple and Salvage value - End period factor

Step 3 – Methods to calculate Terminal Value

Market Approach / Exit Value

- Terminal value is estimated by applying a pricing multiple to some economic variable, such as EBITDA or EBIT or PAT or Book Value.
- Used in limited circumstances because:
 - Future multiple can't be directly observed in the marketplace - must be estimated.
 - Availability of forward estimates is limited
 - Current multiples need not be entirely relevant

Salvage Value / Disposal Cost

- The terminal value of some assets may have little or no relationship to the preceding cash flow. Examples of such assets include wasting assets such as a mine or an oil well.
- In such cases, the terminal value is typically calculated as the salvage value of the asset, less costs to dispose of the asset. In circumstances where the costs exceed the salvage value, the terminal value is negative and referred to as a disposal cost or an asset retirement obligation.

Step 4 – Discount Rate

- A discount rate is a rate of return used to convert a future monetary sum into present value. It is the return required by an investor to make a particular investment.
- A discount rate is a forward-looking rate representing an adequate return for the period during which the investment is held. The discount rate needs to consider the time value of money, and the risk inherent in ownership of the asset being valued.
- Which discount rate to use depends on the nature of the cash flows being discounted. FCFE cash flows are discounted using Cost of Equity, while FCFF cash flows are discounted using the weighted average cost of capital.
- Further, the discount rate should take into account:
 - Nature of cashflows – pretax Vs. post tax, Real cashflows Vs nominal cashflows
 - Currency of Cashflows

Step 4 - Discount Rate – WACC – used for FCFF

WACC is a rate of return that an investor would expect to receive, from a market participant basis, if capital were invested in a similar venture.

$$\text{WACC} = K_e * (E / (D + E)) + K_d * (D / (E + D))$$

K_e represents the cost of equity, i.e. the return required by equity shareholders;

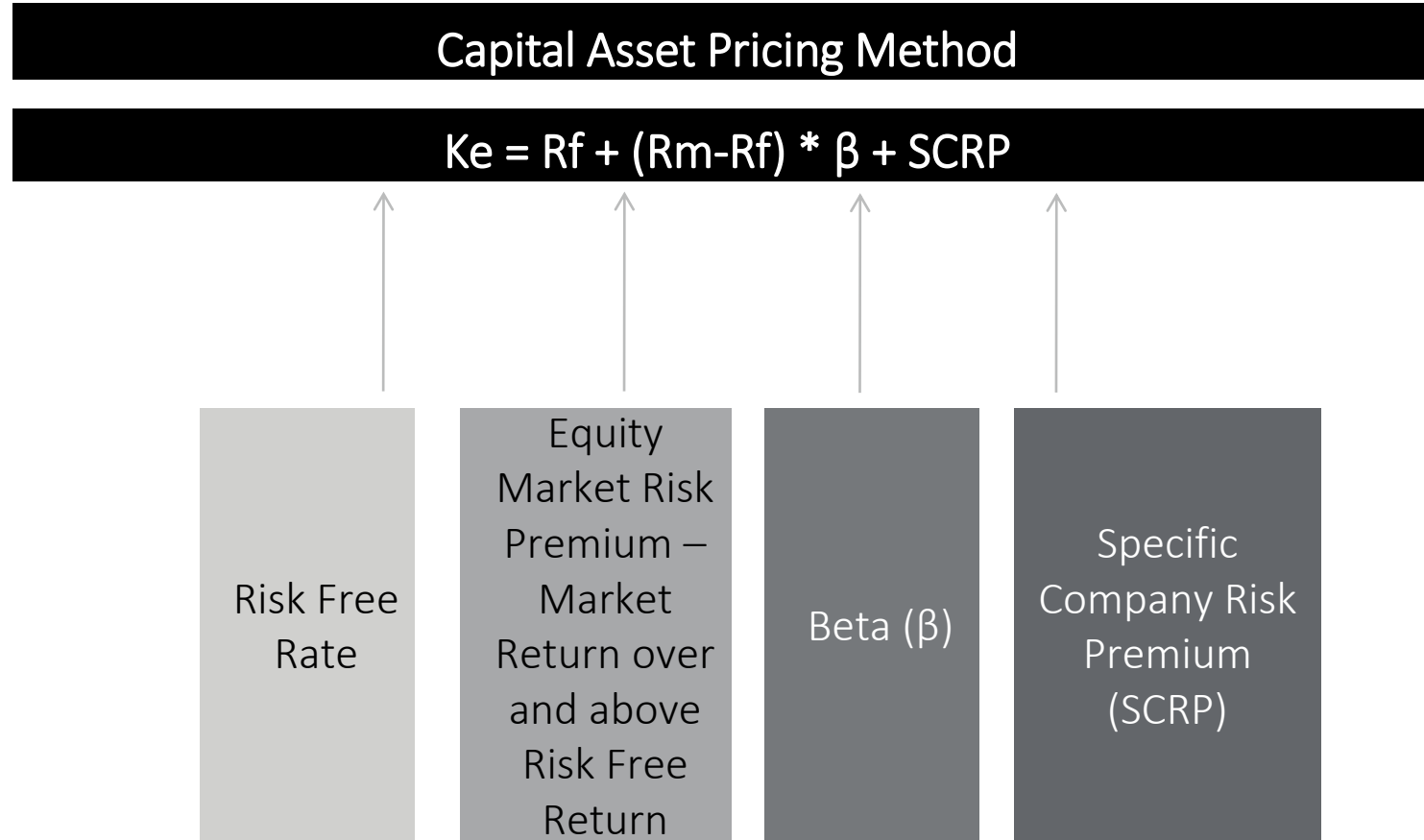
K_d represents the after-tax cost of debt, i.e. the return required by debt holders;

