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2026 Level 2 - Equity Valuation

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Equity Valuation: Applications and Processes

a. define valuation and intrinsic value and explain sources of perceived mispricing

b. explain the going concern assumption and contrast a going concern value to a liquidation value

c. describe definitions of value and justify which definition of value is most relevant to public company valuation

d. describe applications of equity valuation

e. describe questions that should be addressed in conducting an industry and competitive analysis

f. contrast absolute and relative valuation models and describe examples of each type of model

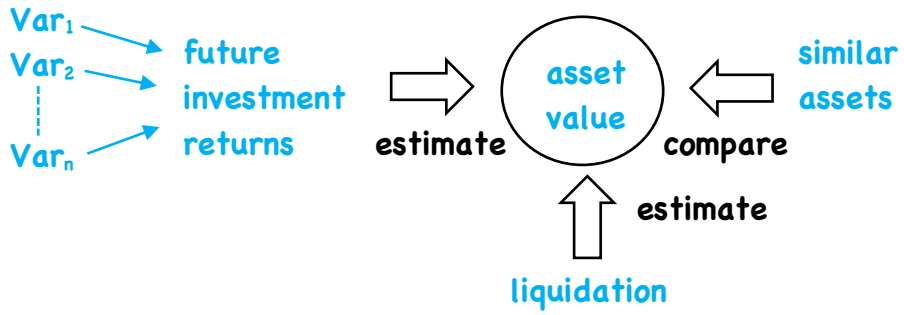
g. describe sum-of-the-parts valuation and conglomerate discounts

h. explain broad criteria for choosing an appropriate approach for valuing a given company

Valuation & Intrinsic Value

Page 1
LOS a
- define
- explain

- The goal of valuation is to identify mispriced securities/assets



⇒ Price vs. Value ⇒ Intrinsic Value (unobservable)

market price (observable)

- value of an asset given a hypothetically complete understanding of the asset's investment characteristics

Page 2
LOS a
- define
- explain

- undertaking valuation efforts assumes
  - ① mispricing exists (P ≠ V)
  - at odds with market efficiency
    - ⇒ Grossman-Stiglitz paradox – if markets were informationally efficient, no rational person would incur costs of valuation
      - how would prices reflect value?

Thus/ – investors will not rationally incur the costs of analysis unless expectations of reward to effort exists (abnormal return, excess risk-adjusted return) (α)

Page 3
LOS a
- define
- explain

- undertaking valuation efforts assumes
  - ② P&V will converge

$$V_e - P = (V - P) + (V_e - V)$$

estimated value — market price — true mispricing (α) — error
- forecast
- model

V- intrinsic value (unobservable)

⇒ key element
- differ from consensus
- correct

⇒ convergence should be expected within some Investment Horizon
- requires a catalyst ⇒ what will cause convergence (i.e. next 2-3 earnings reports)

Going Concern/ Liquidation

Page 4
LOS b
- explain
- contrast

⇒ going concern value
- a company will continue business activities
  - some assets only have value if the 'going-concern' assumption is valid

⇒ liquidation value → immediate
vs
→ orderly liquidation value

companies in financial distress

- Focus of valuation readings → intrinsic value estimated under a going concern assumption

Value

Page 5
LOS c
- describe
- justify

- Intrinsic Value
  - typically, the relevant concept of value for valuing public equities
- Fair market value
  - value at which an asset/liability would change hands between a willing buyer/seller when they are not under any compulsion to buy/sell
    - both are informed to all material aspects
- Investment value
  - an asset may be worth more to a particular buyer (e.g. synergies)

Applications

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LOS d
- describe

- Selecting stocks ⇒ I.V. vs. MV.
  (over, under, fairly)
- Inferring (extracting) market expectations
  - assume Price reflects consensus expectations of investors about future performance
    - reasonable?

$$\text{Price} = \underbrace{\text{Var}_1 + \text{Var}_2 + \text{Var}_3}_{\text{known}} + X$$ – solve for fundamental variable X

- evaluating corporate events
  - M&A, divestiture, spin-off

Page 7
LOS d
- describe

- rendering fairness options
  - parties to a merger may be required to get 3rd party opinion on the fairness of the terms
- evaluating business strategies & business models
- communication with analysts/shareholders
- appraise private businesses
  - transactional (sale)
  - taxation (estate)
  - IPO
- evaluating/setting share-based compensation

Industry/Competitive Analysis

Page 8
LOS e
- describe

⇒ Valuation Process
- understanding the business
- forecasting company performance
- selecting the appropriate valuation model
- converting forecasts to a valuation
- applying the valuation conclusions

Understanding the business/
- industry/competitive analysis
- identify the economic drivers of a business
- threats/opportunities

