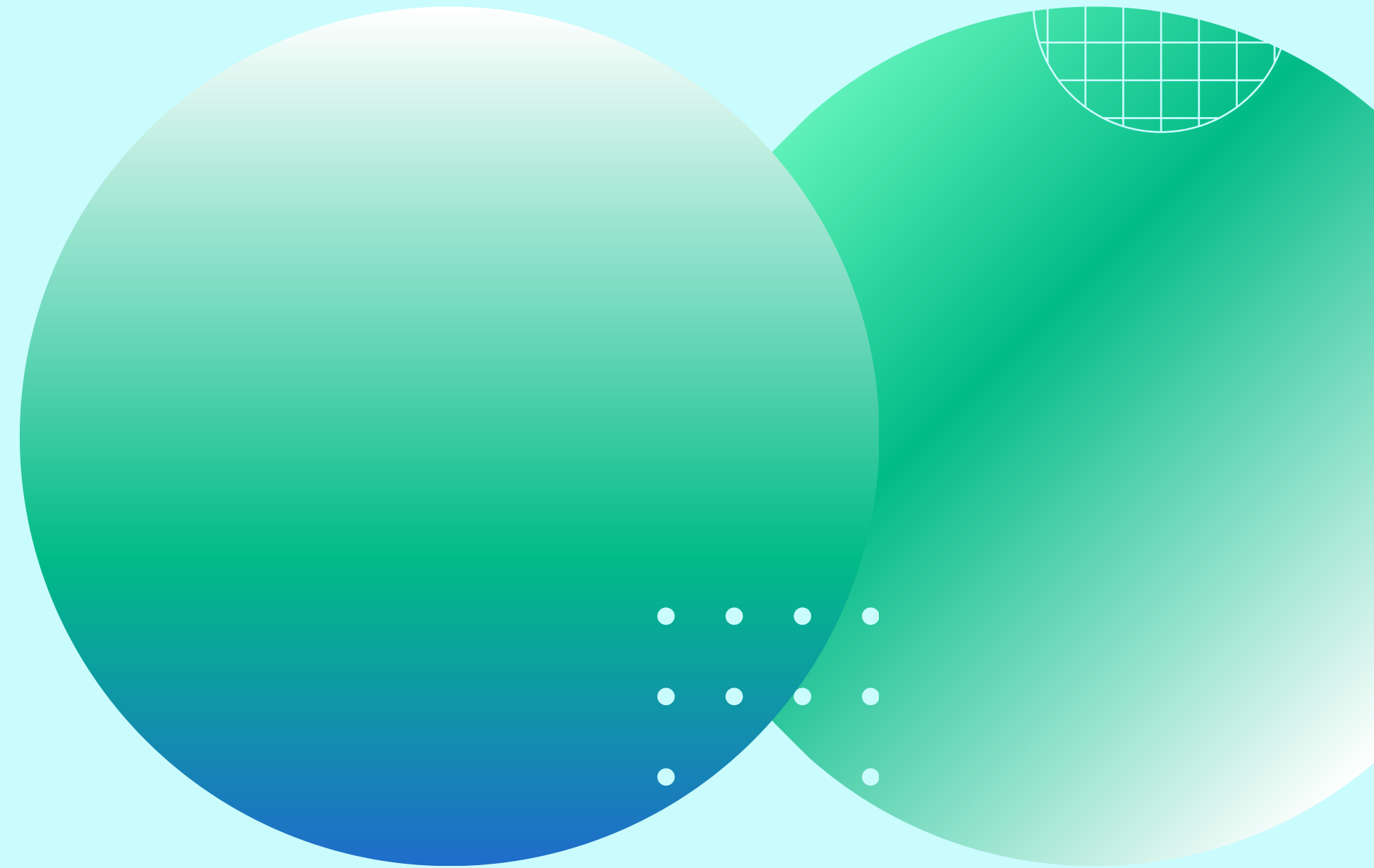
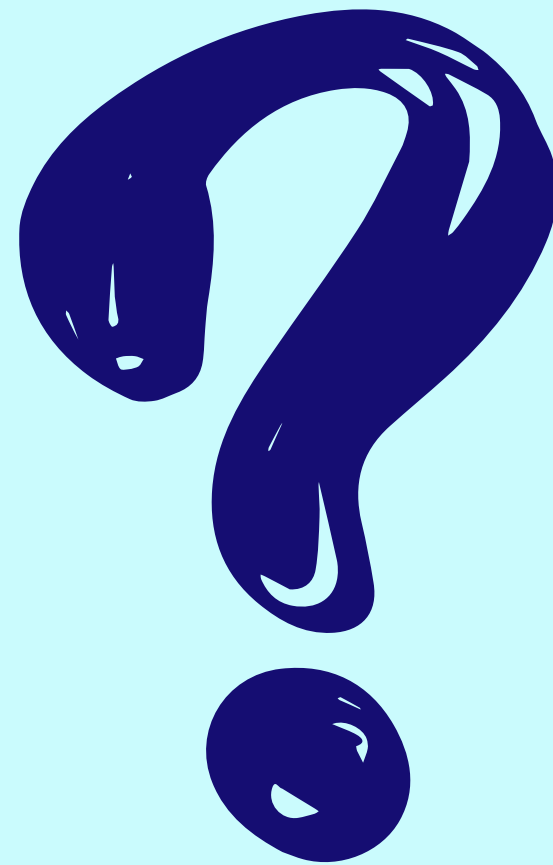


HOW TO VALUE A COMPANY? METHODS AND EXAMPLES



WHY DO WE NEED TO VALUE COMPANIES?



WHY ?

buying and
selling
companies

portfolio
management

capital
raising
(e.g., IPOs)

strategic
decisions and
strategic
planning

M&A

value creation for
stakeholders

HOW?