$e/(d+e)$ represents the percentage of equity capital to the total capital; and

$d/((d+e))$ represents the percentage of debt to the total capital.

- K_e – CAPM Model
- K_d – Cost of Debt on an arm's length basis
- Debt Equity Ratio – generally based on industry debt equity ratio

Step 4 - Discount Rate – Cost of Equity



Step 4 - Discount Rate – R_f

R_f : Risk Free Rate

- To be risk-free, an asset must have:
 - No risk of default associated with its cash flows and
 - No reinvestment risk
- The appropriate risk-free rate to use to obtain expected returns needs to be a default-free (government) zero-coupon rate having the same maturity as the cash flows being discounted

Generally, YTM of 10 year Indian government bonds and securities is considered.

Step 4 - Discount Rate – Equity Market Risk Premium

R_m - R_f : Equity Market Risk Premium

- Equity market risk premium is a rate of return added to a risk-free rate to reflect the additional risk of equity instruments over risk-free instruments (a component of the cost of equity capital or equity discount rate).
- The general formula for the Equity market risk premium is

$$ERP = E(R_m) - R_f$$

Where:

R_m = Return on the stock market

$E(R_m)$ = Expected return on the stock market

R_f = Risk-free rate of return

Step 4 - Discount Rate – Equity Market Risk Premium

- The equity risk premium is forward-looking. It is the expected incremental return on common stocks during the term of the investment. But analysts often look at historical returns as a reasonable indicator of expected returns.
- **Use of historical ERP** - Assumes that the historical differential between stocks and government bond returns is a relatively stable indicator of investor willingness to assume the risk associated with equities.
- **Use of a forecast ERP** - Assumes that an analyst can make a better forecast of the relative risk and return on equities if current market and economic conditions are taken into effect.

Based on the long-term historical returns of the stock markets. Currently, market practice is around at 6% - 8%, trending more towards 7%

Step 4 - Discount Rate – Beta

- The CAPM was developed in the context of portfolio theory as a means of measuring the risk that an individual stock contributes to a well-diversified portfolio. Ownership of a single stock exposes an investor to both unsystematic and systematic risk. In a diversified portfolio, much of the unsystematic risk is eliminated.
- A portfolio's market risk or systematic risk that remains constant **cannot be diversified away** and is captured in beta in the CAPM.
- β is measured by regression of the returns on an asset / stock against returns in the market – A measure of correlation
 - a measure of volatility vis-à-vis the benchmark index

Step 4 - Discount Rate – Beta

- If beta **equals 1.0**, the total return for the subject security moves in tandem with the total return of the market.
- If beta is **higher than 1.0**, the total return for the subject security moves in the same direction as the market but with greater magnitude.
- If beta is **lower than 1.0**, the total return for the subject security moves in the same direction as the market but with less magnitude.
- If beta is **negative**, which is infrequent, the total return for the subject security moves in the opposite direction from the total return on the market.