Page 9
LOS e
- describe

Understanding the business/

A/ industry attractiveness in terms of prospects for sustained profitability

⇒ Porter's 5-forces model
- intra-industry rivalry
- threat of new entrants
- buyer power
- supplier power
- availability of substitutes

B/ company's relative competitive position within the industry & its competitive strategy

- level of and trend in market share

Page 10
LOS e
- describe

Understanding the business/

B/ company's relative competitive position within the industry & its competitive strategy

- cost leadership
- differentiation
- focus-niche

- business model
  - how it turns its strategy into revenues

C/ how well has the company executed on its strategy and what are its prospects for future execution

Financial reports + qualitative factors

Absolute vs. Relative

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- contrast
- describe

- selecting the appropriate valuation model/
  - A/ Absolute valuation models
    - specifies an asset's intrinsic value
      (present value, discounted cash flow)

Cash flows
- shareholder level ⇒ Dividends
- company level ⇒ FCF, Residual Income

(CFO-Capex-ΔWC)

economic profit

$$\sum_{i=1}^{\infty} \frac{CF_i}{(1+r)^i}$$

- type
- forecasts
- often subjective

Page 12
LOS f
- contrast
- describe

- selecting the appropriate valuation model/
  - A/ Absolute valuation models
    - asset-based valuations → MV of assets/resources it controls
      (REIT)
  - B/ Relative valuation models (method of comparables)
    - estimate of value relative to another
      - law of one price: similar assets should sell for similar prices
    - price multiples or enterprise multiples
      (derives relative over/under valuation)

Sum-of-the-Parts

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LOS g
- describe

a.k.a. break-up or private market value
- the estimated value of the company by the sum of the estimated values of the various businesses considered as independent going concerns
  - corp. with segments indifferent industries that have different valuation characteristics
    - few synergies between segments (although not zero)
    - useful for valuing spin-offs (+ pure-play premium)
- requires a detailed breakdown of each segments contribution to earnings & cash flow

Conglomerate Discount

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- describe

⇒ market typically applies a discount to the stock of a company operating in multiple, unrelated businesses

Explanations/
- inefficiency in capital allocation
  → capital allocation across segments may not maximize shareholder value
- path to conglomerate status
  → poorly performing companies tend to expand by diversifying the earnings base (acquisitions in unrelated businesses)
- does not exist
  → measurement error

Valuation Approach

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LOS h
- explain

→ broad criteria/

business understanding →
- consistent with the characteristics of the company being valued
- appropriate given the availability and quality of data
- consistent with the purpose of valuation, including the analyst's perspective

→ use of multiple models/valuation approaches

→ Converting forecasts to a valuation/
- sensitivity analysis – how changes in an input affect the outcome

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LOS h
- explain

→ Converting forecasts to a valuation/
- situational adjustments
  - incorporate valuation impact of specific issues

1) control premium
2) lack of marketability discount
3) illiquidity discount

Discounted Dividend Valuation

a. compare dividends, free cash flow, and residual income as inputs to discounted cash flow models and identify investment situations for which each measure is suitable

b. calculate and interpret the value of a common stock using the dividend discount model (DDM) for single and multiple holding periods

c. calculate the value of a common stock using the Gordon growth model and explain the model's underlying assumptions

d. calculate the value of non-callable fixed-rate perpetual preferred stock

e. calculate and interpret the implied growth rate of dividends using the Gordon growth model and current stock price

f. calculate and interpret the present value of growth opportunities (PVGO) and the component of the leading price-to-earnings ratio (P/E) related to PVGO

g. calculate and interpret the justified leading and trailing P/Es using the Gordon growth model

h. describe strengths and limitations of the Gordon growth model and justify its selection to value a company's common shares

i. explain the growth phase, transition phase, and maturity phase of a business

j. explain the assumptions and justify the selection of the two-stage DDM, the H-model, the three-stage DDM, or spreadsheet modeling to value a company's common shares

k. describe terminal value and explain alternative approaches to determining the terminal value in a DDM

l. calculate and interpret the value of common shares using the two-stage DDM, the H-model, and three-stage DDM

m. explain the use of spreadsheet modeling to forecast dividends and to value common shares

n. estimate a required return based on any DDM, including the Gordon growth model and the H-model

o. calculate and interpret the sustainable growth rate of a company and demonstrate the use of DuPont analysis to estimate a company's sustainable growth rate

p. evaluate whether a stock is overvalued, fairly valued, or undervalued by the market based on a DDM estimate of value

LOSs will match between the video and the PDFs, but may be in a different order than the CFAI readings