The value of a company is a function of

- expected cash flows (cf)
- uncertainty about these cfs

METHODS

MAIN VALUATION METHODS					
BALANCE SHEET	INCOME STATEMENT	MIXED (GOODWILL)	CASH FLOW DISCOUNTING	VALUE CREATION	OPTIONS
Book value Adjusted book value Liquidation value Substantial value	Multiples PER Sales P/EBITDA Other multiples	Classic Union of European Accounting Experts Abbreviated income Others	Equity cash flow Dividends Free cash flow Capital cash flow APV	EVA Economic profit Cash value added CFROI	Black and Scholes Investment option Expand the project Delay the investment Alternative uses

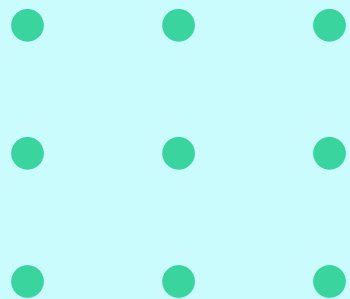
Fernández , 2007

BALANCE SHEET-BASED

- take a “static” picture of the company

examples

- book value of equity
 - also equal to: total assets - liabilities
 - liquidation value
- may differ (a lot!) from market value



BALANCE SHEET-BASED

- take a “static” picture of the company

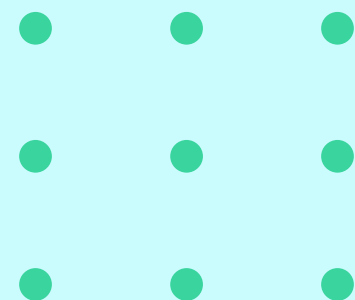
examples

- book value of equity
 - also equal to: total assets - liabilities
 - liquidation value
-
- may differ (a lot!) from market value

BS

ASSETS	LIAB.
CASH	ST. LIAB.
CURRENT ASSETS	LT. LIAB.
FIXED ASSETS	EQUITY

ST → Short Term
LT → Long Term



BALANCE SHEET-BASED

- take a “static” picture of the company

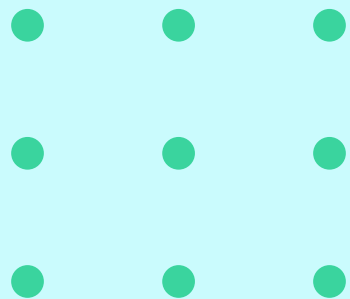
examples

- book value of equity
 - also equal to: total assets - liabilities

- total assets = 100
- total liabilities = 30
- book value of equity = $100 - 30 = 70$



Vodafone annual report



INCOME STATEMENT-BASED

NET SALES

COST OF SALES

GROSS PROFIT

SELLING AND OPERATING EXPENSES

GENERAL AND ADMINISTRATIVE EXPENSES

TOTAL OPERATING EXPENSES

OPERATING INCOME

OTHER INCOME

GAIN (LOSS) ON FINANCIAL INSTRUMENTS


(LOSS) GAIN ON FOREIGN CURRENCY

INTEREST EXPENSE

INCOME BEFORE TAXES


INCOME TAX EXPENSE

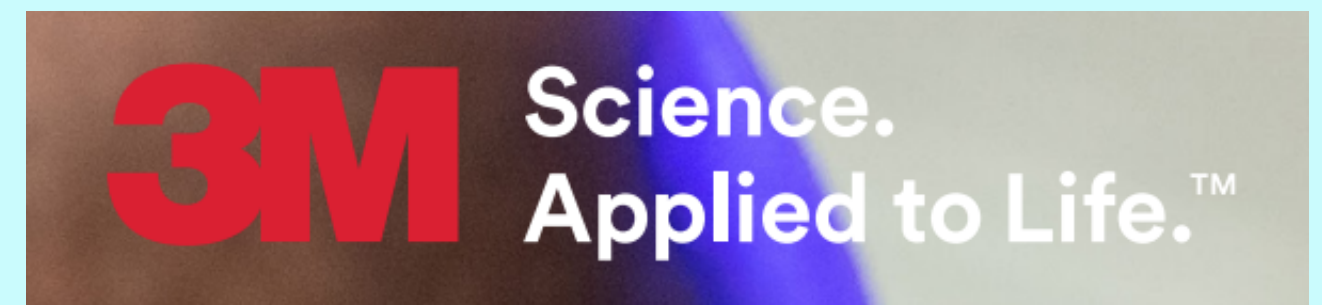
NET INCOME



The cover of the Deutsche Telekom 2023 Financial Year report features a vibrant pink background with abstract white and blue wavy patterns on the left. In the center, a large white 'T' logo is partially obscured by a man sitting on the ground using a laptop and a woman walking past him. To the right of the logo, the text 'THE 2023 FINANCIAL YEAR' is written in a bold, white, sans-serif font.

Income statement
Of which: interest income calculated using the effective interest method

 Deutsche Telekom Annual Report 2023



INCOME STATEMENT-BASED

NET SALES

COST OF SALES

GROSS PROFIT

SELLING AND OPERATING EXPENSES

GENERAL AND ADMINISTRATIVE EXPENSES

TOTAL OPERATING EXPENSES

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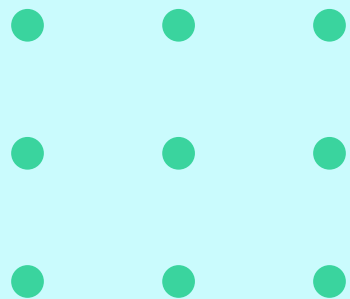
INTEREST EXPENSE

INCOME BEFORE TAXES

INCOME TAX EXPENSE

NET INCOME

WHAT TO DO
WITH IT?



INCOME STATEMENT-BASED

- determine the value according to earnings or sales

examples

- multiples evaluations
 - price earnings ratio (PER)

$$\text{Equity value} = \text{PER} \times \text{earnings}$$

- sales multiple (price/sales)

of course, you need “multiples”, hence comparables

INCOME STATEMENT-BASED

- dividends -> dividend discount model

$$\text{Equity value} = \text{DPS} / K_e$$

$$\rightarrow P = \frac{5}{0.10} = 50$$

$$\text{Equity value} = \text{DPS}_1 / (K_e - g)$$

$$\rightarrow P = \frac{5}{0.10 - 0.02} = 62.5$$

where

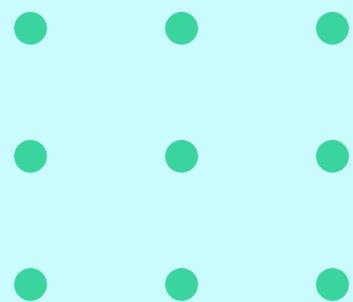
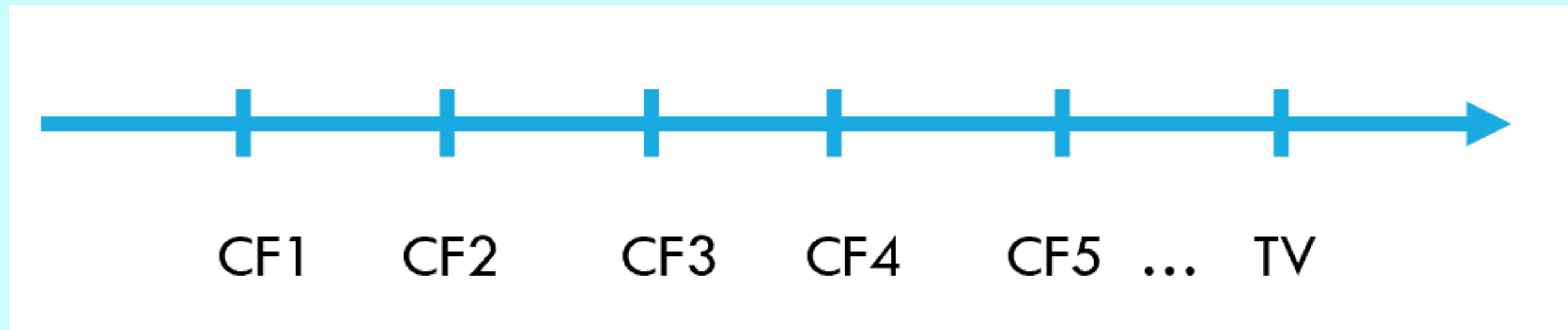
- DPS: dividends per share;

