

Ned Krastev

DCF Valuation

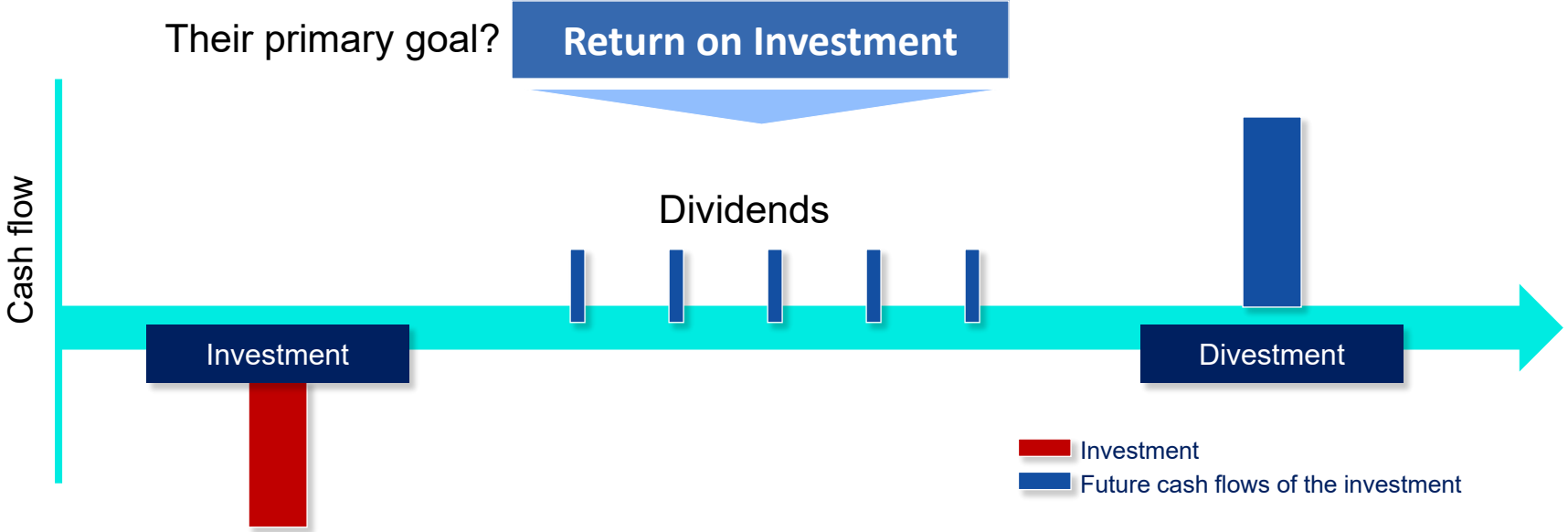
Course Notes

Why discount future cash flows?

The investor perspective

Let's consider that an investor wants invest in a company

Their primary goal? **Return on Investment**



Every Investor buys the shares of a company based on their expectations for future Cash Flows