Cash Flow Types

Page 1
LOS a
- compare
- identify

- 4 steps in applying DCF analysis
  1) select a definition of cash flow
  2) forecast those cash flows
  3) choose a discount rate methodology
  4) estimate the discount rate

A/ Dividends

B/ Free Cash Flow

C/Residual Income

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- compare
- identify

A) Dividends ⇒ as cash flows
- less volatile than earnings
- less sensitive to short-term fluctuations in underlying value than other DCF models
- reflects long-term intrinsic value
- companies usually reluctant to reduce dividends

⇒ 1978 → 1999 } long-term decline in the number of companies paying dividends
66.5% 20.8%

- combination of both reduction propensity + more small cap stocks
  - fraction of companies engaged in share repurchase has increased over the spread

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LOS a
- compare
- identify

A) Dividends

- DDM can be applied to non-div. paying companies, but rarely is

⇒ DDM suitable when/

i) company is dividend paying

ii) established dividend policy that bears an understandable and consistent relationship to the company's profitability

iii) the investor takes a non-control perspective

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LOS a
- compare
- identify

A) Dividends

	COKE			HRL		
Year	EPS ($)	DPS ($)	Payout Ratio (%)	EPS ($)	DPS ($)	Payout Ratio (%)
2012	3.08	1.00	32	1.86	0.60	32
2011	3.08	1.00	32	1.74	0.51	29
2010	3.94	1.00	25	1.51	0.42	28
2009	3.56	1.00	28	1.27	0.38	30
2008	1.77	1.00	56	1.04	0.37	36
2007	2.17	1.00	46	1.07	0.30	28
2006	2.55	1.00	39	1.03	0.28	27
2005	2.53	1.00	40	0.91	0.26	29
2004	2.41	1.00	41	0.78	0.23	29
2003	3.40	1.00	29	0.67	0.21	31
2002	2.56	1.00	39	0.68	0.20	29
2001	1.07	1.00	93	0.65	0.19	29
2000	0.71	1.00	141	0.61	0.18	30
1999	0.37	1.00	270	0.54	0.17	31
1998	1.75	1.00	57	0.41	0.16	39

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- compare
- identify

B) Free Cash Flow

- FCFF ⇒ pre-debt
- FCFE ⇒ post-debt

⇒ suitable when/

i) company is non-div. paying

ii) company is div. paying but divs. significantly exceed or fall short of FCFE

iii) company's FCF aligns with the company's profitability within the forecast horizon

iv) the investor takes a control perspective

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LOS a
- compare
- identify

C) Residual Income

- earnings > required rate of return

⇒ suitable when/

i) company is not paying dividends

ii) expected FCFs are negative within the forecast horizon

DDM

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LOS b
- calculate
- interpret

- Single Period/

$$V_0 = \frac{D_1}{(1+r)^1} + \frac{P_1}{(1+r)} = \frac{D_1 + P_1}{(1+r)}$$

e.g./ D_1 = \$0.58, P_1 = \$27 r = 9%

$$V_0 = \frac{0.58 + 27}{1.09} = \$25.30$$

- Multiple Periods/

$$V_0 = \sum_{t=1}^{n} \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$$

e.g./

D_1	D_2	D_3	D_4	D_5	P_5 = \$40	r = 10%
2.00	2.10	2.20	3.50	3.75		

$$V_0 = \frac{2}{(1.1)^1} + \frac{2.10}{(1.1)^2} + \frac{2.20}{(1.1)^3} + \frac{3.50}{(1.1)^4} + \frac{3.75}{(1.1)^5} + \frac{40}{(1.1)^5} = \$34.76$$

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- calculate
- interpret

- general form

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

- 2 approaches to using DDM

A/ use a growth pattern
- GGM – constant growth forever
- 2-stage, H-stage or 3-stage DDM

B/ explicit forecast period + terminal value

depends on visibility of earnings

- apply a growth pattern from A/above or/ multiples-based

Gordon Growth Model

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- calculate
- explain

- assumes dividends grow indefinitely at a constant rate

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

r > g actually r >> g

e.g./ D_0 = \$5 g = 5% r = 8%

$$V_0 = \frac{5(1+.05)}{.08-.05} = \frac{5.25}{.03} = \$175$$

Proof/

$$V_0 = \frac{D_1}{(1+r)} + \frac{D_1}{(1+r)} \times \frac{(1+g)}{(1+r)} + \frac{D_1}{(1+r)} \times \frac{(1+g)^2}{(1+r)^2} \ldots$$

- geometric series

∴ we can use infinite sum formula,

$$\frac{D_1}{(1+r)} \times \frac{1}{\left(1 - \frac{1+g}{1+r}\right)} = \frac{D_1}{(1+r) - \frac{(1+g)(1+r)}{(1+r)}} = \frac{D_1}{(1+r) - (1+g)} = \frac{D_1}{r-g}$$

