PRINCETON UNIVERSITY

# FCF VALUATION

# Roadmap

Dividend-Discount Model: *BDM [Chapter: Valuing Stocks]*

Cash flows: *BDM [Chapter: Fundamentals of Capital Budgeting]*

1. Free Cash Flows (FCF)
2. Terminal value of a project
3. Incremental cash flows

# Dividend Discount Model

# Value of a Stock

- What is the fundamental value of a stock?

- What if the investor plans to sell the stock before the end of the company?

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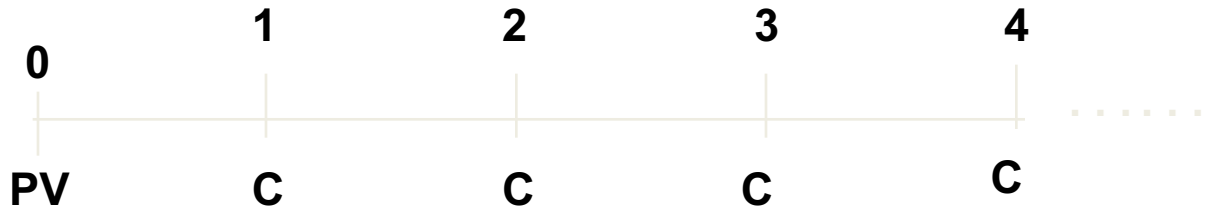
- $P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \ldots = \sum_{n=1}^{\infty} \frac{Div_n}{(1+r_E)^n} = \frac{Div_1}{r_E}$

- $P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \ldots = \sum_{n=1}^{\infty} \frac{Div_n}{(1+r_E)^n} = \frac{Div_1}{r_E - g}$

# Perpetuity




$$PV = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} \ldots \qquad (1)$$

- Multiply by 1+r

$$(1+r)PV = C + \underbrace{\frac{C}{(1+r)} + \frac{C}{(1+r)^2} \ldots}_{= PV} \qquad (2)$$

# Perpetuity

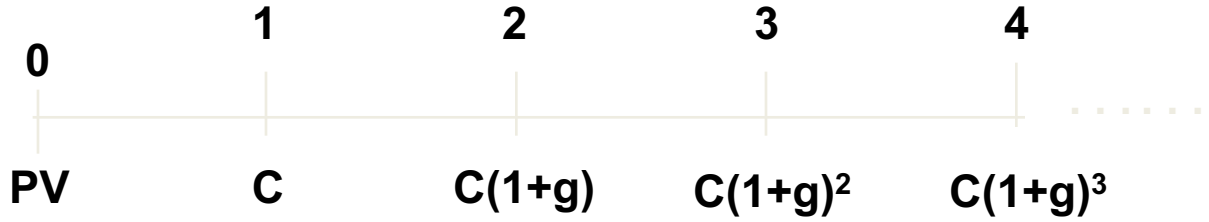
- (1+r) PV = C + PV
- Rearranging a bit:
- rPV = C

- Therefore

$$\text{PV of perpetuity} = \frac{C}{r}$$

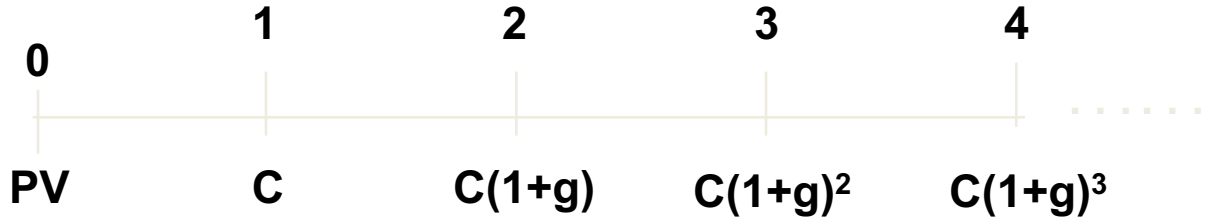
➔ *What if cash-flow increases over time?*

# Growing perpetuity (r > g)




$$PV = \frac{C}{1+r} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} \ldots$$

# Growing perpetuity (r > g)




$$PV = \frac{C}{1+r} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} \ldots$$

times $\frac{1+r}{1+g}$

$$\frac{1+r}{1+g} PV = \boxed{\frac{C}{1+g}} + \underbrace{\frac{C}{1+r} + \frac{C(1+g)}{(1+r)^2} \ldots}$$