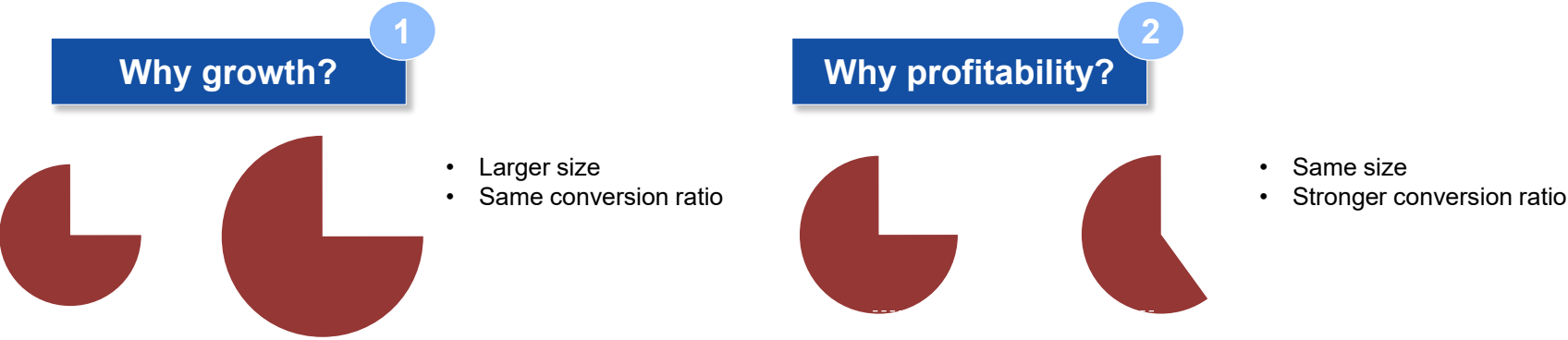
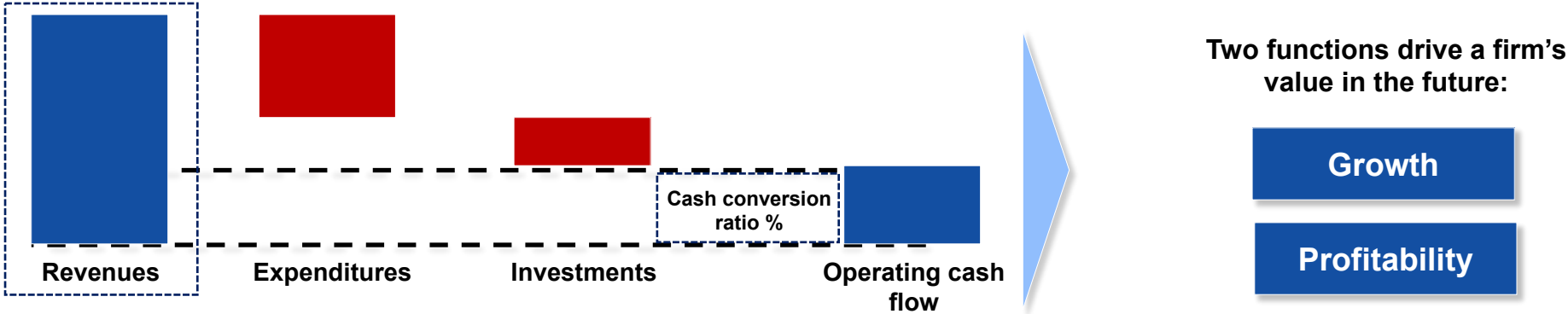
Dividends are a function of future cash flows

Divestment price is a function of future cash flows

What drives company value?

The two key parameters determining a firm's value

Given that a company's value is a function of its future cash flows, we need to determine what drives future cash flows



Higher future cash flows, higher valuation

Calculating Cash Flow: NOPAT

NOPAT = Net Operating Profit After Taxes

1 NOPAT (Net Operating Profit After Taxes) :

| \$ in million | Year 1 | Year 2 | Year 3 |
|---------------------|--------------|--------------|--------------|
| Net Sales | 17,022 | 18,341 | 18,549 |
| Cost of goods sold | (9,483) | (9,822) | (9,857) |
| Gross Margin | 7,539 | 8,519 | 8,692 |
| Operating expenses | (3,492) | (4,394) | (4,123) |
| D&A | (487) | (511) | (693) |
| EBIT | 3,560 | 3,614 | 3,876 |
| Tax rate | 35% | 35% | 35% |
| Operating taxes | (1,246) | (1,265) | (1,356) |
| NOPAT 1 | 2,314 | 2,349 | 2,520 |

NOPAT is a measure of operating profitability. It does not take into consideration a firm's financial structure. Interest expense is not included in the calculation.