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⇒ both r and g should reflect long-term expectations

⇒ most appropriate for companies with earnings expected to grow at a rate comparable to or lower than the $\underbrace{\text{economy's nominal growth rate}}_{\text{GDP}}$

- if g > GDP growth ⇒ use multi-stage DDM

e.g./ Qtly Div = 31¢
g = 4%
r_f = 3%
β = 0.95
ERP = 4.5%

V_0 = ?

$$V_0 = \frac{D_1}{r-g} = \frac{4(.31)(1.04)}{0.073-.04} = \frac{1.2896}{.033} = \$39.08$$

$$r = .03 + .95(.045) = .073$$

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D_0 = \$0.74 g = 3.5% (vs 2.7% by Zacks)

β_{raw} = 0.70
β_{adj} = 0.80
} based on 60 monthly returns
R^2 < 20%

pre-tax r_d = 5.6% r_e = 7% P_0 = \$20.50 RP = 2.5%

① Find V_0

$$\frac{D_1}{r - g} = \frac{0.74(1.035)}{.07 - .035} = 21.88$$

② under/over/fair?

$$\frac{21.88 - 20.50}{20.50} = 6.77\%$$

under

③ Calculate r using CAPM & BYRP
- β regresses to the mean
- r_f = 3% ERP = 4.5%

r = .03 + .80(0.045) = 6.6%

$$\frac{.74(1.035)}{.066 - .035} = 24.71$$

r = 0.056 + .025
= 8.1%
V_0 = 16.65

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- calculate
- explain

- sensitive to values of r & g

	$g = 3.25\%$	$g = 3.50\%$	$g = 3.75\%$
$r = 6.75\%$	\$21.83	\$23.57	\$25.59
$r = 7.00\%$	\$20.37	**\$21.88**	\$23.62
$r = 7.25\%$	\$19.10	\$20.42	\$21.94

⇒ when r − g is greatest, V_0 is smallest

- GGM can also be used to value:
  - an index (broad market)
  - fixed-rate perpetual pref. $V_0 = D/r$
    g = 0 ∴ $D_0 = D_1 = D_2 \ldots = D_\infty$
  - a company with a declining g

e.g./ D_1 = 4.25 r = 9%
g = -4%

$$V_0 = \frac{4.25}{.09 - (-.04)} = \frac{4.25}{.13} = 32.69$$

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- calculate
- explain

- since div. grows at g, V_0 grows at g

$$V_0 = \frac{D_1}{(r-g)} \quad ; \quad V_0(1+g) = \frac{D_1(1+g)}{r-g} \quad \Rightarrow \quad V_1 = \frac{D_2}{r-g}$$

∴ g is the rate or capital appreciation → a.k.a. the cap. gains yield } expected (eff. mkts)

⇒ Div yield constant through time

D_0 → grows at g

$V_0 = P_0$ → grows at g

$$\therefore \; {}^{D_1}/_{P_0} = {}^{D_2}/_{P_1} = {}^{D_n}/_{P_{n-1}}$$

∴ Total Return = g + ${}^{D_1}/_{P_0}$ (cap. gain + div. yields)

⇒ given a constant DPR, earnings also grow at g

Implied Growth Rate

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- calculate
- interpret

$$\Rightarrow V_0 = P_0 = \frac{D_0(1+g)}{r-g} \Rightarrow \text{solve for g}$$

e.g./ β = 1.1 r_f = 5.6% ERP = 6% D_0 = 2.00 g = 5% P_0 = $40

1) $$V_0 = \frac{D_0(1+g)}{r-g} = \frac{2.00(1.05)}{.122-.05} = \frac{2.10}{.072} = 29.17$$

r = 0.056 + 1.1(.06) = .122

2) What g justifies P_0 = $40

$$40 = \frac{2(1+g)}{.122-g}$$

$$4.88 - 40g = 2 + 2g$$

$$2.88 = 42g$$

$$g = {}^{2.88}/_{42} = .0686$$

6.86%

PVGO

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- calculate
- interpret

Assume a company has a 100% DPR.