- K_e : rate of return required by investors or cost of capital;

- g : growth rate of dividends

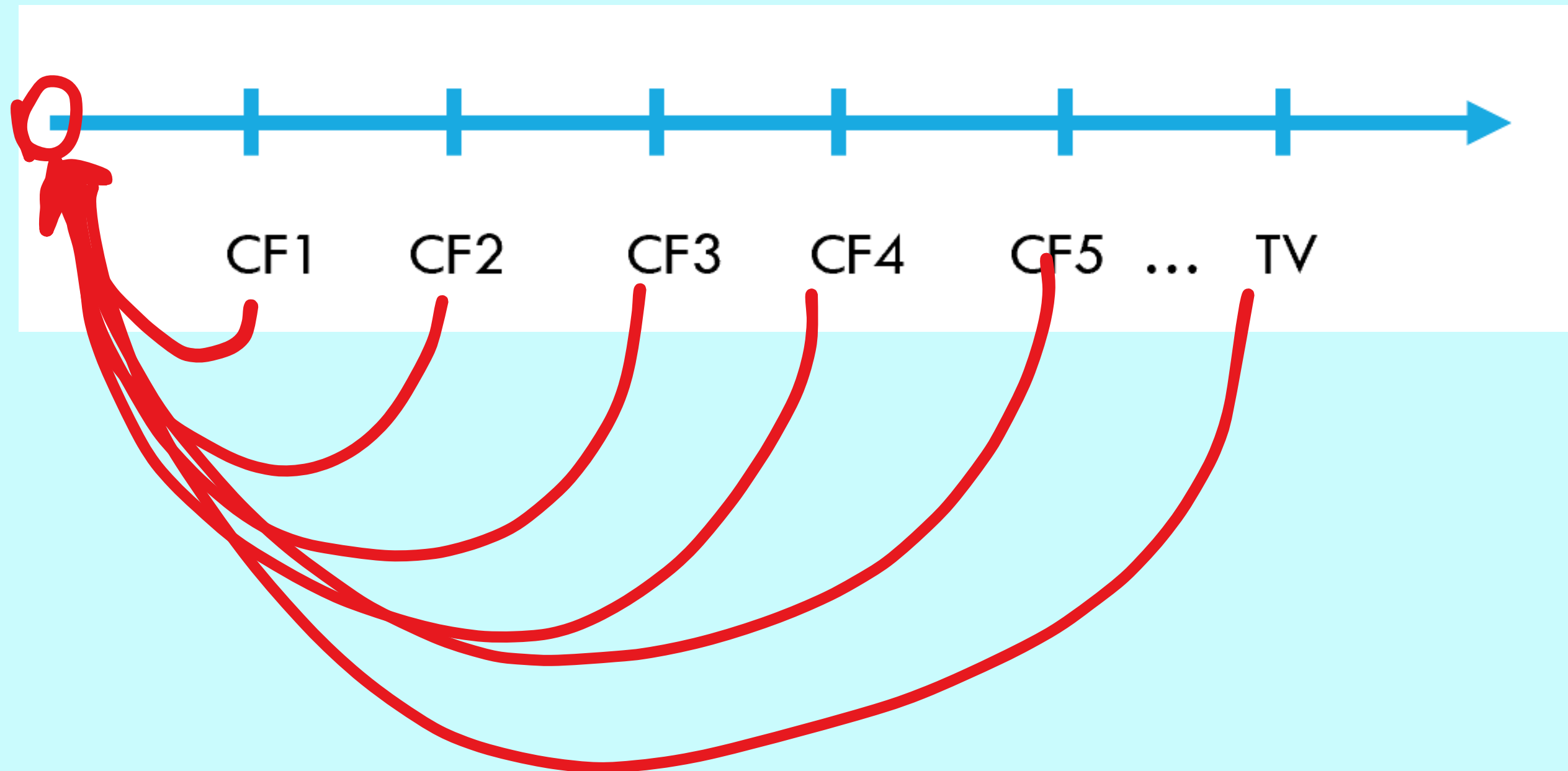
CASH FLOW DISCOUNTING METHODS

General approach:



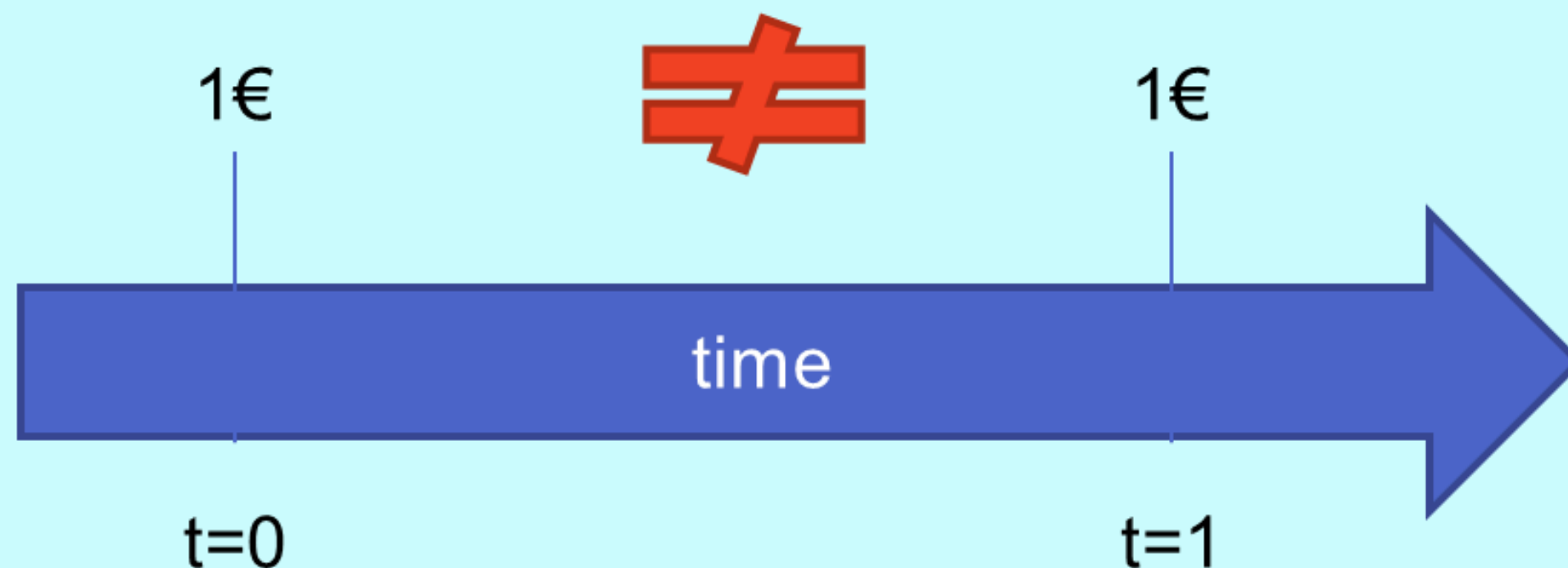
CASH FLOW DISCOUNTING METHODS

General approach:



VALUE OF MONEY

review/digression



- Someone, to give up the availability of money today, asks for a remuneration
- The rate of return is the price of giving up something (money) today
- eg. A rate of return equal to 3% (on yearly basis) → to give up 100 euros today and have them back in one year, you require 3 euros by way of remuneration

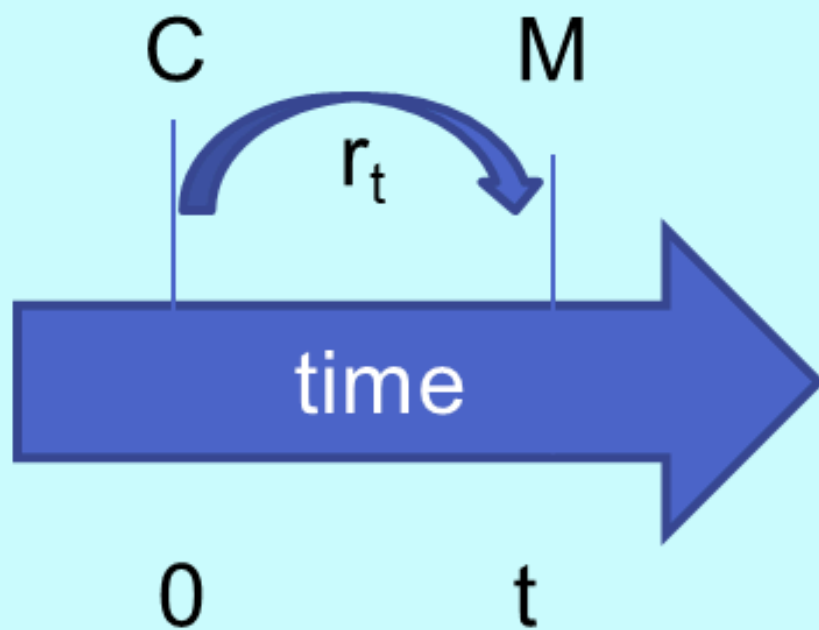
HOW TO COMPOUND

review/digression

The rate of return for the period (r_t) is calculated as the percentage difference between the terminal value (M) and Capital (C)

$$r_t = \frac{M - C}{C}$$

- $M = C + I$, where $I = C * r \rightarrow M = C + C * r = (1 + r) * C$
- schemes:
 - simple: $M = C * (1 + r * t)$
 - compound: $M = C * (1 + r)^t$



Ex. $C=100$, $M=103$, $t=1$

$$r_t = \frac{M - C}{C} = \frac{103 - 100}{100} = 3\%$$

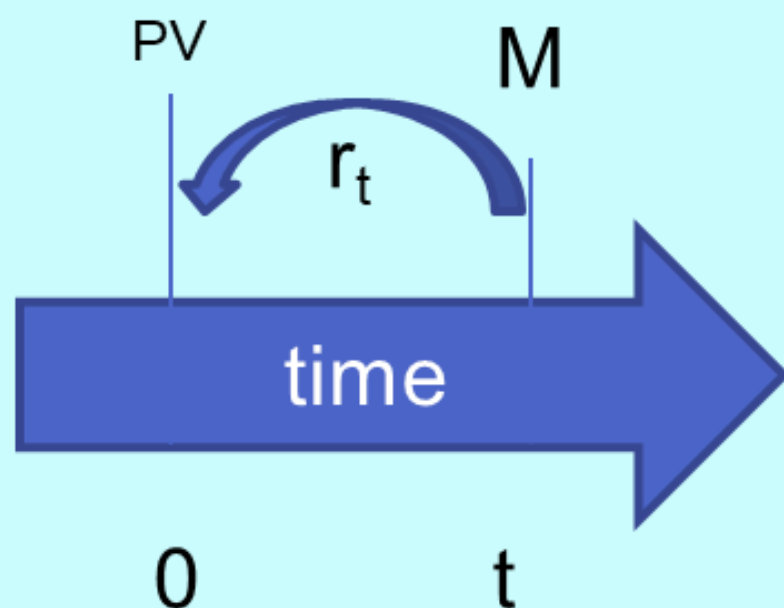
HOW TO DISCOUNT

review/digression

- Determine the amount of money today (PV) equal to a future value M
 - Ex. To have 100 euros in one year time, how much do I have to deposit in the account/invest, knowing the interest rate is equal to r?

Capitalisation schemes

- simple: $PV = M / (1 + r * t)$ $\longrightarrow M = \text{TERMINAL VALUE}$
- compounded: $PV = M / (1 + r)^t$



Ex. simple c.