- Because betas are unavailable for private companies, one typically needs to identify a group of guideline public companies that are similar to the subject company, determine the beta of each company, and then select a central tendency of the betas (median, mean, or market value weighted average) to represent industry risk. Used this way, beta assumes the function of an industry risk component.

Step 4 - Discount Rate – Beta

- Period of measurement : 1 / 3 / 5-year beta?
 - Industry character – cyclical, longer gestation period
 - Company-specific characteristics – post a material corporate announcement
- Frequency of measurement: Daily / weekly / monthly beta?
- Preferred index – Sensex, Nifty, BSE/NSE-500?
- Unlevering of beta
 - **Unlevered Beta** = Levered Beta/[1+(1–tax rate) x debt-to-equity ratio]
 - Tax Rate : Marginal tax rate to be used
 - Consider debt to equity ratio based on period considered for beta measurement
 - Individually unlever beta of each company based on its debt equity ratio and marginal tax rate

- Valuation of Listed Companies ?
- Infrequently traded companies ?

Step 4 - Discount Rate – Beta

- Relevering of beta
 - **Relevered Beta** = Unlevered Beta x $[1 + (1 - \text{tax rate}) \times \text{debt-to-equity ratio}]$
 - Tax Rate :
 - ✓ Generally, marginal tax rate
 - ✓ Certain specific cases – effective tax rate (where company is unlikely to pay taxes for a reasonably long period of time). Ensure this is in sync with tax rate considered for EBIT net of tax calculation
 - Debt to Equity Ratio :
 - ✓ Company's Past average D/E vs. current D/E vs. Projected D/E vs. Target D/E
 - ✓ Industry D/E
 - ✓ Different D/E for Explicit Period vs. Terminal Period?

Step 4 - Discount Rate – Specific Company Risk Premium

- Size Premia – risk and return varies inversely with size
- Projections risk taking into account
 - **Business risk**
 - Geographical drivers
 - Management strength and depth
 - Product line diversity
 - Customer / supplies mixture and reliance – dependency / concentration risk
 - Competitive strengths and weaknesses
 - **Financial risk**
 - Degree of leverage
 - Coverage ratios
 - Liquidity
 - Access to sources of capital

Step 4 - Discount Rate – Cost of Debt

- The cost of debt is the rate obtained from the market.
- It is sensitive to economic conditions and the company's ability to service debt, indicated by its capital structure and debt coverage ratios.
- Tax rate for arriving at post tax cost of debt
 - Generally, marginal tax rate
 - Certain specific cases – effective tax rate (where company is unlikely to pay taxes for a reasonably long period of time)
Ensure this is in sync with tax rate considered for EBIT net of tax calculation

Step 4 - Discount Rate – International Cost of Capital

Country Spread Model

- The Country Spread Model adds a country-specific spread to a cost of equity.
- Typically, a cost of equity is determined using US base data, and then a spread is added to the cost of equity as appropriate.
- The country-specific spread is intended to measure the additional return required to compensate for the additional risk inherent in the foreign investment (*As per latest data, US is no longer considered risk-free*)
- Once the Country Risk Premium is estimated, it can be added to the cost of equity from the CAPM to estimate the cost of equity for the subject foreign company

$$\text{Cost of Equity} = R_f + \beta(\text{ERP}_{\text{US}}) + \text{Country Risk Premium} + \text{SCR}$$

Where,

R_f = U.S. Risk Free Rate

β = Beta

ERP_{US} = U.S ERP

The US risk free rate is used assuming the forecasted cash flows of the company are in US dollars.