- let g = 0 (a no-growth company)

then $V_0 = \frac{D_1}{r-g} = {}^{D_1}/_{r}$

Let r = 10% and D_1 = \$4, then $V_0 = {}^{4}/_{.1} = \$40$

- now assume a company can earn 15% on its reinvested earnings
  - reduce the DPR to 50% or \$2, g = $\underbrace{15\% \times 50\%}_{\text{ROE} \times \text{RR}}$ = 7.5%

$V_0 = {}^{2}/_{.025} = \$80$

since ROE > r, g has pos. NPV

if ROE = 10%, $V_0 = {}^{2}/_{.05} = \$40$

if RR = 90%, $V_0 = {}^{.40}/_{.01} = \$40$

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- calculate
- interpret

$$\overset{20}{P} = \underbrace{\overset{15}{E_1}/_{r}}_{\text{value of a company without earnings reinvestment}} + \underbrace{\overset{5}{PVGO}}_{\text{value of growth}}$$

value of growth ⇒ depends on opportunities and flexibility in pursing them

e.g./ ABC EPS = 0.79 P_0 = 18.39, find PVGO if r = 9.25%

letting g = 0, D_1 = EPS (100% DPR)

$18.39 = {}^{.79}/_{.0925} + PVGO$

$18.39 = 8.54 + PVGO$

$PVGO = \$9.85$

Risks/
1) E_1 is too low/high
2) r is too low/high

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- interpret

$V_0 = {}^{E_1}/_{r} + PVGO$ ⇒ divided by E_1

${}^{V_0}/_{E_1} = \frac{1}{r} + \frac{PVGO}{E_1}$ ⇒ since we assume $V_0 = P_0$

$${}^{P_0}/_{E_1} = \boxed{P/E = \underbrace{\frac{1}{r}}_{\text{value of P/E for a no-growth company}} + \frac{PVGO}{E_1}}$$

component of P/E that relates to growth opportunities

e.g./ $P_0 = 18.39$
$E_1 = \$0.79$

$${}^{P}/_{E} = {}^{18.39}/_{.79} = 23.3$$

$$\frac{1}{r} = \frac{1}{.0925} = 10.8$$ no growth

+

$$\frac{PVGO}{E_1} = \frac{9.85}{.79} = \frac{12.5}{23.3}$$ growth / = P/E

Justified P/Es

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- calculate
- interpret

$V_0 = \frac{D_0(1+g)}{r-g}$, then $\frac{V_0}{EPS}$ = Justified P/E

trailing 12 months (ttm) E_0

forward 12-months E_1

- again, assuming that $V_0 = P_0$

$${}^{D_1}/_{E_1} = DPR = 1 - RR$$

$${}^{P_0}/_{E_1} = \frac{{}^{D_1}/_{E_1}}{r-g} = \frac{1-RR}{r-g}$$ ⇒ leading/forward

or/

$${}^{P_0}/_{E_0} = \frac{\frac{D_0(1+g)}{E_0}}{r-g} = \frac{(1-RR)(1+g)}{r-g}$$ ⇒ trailing

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e.g./ P_0 = \$23.84 r_f = 2.8% r = .028 + .8(.04)
EPS_{ttm} = 1.81 ERP = 4.0% = .06
D_0 = \$0.58 β = 0.80 DPR = $.58/1.81 = .3204$
g = 3.5% RR = .6796

Justified P/E

Forward

$$= \frac{1 - RR}{r - g} = \frac{.3204}{.06 - .035} = 12.814$$

Trailing

$$= \frac{(1 - RR)(1 + g)}{r - g} = \frac{.3204(1.035)}{.025} = 13.264$$

$$V_0 = \frac{0.58(1.035)}{.025} = 24.01$$

$$\frac{24.01}{1.81(1.035)} = 12.816$$

actual

$$23.84/1.81 = 13.17$$

$$24.01/1.81 = 13.266$$

Preferred Stock

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LOS g
- calculate

- non-callable, fixed-rate perpetual

level dividend implies

a) $D_0 = D_1 = D_2 = \ldots = D_\infty$

b) g = 0

$$\therefore V_0 = D/r$$

e.g./ KSV-P 4% par \$25 pref., r = 5.5%

$$V_0 = \frac{25 \times .04}{.055} = \frac{1}{.055} = \$18.18$$

Summary

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- describe

+/ • simplest of the DDM models
• most commonly used
• easy to understand
• has reverse logic
• scope ⇒ indicies, preferreds

-/ • sensitive to levels of r and g
• r >> g
• stock must be dividend paying and dividends must have a consistent relationship with earnings

Justifications/ • dividends are more stable/predictable
• more reflective of long-term intrinsic value since they are actual distributions

Multi-Stage DDM

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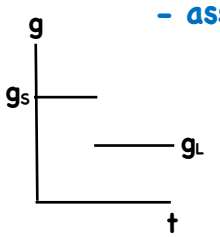
- explain
- justify

• assumption of stable div. growth rate not realistic for most companies

⇒ 2-stage (growth - maturity)