$M=103$; $r=3\%$; $t=1$

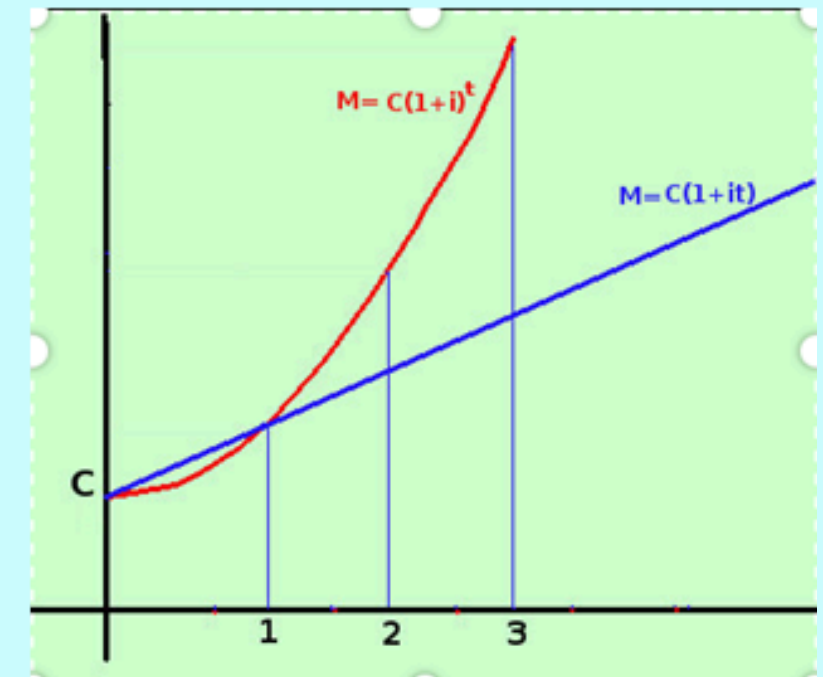
$$PV = \frac{M}{(1 + r * t)} = \frac{103}{(1 + 3\% * 1)} = 100$$

VALUE OF MONEY

review/digression

When are different capitalisation schemes employed

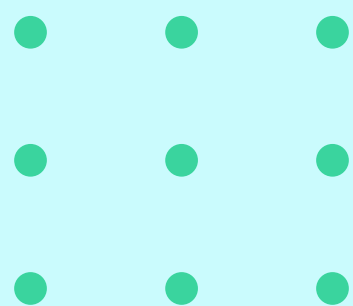
- SC:
 - Computing coupons for bonds
 - Computing returns for assets with expire date ≤ 1 year
- CC:
 - computing returns for assets with expire date > 1 year



CASH FLOW DISCOUNTING METHODS

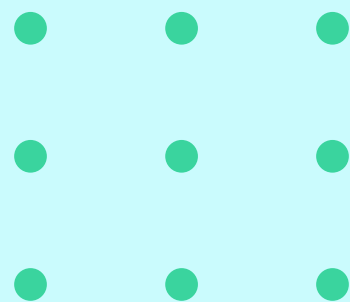
Free cash flow is used as the return

- if the company is not paying dividends
- if the company pays dividends but the dividends paid differ significantly from the company's capacity to pay dividends
- if free cash flows align with profitability within a period
- if the investor takes a control perspective.



THE APPROPRIATE DISCOUNT RATE

method	discount rate
FCF	wacc
ECF	cost of equity, return to equity
DCF (debt)	cost of debt, return to debt



THE APPROPRIATE DISCOUNT RATE

Weighted Average Cost of Capital

method	discount rate
FCF	wacc

$$WACC = r_A = \left(r_D \times \frac{D}{V} \right) + \left(r_E \times \frac{E}{V} \right)$$

or

$$WACC = r_D \times (1 - T_c) \times \left(\frac{D}{V} \right) + \left(r_E \times \frac{E}{V} \right)$$

T_c = tax rate

where

r_A = return of the unlevered firm

r_D = return of debt

r_E = return of equity

D = debt outstanding

E = equity

V = total value of company (Total assets at market values)

EVALUATION METHODS FOR CF DISCOUNTING

A company can be evaluated

Asset side

Free cash flow to
the firm (FCFF)

Equity side

Free cash flow to
equity (FCFE)

1. ASSET SIDE - UNLEVERED DCF

- estimate invested capital (enterprise value - EV) and deduct net financial position (NFP) to get Free cash flow to the firm (FCFF) in time t
- the aim is to estimate company value irrespective of financial structure
- discount rate is WACC (weighted average cost of capital)

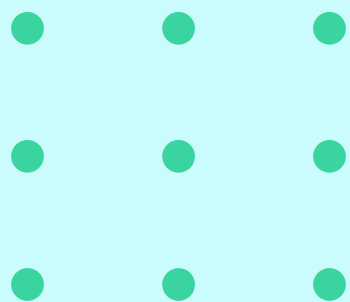
$$\text{Equity value} = \text{EV} - \text{PFN}$$

$$\text{Firm value} = \sum_{t=1}^{\infty} \frac{\text{FCFF}_t}{(1 + \text{WACC})^t}$$