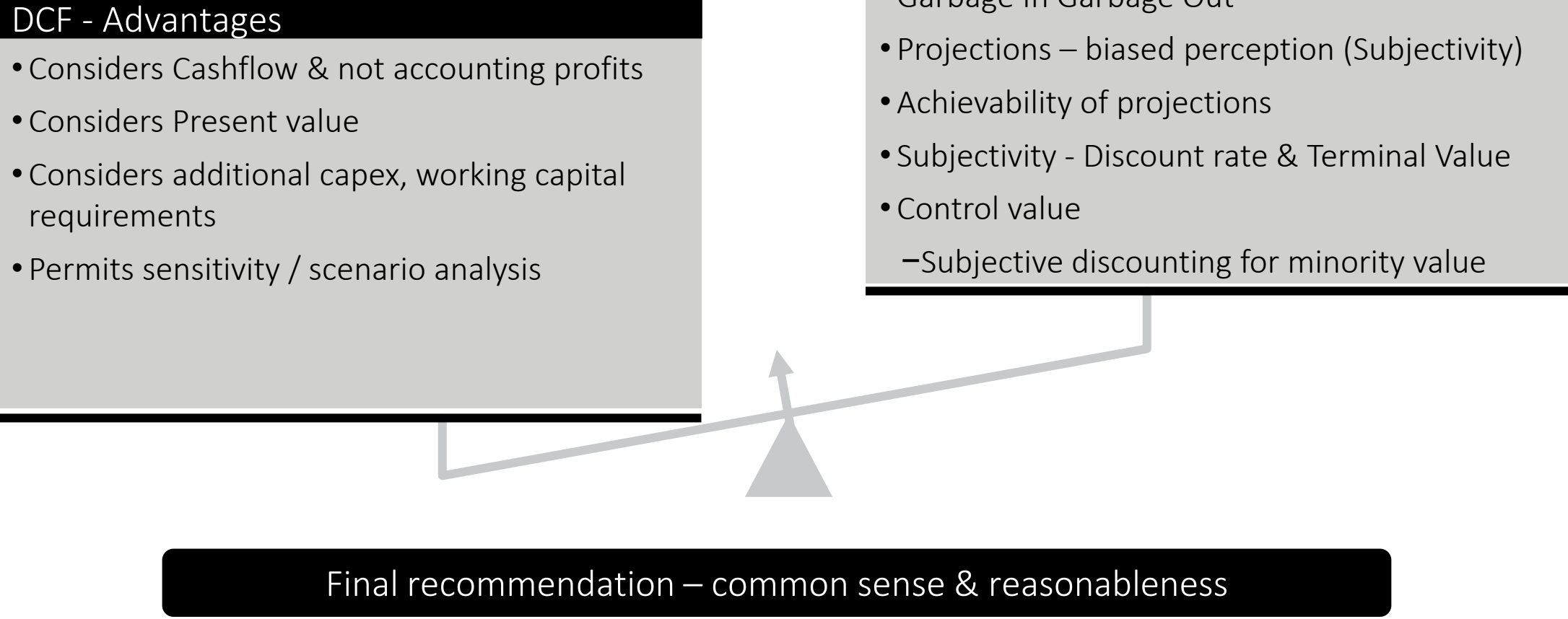
DCF – Advantages / Disadvantages

DCF - Advantages

- Considers Cashflow & not accounting profits
- Considers Present value
- Considers additional capex, working capital requirements
- Permits sensitivity / scenario analysis

DCF - Disadvantages

- Availability of projections
- Garbage In Garbage Out
- Projections – biased perception (Subjectivity)
- Achievability of projections
- Subjectivity - Discount rate & Terminal Value
- Control value
 - Subjective discounting for minority value



Final recommendation – common sense & reasonableness

Common Errors in DCF

- Cashflows before Valuation Date considered
- Present Value Factor – End Period vs Mid Period Convention
- COE applied to FCFF / WACC applied to FCFE
- Net Debt / Cash Bank not adjusted
- Interest income from surplus cash considered in DCF cashflows (*where core business does not pertain to financing activities*)
- Lease Rentals and Lease Debt
- Interest expenses not adjusted while arriving at FCFF
- Currency of Cash-Flows and Discount Rate do not align
- Non-Cash Items not adjusted – e.g. Loss on account of Fire.
- What's one off expense / income – Is still a Cash Flow – e.g. Employee VRS
- Terminal Year Cashflows include one-offs / non – maintainable items



Thank You