- assumptions/
  - abnormal g is Stage 1 (g_S)
  - constant g at maturity (g_L)
  - transition from growth to maturity abrupt
  - single r at both stages
- justification/
  - represents reality better (temporary comp. advantage ⇒ patents, first mover)
  - company that pays $0 now but a div. is anticipated

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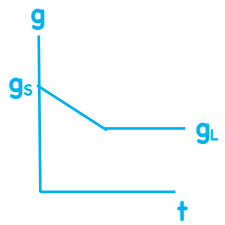
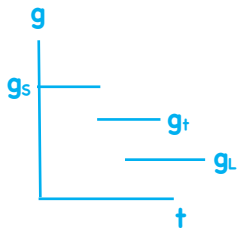
⇒ H-model (growth - maturity)

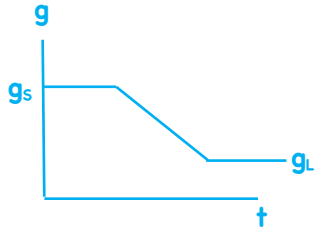


- results in an approximation of V_0
- if g_S is a long period or if (g_S – g_L) is large, discounting each dividend would be better

⇒ 3-stage (growth – transition – maturity)



or/



- for all 3 models, no assumptions are made as to the length of each phase (flexible)

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- explain
- justify

⇒ Spreadsheet Modelling

- allows for more complex dividend patterns
- built-in functions simplify complex/tedious calculations
- easily shared

Stages of Growth

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1) Growth phase
- rapidly expanding markets
- high profit margins
- abnormally high growth rate in EPS
- often FCFE < 0
- DPR = 0

2) Transition phase
- earnings growth slows towards rate of GDP
- competition puts pressure on prices and margins
- CAPEX requirements decline
- FCFE & DPR > 0

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3) Maturity phase/
- equilibrium ⇒ investment opps earn cost of capital

$\therefore ROE \sim r_e$

- earnings growth, DPR & ROE stabilize at sustainable long-term levels

Terminal Value

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2-stage

$$V_0 = \sum_{t=1}^{n} \frac{D_0(1+g_S)^t}{(1+r)^t} + \frac{V_n}{(1+r)^n}$$

3-stage

$$V_0 = \sum_{a=1}^{m} \frac{D_0(1+g_S)^a}{(1+r)^a} + \sum_{b=1}^{n-m} \frac{D_0(1+g_S)^m(1+g_t)^b}{(1+r)^{m+b}} + \frac{V_n}{(1+r)^n}$$

V_n – terminal value (continuing value)

① $V_n = \dfrac{D_0(1+g_S)^n(1+g_L)}{r - g_L}$ $\quad V_n = \dfrac{D_0(1+g_S)^m(1+g_t)^{n-m}(1+g_L)}{r - g_L}$

GGM

② V_n = EPS_n × multiple
BV/sh × multiple

· typically the largest component of V_0

Examples

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- 2-stage

$$V_0 = \sum_{t=1}^{n} \frac{D_0(1+g_S)^t}{(1+r)^t} + \frac{\left(\frac{D_0(1+g_S)^t(1+g_L)}{(r - g_L)}\right)}{(1+r)^n}$$

e.g./ $P_0 = 23.37$ $\quad D_0 = 0.40$
$r_e = 7.1\%$ $\quad g_S = 9\%$ (10 yrs) $g_L = 5\%$

$$V_n = \frac{.40(1.09)^{10}(1.05)}{.071 - .05} = 47.3473$$

$$V_0 = \frac{V_{10}}{(1+r)^{10}} + 4.4118 = \frac{47.3473}{(1.071)^{10}} + 4.4118 = 28.257$$

1	D_1	€0.40(1.09)	€0.4360	€0.4071
2	D_2	$0.40(1.09)^2$	0.4752	0.4143
3	D_3	$0.40(1.09)^3$	0.5180	0.4217
4	D_4	$0.40(1.09)^4$	0.5646	0.4291
5	D_5	$0.40(1.09)^5$	0.6154	0.4368
6	D_6	$0.40(1.09)^6$	0.6708	0.4445
7	D_7	$0.40(1.09)^7$	0.7312	0.4524
8	D_8	$0.40(1.09)^8$	0.7970	0.4604
9	D_9	$0.40(1.09)^9$	0.8688	0.4686
10	D_{10}	$0.40(1.09)^{10}$	0.9469	0.4769
				4.4118

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e.g. 2/ $P_0 = 52.72$ $D_0 = 1.70$ $g_S = 4\%$ (4 yrs)
$r_e = 9\%$ ($DPR_4 = .35$, $PE_{ttm} = 13$)

V_0?