**= PV**

# Growing perpetuity (r > g)

$$\left(\frac{1+r}{1+g}-1\right)PV=\frac{C}{1+g}\Rightarrow\left(1+r-(1+g)\right)PV=C$$

$$\text{PV of growing perpetuity}=\frac{C}{r-g}$$

# Free Cash Flows (FCF)

# Free Cash Flows

**Free Cash Flow = Incremental after-tax cash flows the project would generate on average if it had no debt**

$$PV = \frac{FCF}{(1 + WACC)^N}$$

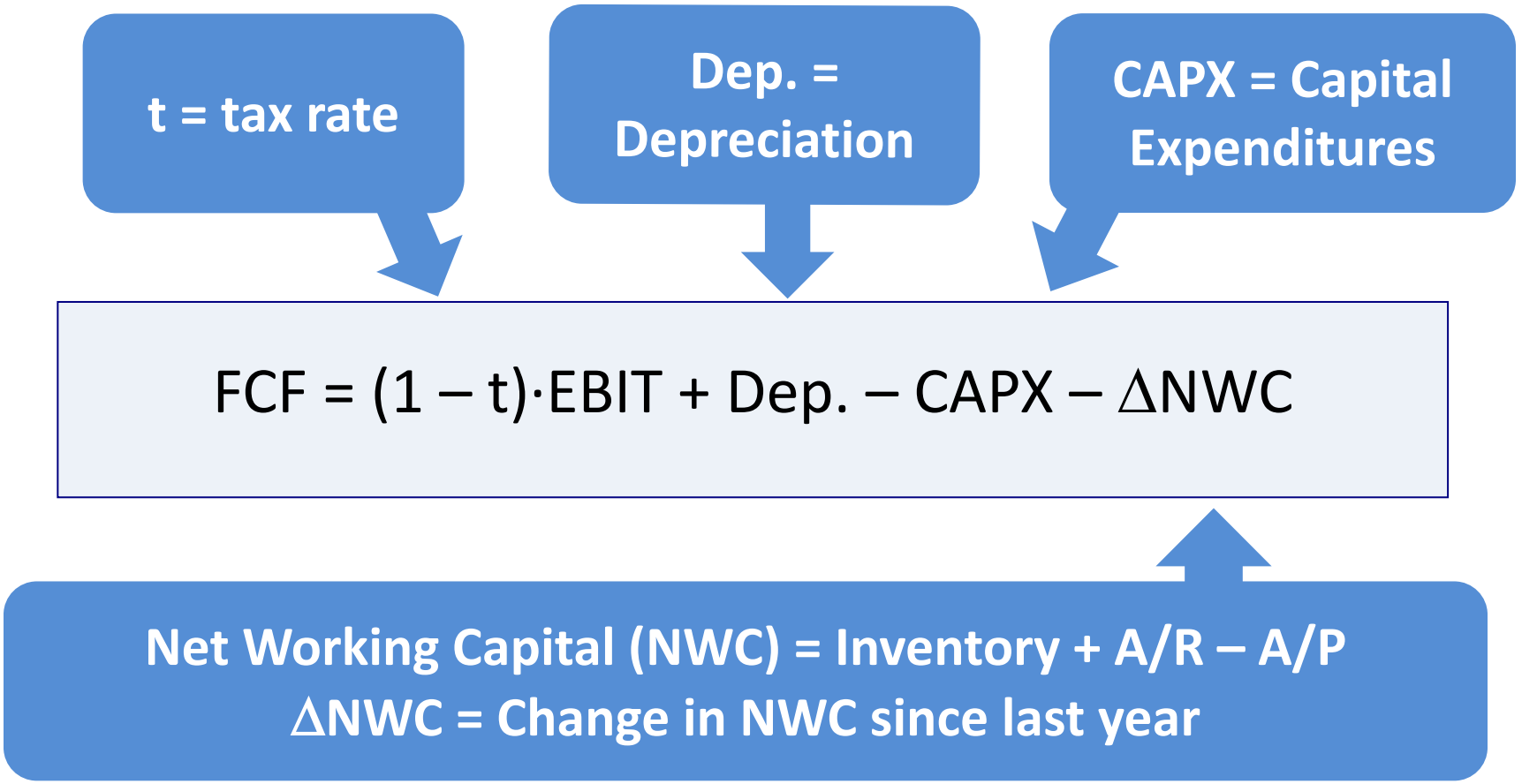
1 2

FCF does not reflect…

1. Risk
2. Financing

**Weighted Average Cost of Capital (WACC) accounts for the effects of Risk and Financing**

# FCF formula


t = tax rate
Dep. = Depreciation
CAPX = Capital Expenditures
FCF = (1 – t)·EBIT + Dep. – CAPX – ΔNWC
Net Working Capital (NWC) = Inventory + A/R – A/P
ΔNWC = Change in NWC since last year

# In words…

- If the project had no debt…
  - There would be no interest expense
  - Earnings before tax would be EBT = EBIT
  - Taxes would be EBIT×t
  - Net income would be EBIT (1-t)

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# In words…


- EBIT ≠ actual cash flow

$$FCF = (1 - t) \cdot EBIT + Dep. - CAPX - \Delta NWC$$

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# Terminal value

1. Salvage value (SV):
   - Resale value of the assets
   - Taxable ➔ Cash inflow: $(1 - t) \times SV$

2. Final depreciation tax shield:
   - Project's PPE in final year = CAPX not depreciated
   - One-time, full depreciation of PPE ➔ Tax credit ➔ Inflow of $t \times PPE$

3. Final net working capital
   - Recoup final NWC, i.e. sell final inventory, collect final A/R, and pay final A/P
   - One-time negative $\Delta NWC = -$ Final year NWC

# Example

- FOR NEXT TIME: PREPARE THE CASE PACIFIC (DOWNLOAD ON MY WEBSITE)