Calculating Cash Flow: Working Capital & Capex

The cash impact of Balance Sheet items

2 Working Capital

| \$ in million | Year 1 | Year 2 | Year 3 | DeltaY1-Y2 | Calculate cash effect |
|------------------------|--------------|--------------|--------------|--------------|----------------------------------|
| Account receivables | 3,621 | 4,174 | 3,492 | (553) | -(Receivables Y2-Receivables Y1) |
| Inventories | 2,311 | 1,813 | 2,104 | (498) | -(InventoriesY2-InventoriesY1) |
| Trade payables* | (3,383) | (4,207) | (3,212) | 824 | PayablesY2-PayablesY1 |
| Working Capital | 2,549 | 1,780 | 2,384 | (227) | |

*Please note that Trade Payables are with a negative sign because they are a liability

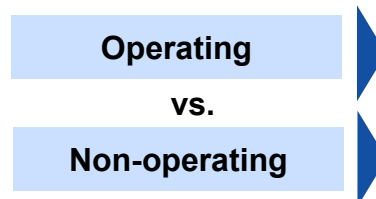
3 Capital Expenditures

Capital expenditure is the cost which the company sustains to replace old PP&E or Acquire new PP&E.

A reasonable assumption is that a growing business will need additional PP&E investments.



4 Other assets and liabilities



Used for the generation of Operating cash flows;
Could be modeled as a % of revenues

Not used for the generation of Operating cash flows; Their value (positive or negative) should be added/(subtracted) to Enterprise Value

Calculating Cash Flow

Discounting Unlevered Free Cash Flows

\$ in million

NOPAT

Add-back D&A

△ Working capital

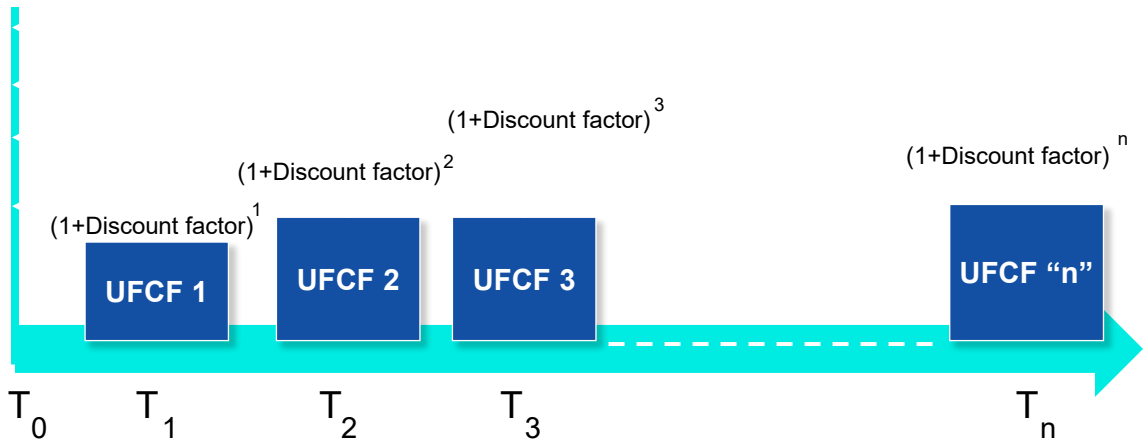
△ Net other assets, liabilities

Capex

Unlevered Free Cash Flow

!Free cash flows are available to both debt and equity investors!

| | |
|---|--|
| NOPAT | Net Operating Profit After Taxes is a measure of operating profitability |
| Add-back D&A | D&A is added back as it is not a Cash expense |
| Delta Working Capital | Growing a business requires investments in Receivables and Inventory and generates more Payables |
| Delta Net Other Operating assets | Similar to Working Capital. As a business grows it needs more other operating assets |
| Capex | Expenditure for PP&E used to replace old PP&E or acquire new PP&E in order to support the growth of the business |



Finding a proper discount factor: WACC

WACC = Weighted Average Cost of Capital



WACC (Weighted Average Cost of Capital) represents the opportunity cost that investors sustain for investing their funds in the firm

$$WACC = \left(\frac{D}{D + E} \right) * k_d * (1 - t) + \left(\frac{E}{D + E} \right) * k_e$$