$$\sum_{t=1}^{4} \frac{D_0(1+g_S)^t}{(1+r)^t} = \frac{1.70(1.04)}{(1.09)} + \frac{1.70(1.04)^2}{(1.09)^2} + \frac{1.70(1.04)^3}{(1.09)^3} + \frac{1.70(1.04)^4}{(1.09)^4}$$

$$= 6.0551$$

$$\frac{V_n}{E_n} = 13 \qquad V_n = 13 \times E_n = 13 \times \frac{1.70(1.04)^4}{.35} = 13 \times 5.6822$$

$$= 73.8682$$

$$V_0 = \frac{73.8682}{(1.09)^4} + 6.0551 = \$58.3852$$

$$\frac{58.3852 - 52.72}{52.72}$$

$$= 10.746\%$$

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H-model/

$$V_0 = \frac{D_0(1+g_L)}{r - g_L} + \frac{D_0 \cdot H(g_S - g_L)}{r - g_L}$$

H = half-life in years of the high growth period

e.g./ $P_0 = \$23.37$ $D_0 = 0.40$ $g_S = 9\%$ (10 yrs) (2-stage, $V_0 = 28.257$)
$r_e = 7.1\%$ $g_L = 5\%$

$$V_0 = \frac{.40(1.05)}{.071 - .05} + \frac{.40(5)(.09 - .05)}{.071 - .05}$$

$$= 20 + 3.8095$$

$$= 23.8095$$

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H-model/

e.g. 2/ $P_0 = \$41.70$ $D_0 = 1.77$
$g_S = 7\%$ (10 yrs)
$g_L = 4\%$
$r_e = 9.5\%$

$$V_0 = \frac{D_0(1+g_L)}{r - g_L} + \frac{D_0 \cdot H(g_S - g_L)}{r - g_L}$$

$$= \frac{1.77(1.04)}{.095 - .04} + \frac{1.77(5)(.03)}{.055}$$

$$= 33.47 + 4.83$$

$$= 38.30$$

$$\frac{38.30 - 41.70}{41.70}$$

$$= -8.153\%$$

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3-stage

e.g. 1/ $P_0 = 194.98$ $D_0 = 3.30$ $r_e = 9\%$
$g_S = 14\%$ (2 yrs)
$g_t = 12\%$ (5 yrs)
$g_L = 6.75\%$

$$V_7 = \frac{D_0(1+g_S)^2(1+g_t)^5(1+g_L)}{r - g_L}$$

$$= \frac{3.30(1.14)^2(1.12)^5(1.0675)}{.09 - .0675}$$

$$= 358.5908$$

$$PV_{div} = \frac{3.30(1.14)}{1.09} + \frac{3.30(1.14)^2}{(1.09)^2} + \frac{3.30(1.14)^2(1.12)}{(1.09)^3} + \ldots + \frac{3.30(1.14)^2(1.12)^5}{(1.09)^7}$$

$$= 26.6561$$

$$V_0 = \frac{358.5908}{(1.09)^7} + 26.6561 = 222.8171$$

$$\frac{222.8171 - 194.98}{194.98} = 14.277\%$$

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3-stage w/H-model

e.g. 2/

- P_0 = 56.18 · D_0 = 0.56
- g_S = 11% (5 yrs)
- [$g_S \rightarrow g_L$ = 10 yrs]
- g_L = 6.5% · ERP = 4.2%
- β_{adj} = 1.2 - 2 yrs of weekly obs.
- r_f = 3% (20 yr T-Bond)
- FairVal = +/- 20% · V_0

V_0 =?

$$V_5 = \frac{D_5(1+g_L)}{r - g_L} + \frac{D_5 \cdot H(g_S - g_L)}{r - g_L}$$

$$r = .03 + 1.2(0.042) = .08$$

$$V_5 = \frac{0.56(1.11)^5(1.065)}{.08 - .065} + \frac{0.56(1.11)^5 \cdot 5(.11 - .065)}{.08 - .065}$$

$$= 66.9979 + 14.1545$$

$$= 81.1524$$

$$V_0 = 3.0421 + \frac{81.1524}{(1.08)^5} = 58.2731$$

$$PV_{div} = \frac{.56(1.11)}{(1.08)} + \ldots + \frac{.56(1.11)^5}{(1.08)^5}$$

$$= 3.0421$$

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Single Stage

- GGM
- multiples-based

2-stage

- explicit forecast period
  - GGM
  - multiples-based

or/

- H-model

3-stage

- explicit forecast period
  - explicit forecast period
    - GGM
    - multiples-based
  - H-model

(1) (2) (3)