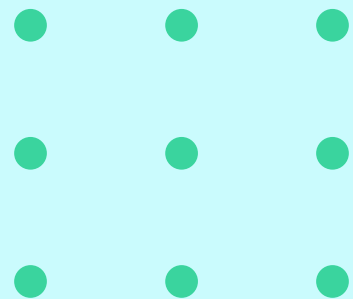
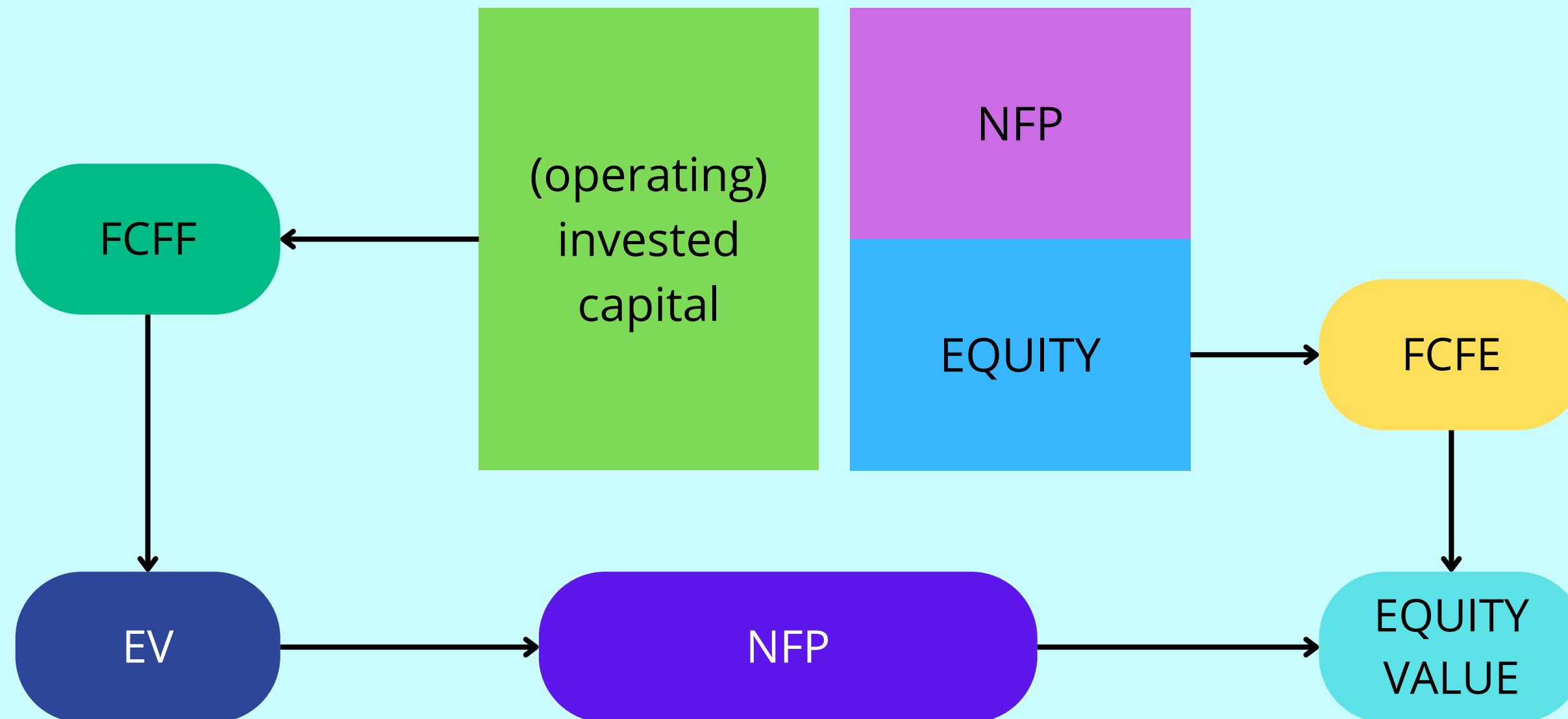
2. EQUITY SIDE

- estimate the free cash flow available to the shareholder (FCFE) in time t
- the discount rate is the cost of equity (r), estimated e.g. through CAPM (Capital asset pricing model) or other methods (ex-ante cost of equity - P/E ratio)

$$\text{Equity value} = \sum_{t=1}^{\infty} \frac{\text{FCFE}_t}{(1 + r)^t}$$



ASSET AND EQUITY SIDE



DETERMINING FCF

from net income (NI)

$$\text{FCFF} = \text{NI} + \text{NCC} + \text{Int}(1 - \text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

$$\text{FCFE} = \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{Net borrowing.}$$

where

- NI= net income;
- NCC =Non cash charges;
- INT= interest expenses;
- FCInv=Investment in fixed capital;
- WCInv=Investment in working capital

FCFE CAN ALSO BE FOUND BY USING $\text{FCFE} = \text{FCFF} - \text{INT}(1 - \text{TAX RATE}) + \text{NET BORROWING}$

DETERMINING FCF

from net income (NI)

$$\text{FCFF} = \text{NI} + \text{NCC} + \text{Int}(1 - \text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

$$\text{FCFE} = \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{Net borrowing.}$$

where

- NI= net income;
- NCC =Non cash charges;
- INT= interest expenses;
- FCInv=Investment in fixed capital;
- WCInv=Investment in working capital

We want to evaluate Abc Company for the year 2024. We the following information (in mn):

- Net income: \$250.
- Interest expense: \$50.
- Depreciation: \$130.
- Investment in working capital: \$20.
- Investment in fixed capital: \$100.
- Tax rate: 30%.
- Net borrowing: \$180.

The company has launched a new product in the market. It has capitalized \$200 as intangible asset out of product launch expense of \$240.

During the year, it has written down restructuring non-cash charges amounting to \$30.

The tax treatment of all non-cash items is the same as that of other items in the books. There are no differed taxes incurred.

DETERMINING FCF

from net income (NI)

$$\text{FCFF} = \text{NI} + \text{NCC} + \text{Int}(1 - \text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

$$\text{FCFE} = \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{Net borrowing.}$$

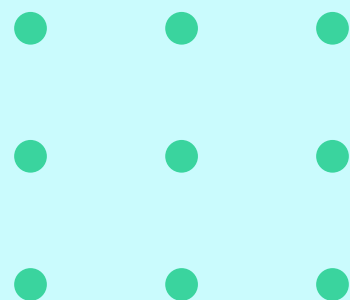
where

- NI= net income;
- NCC =Non cash charges;
- INT= interest expenses;
- FCInv=Investment in fixed capital;
- WCInv=Investment in working capital

NCC = Depreciation + non-cash restructuring charges - Cash expense during the year in which they are capitalized = 130 + 30 - 200 = -\$40 million.

FCFF = NI + NCC + Int (1 - Tax rate) - FCInv - WCInv = 250 + (-40) + 50 (1 - 0.3) - 20 - 100 = \$125 million.

$$\text{FCFE} = \text{FCFF} + \text{NET BORROWING} - \text{INT} (1 - \text{TAX RATE})$$



DETERMINING FCF

from net income (NI)

$$\text{FCFF} = \text{NI} + \text{NCC} + \text{Int}(1 - \text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

$$\text{FCFE} = \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{Net borrowing.}$$

from EBITDA

$$\text{FCFF} = \text{EBIT}(1 - \text{Tax rate}) + \text{Dep} - \text{FCInv} - \text{WCInv}$$

$$\text{FCFF} = \text{EBITDA}(1 - \text{Tax rate}) + \text{Dep}(\text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

FCFE can then be found by using $\text{FCFE} = \text{FCFF} - \text{Int}(1 - \text{Tax rate}) + \text{Net borrowing}$

DETERMINING FCF

from EBITDA

$$\text{FCFF} = \text{EBIT}(1 - \text{Tax rate}) + \text{Dep} - \text{FCInv} - \text{WCInv}$$

$$\text{FCFF} = \text{EBITDA}(1 - \text{Tax rate}) + \text{Dep}(\text{Tax rate}) - \text{FCInv} - \text{WCInv}$$

you have this info

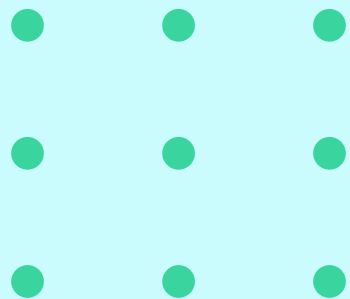
- EBIT: 400
- Interest expense: 150
- Depreciation: 120
- Income tax rate: 30%
- Investment in working capital: 60
- Investment in fixed capital: 300
- Calculate FCFF for the company.