D = Amount of debt financing

E = Amount of equity financing

k_d = Cost of debt

k_e = Cost of equity

t = Tax rate

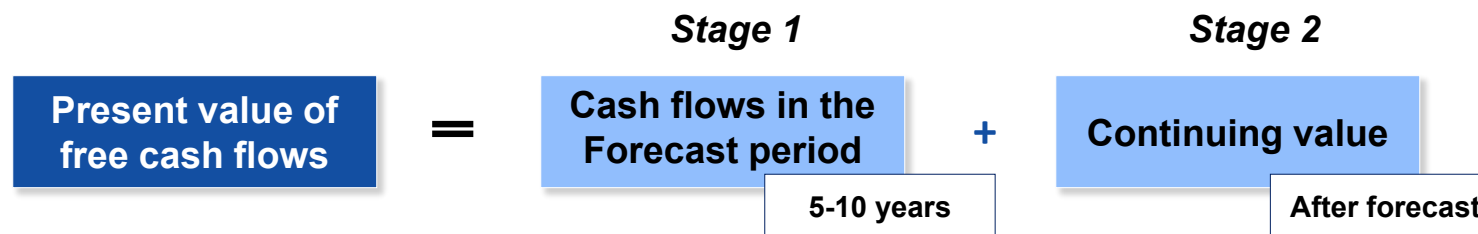
Finding cost of equity and cost of debt

The practical way to calculate cost of equity and debt

| | Methodology | Needed data | Practical implementation |
|----------------|--|---|--|
| Cost of debt | <ul style="list-style-type: none"> Market value of debt | <ul style="list-style-type: none"> Bond current pricing | Use the bond's Yield to Maturity |
| | <ul style="list-style-type: none"> Book value of debt | <ul style="list-style-type: none"> Book value of Financial debt in BS Interest expense in P&L | Divide Interest expense to the amount of Financial debt |
| Cost of equity | <ul style="list-style-type: none"> CAPM (Capital Asset Pricing Model) | <ul style="list-style-type: none"> Risk-free rate | Use a 10-year government bond |
| | $k_e = r_f + \beta * \text{Market risk Premium}$ | <ul style="list-style-type: none"> Market Risk Premium Company beta | <p>Studies show it is between 4.5% and 5.5%</p> <p>A measure of a stock's volatility in relation to the market. Available in financial platforms such as Bloomberg, Thomson Reuters etc.</p> |

Two stages of DCF

Explicit forecast period + Continuing value



| | Description | Needed data | Math formula |
|-----------------------------------|--|---|--|
| Forecast period (Stage 1) | The explicit forecast period should be long enough to allow the business to reach maturity | <ul style="list-style-type: none"> ▪ Free cash flow Forecast (5 or 10 years) ▪ WACC | $\frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \frac{FCF_3}{(1+WACC)^3} + \frac{FCF_4}{(1+WACC)^4} + \frac{FCF_5}{(1+WACC)^5}$ |
| Continuing Value (Stage 2) | Continuing value (Terminal value) is the period after the explicit forecast period. Often a large portion (>50%) of a company's valuation lies in its Continuing value | <ul style="list-style-type: none"> ▪ Free cash flow Forecast for 5th year ▪ WACC ▪ Perpetuity growth rate (g) | $\frac{FCF_5 * (1 + g)}{(WACC - g)^1} \frac{1}{(1 + WACC)^5}$ |

From Enterprise Value to Equity Value

Understanding the difference between Enterprise Value and Equity Value

+ Present Value of free cash flows
+ Present Value of Terminal value

Non-operating Assets **1**

Enterprise Value

- Financial debt **2**

+ Cash

- Debt-like items **3**

Equity Value

1

Non-operating Assets: Assets that are not used for the core business of the company

Non-operating real estate, personal cars, financial subsidiaries etc.

2

Financial debt: Interest-bearing financial debt

Debt to banks, Bond issues, Leases etc.

3

Debt-like items: Non-interest bearing liabilities that are not considered within Free cash flow

Provisions, Unfunded Pension liabilities, Liabilities from litigation, etc.

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