$$\begin{aligned}\text{FCFF} &= \text{EBIT} (1 - \text{Tax rate}) + \text{Dep} - \text{FCInv} - \text{WCInv} = \\ &400 \times (1 - 0.30) + 120 - 60 - 300 = 40\end{aligned}$$

HYBRID METHODS

- methods that combine both sides (asset + equity)

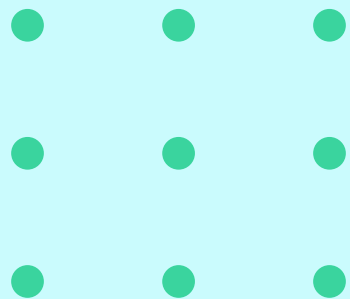
ADJUSTED PRESENT VALUE



ADJUSTED PRESENT VALUE

the company value is computed as the sum of

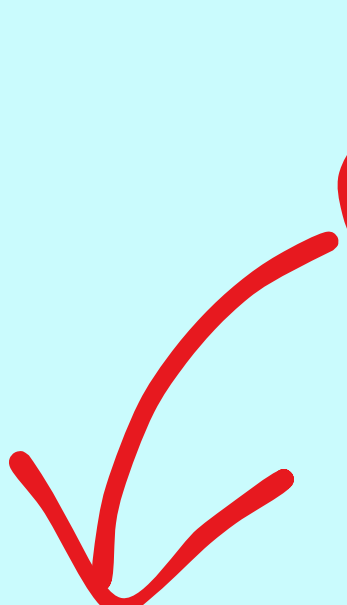
UNLEVERED VALUE + PV(TAX SHIELD)



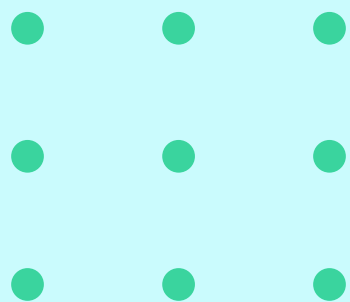
ADJUSTED PRESENT VALUE

the company value is computed as the sum of

UNLEVERED VALUE + PV(TAX SHIELD)


$$PV(U) = \frac{FCFF}{K_E}$$

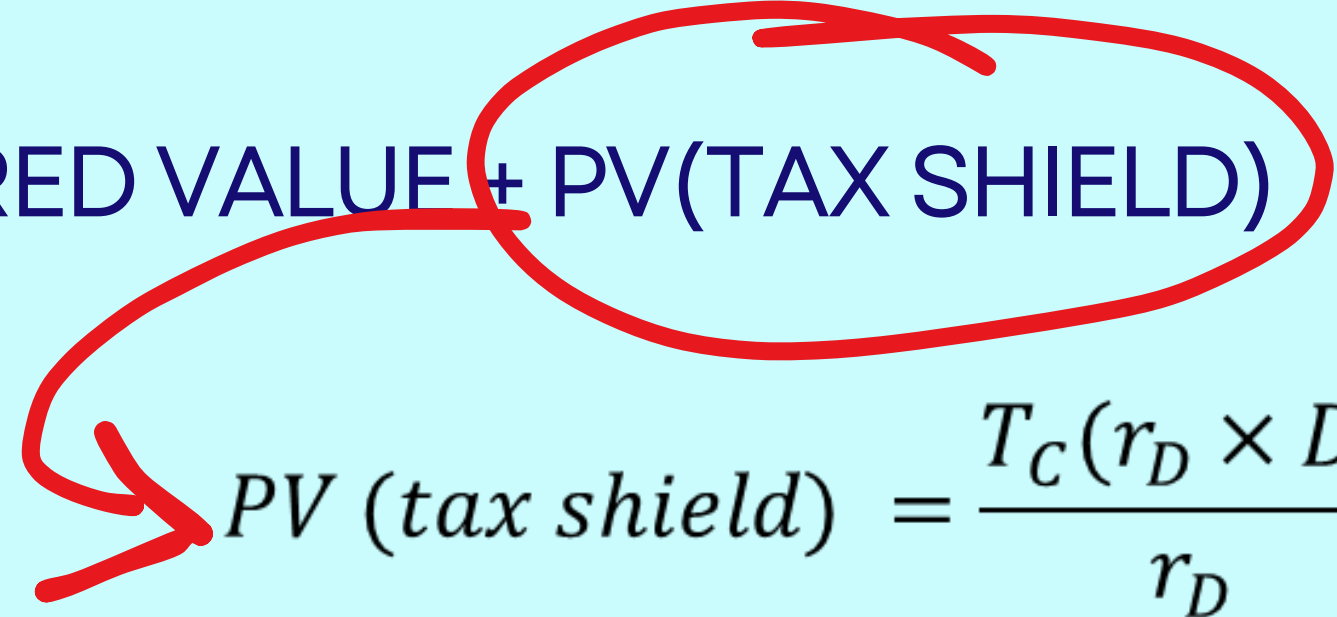
where Unlevered value is the value of the company entirely financed through equity (U)
FCFF is discounted at the rate of return for equity holders or cost of equity capital (K_E)



ADJUSTED PRESENT VALUE

the company value is computed as the sum of

UNLEVERED VALUE + PV(TAX SHIELD)


$$PV(\text{tax shield}) = \frac{T_C(r_D \times D)}{r_D} = T_C \times D$$

represents the increase in value when the company uses also debt

where:

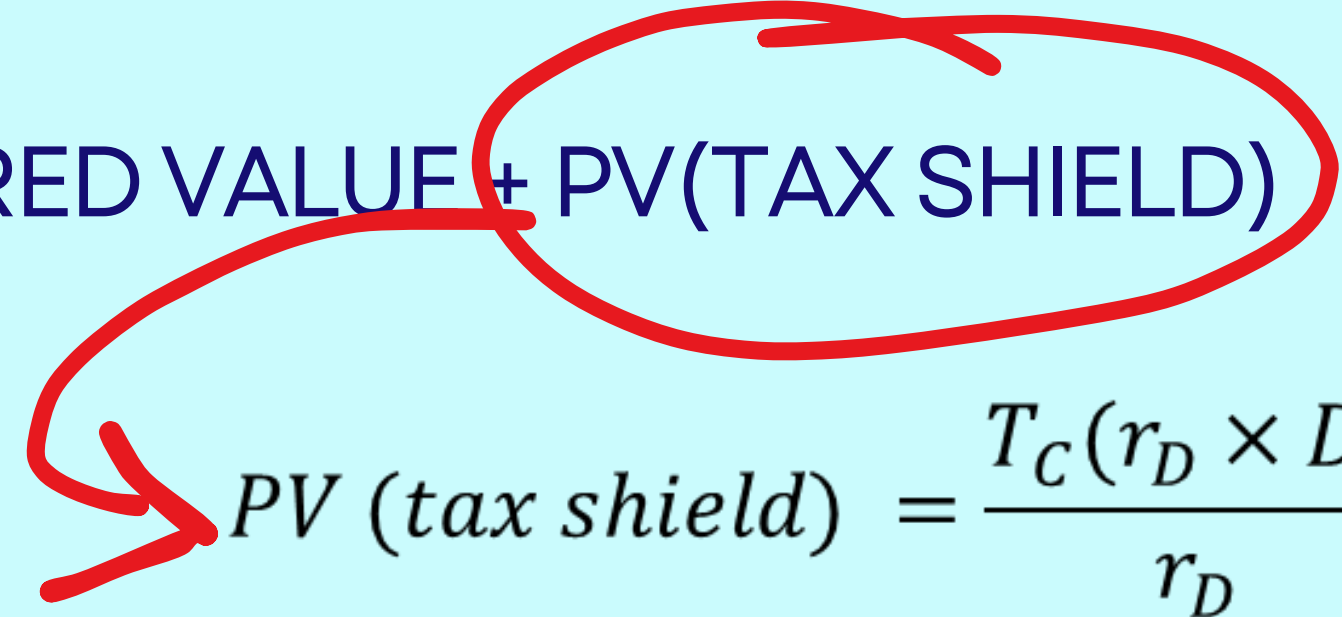
T_c is the average tax rate;
r_D is the interest rate on debt;
D is the debt outstanding

(formula is valid assuming a perpetuity)

ADJUSTED PRESENT VALUE

the company value is computed as the sum of

UNLEVERED VALUE + PV(TAX SHIELD)


$$PV(\text{tax shield}) = \frac{T_C(r_D \times D)}{r_D} = T_C \times D$$

represents the increase in value when the company
uses also debt *

where:

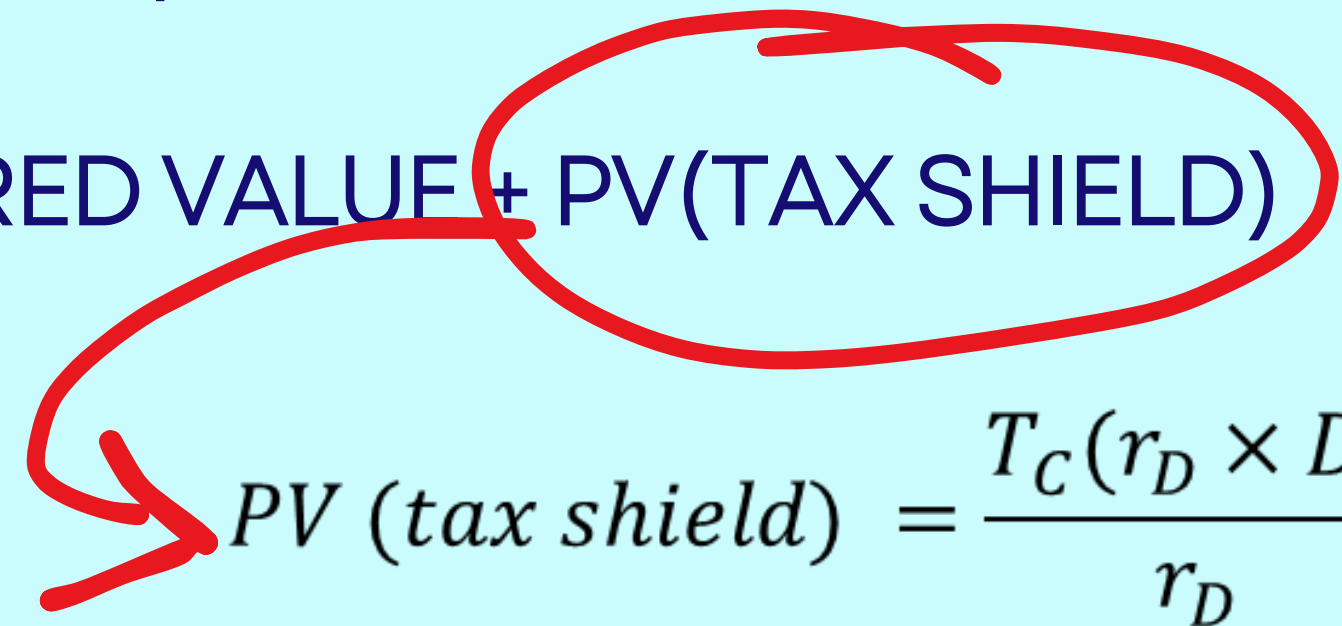
T_c is the average tax rate;
r_D is the interest rate on debt;
D is the debt outstanding

(formula is valid assuming a perpetuity)

ADJUSTED PRESENT VALUE

the company value is computed as the sum of

UNLEVERED VALUE + PV(TAX SHIELD)


$$PV(\text{tax shield}) = \frac{T_C(r_D \times D)}{r_D} = T_C \times D$$

represents the increase in value when the company uses also debt *

where:

T_c is the average tax rate;
r_D is the interest rate on debt;
D is the debt outstanding

(formula is valid assuming a perpetuity)

* debt cannot be expanded indefinitely because of costs of financial distress

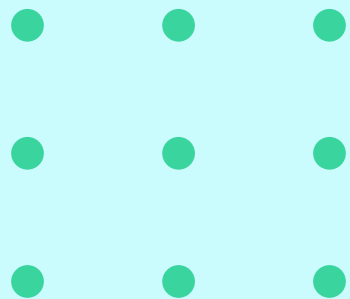
ADJUSTED PRESENT VALUE

the company value is computed as the sum of

UNLEVERED VALUE + PV(TAX SHIELD)

$$PV(U) = \frac{FCFF}{K_E}$$

$$PV(\text{tax shield}) = \frac{T_C(r_D \times D)}{r_D} = T_C \times D$$



THEORY AND PRACTICE

The (intrinsic) value represents a quantity estimated by cash flow forecasts and risk (and hence interest rate) valuation.

In theory, if the asset were traded in an efficient market, in which, in particular:

- all market participants behave rationally;
- there are no information asymmetries;

the price of the asset should reflect its intrinsic value.

In practice, very often, price and intrinsic value differ.

End

THANK YOU

Do you have any questions?