Required Return

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GGM/

$$r = {}^{D_1}/_{P_0} + g$$

$$V_0 = P_0 = {}^{D_1}/_{r - g}$$

$$P_0(r - g) = D_1$$

$$r - g = {}^{D_1}/_{P_0}$$

$$r = {}^{D_1}/_{P_0} + g$$

H-model/

$$r = \left({}^{D_0}/_{P_0}\right)[(1 + g_L) + H(g_S - g_L)] + g_L$$

$$V_0 = P_0 = \frac{D_0(1 + g_L)}{r - g_L} + \frac{D_0 H(g_S - g_L)}{r - g_L}$$

$$P_0(r - g_L) = D_0(1 + g_L) + D_0 H(g_S - g_L)$$

$$r - g_L = \frac{D_0(1 + g_L)}{P_0} + \frac{D_0 H(g_S - g_L)}{P_0}$$

$$r - g_L = \left({}^{D_0}/_{P_0}\right)[(1 + g_L) + H(g_S - g_L)]$$

$$r = \left({}^{D_0}/_{P_0}\right)[(1 + g_L) + H(g_S - g_L)] + g_L$$

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2-stage

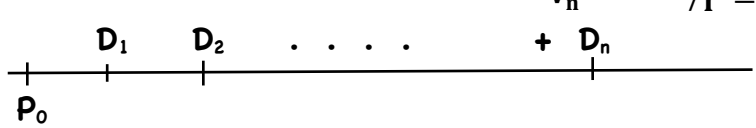
$$\sum_{t=1}^{n} \frac{D_0(1 + g_S)^t}{(1 + r)^t} + \frac{V_n}{(1 + r)^n} \qquad V_n \to \frac{D_{n+1}}{r - g_L}$$

3-stage

$$\sum_{a=1}^{m} \frac{D_0(1 + g_S)^a}{(1 + r)^a} + \sum_{b=m+1}^{n} \frac{D_0(1 + g_S)^a(1 + g_t)^b}{(1 + r)^{b-m}} + \frac{V_n}{(1 + r)^n} \qquad V_n \to \frac{D_{n+1}}{r - g_L}$$

⇒ given P_0, solve for r (IRR) ⇒ efficient market required return (implied r)

$$V_n = {}^{D_{n+1}}/_{r - g}$$



initial est.

$$r = {}^{D_1}/_{P_0} + g_L$$

Spreadsheet Modelling

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⇒ any dividend pattern

Q: how to estimate g for the terminal value

$$\sum_{i=1}^{n} \frac{D_i}{(1+r)^i} + \frac{V_n}{(1+r)^n} \rightarrow \frac{D_{n+1}}{r-g}$$

1) g = ROE × RR in mature stage
   - → set ROE = r (equilibrium condition)
   - → set to the median industry ROE
   - → DuPont decomposition based on forecasts for the components of ROE

2) relate g to macro or industry growth projections

g_L

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⇒ g_L – sustainable growth rate for a given level of ROE
(assumes a constant capital structure)

g = ROE × RR — higher ROE, higher RR } higher g

b = (1 – DPR)

- lower RR ⇒ lower g

dividend displacement or earnings — Not quite!

e.g./ ROE = 25%
RR = 60%

g = .25 × .60 = 15%

	T_0
Sh. Eq.	$1M
NI	250k
Div	100k
(DPR = 40%)	

	T_1
Sh. Eq.	$1.150M
NI = Sh. Eq × ROE	287,500
	(15% increase)
Div (40% DPR)	115,000
	(15% increase)

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$$\Rightarrow g = \underbrace{ROE}_{} \times RR$$

$$= \frac{\text{Net Income}}{\text{Sh. Equity}} \times RR$$

(or Avg. TA)

(ROA × leverage)

$$= \frac{NI}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Sh. Equity}} \times RR$$

$$= \frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Sh. Equity}} \times RR$$

(Pr. margin × turnover × leverage)

$$g = \underbrace{\frac{NI - \text{Div.}}{NI} \times \frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Sh. Equity}}}_{\text{PRAT model}}$$

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e.g./ ABC → ROA = 10%
RR = 30%
leverage = 1.25 (a.k.a. equity multiplier)

XYZ → ROA = 10%
RR = $^2/_3$
leverage = 2.0

g = RR × ROA × leverage

ABC/ g = .3 × .1 × 1.25 = 3.75%

XYZ/ g = $^2/_3$ × .1 × 2 = 13.33%

higher RR
higher leverage

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$$g = RR \times \underbrace{\text{Profit Margin} \times \text{turnover}} \times \text{leverage}$$

$$= \underbrace{RR \times \text{ROA} \times \text{financial leverage}}$$

- match estimates of each factor with the forecast horizon

- typically, $^{\text{sales}}/_{\text{assets}}$ & $^{\text{assets}}/_{\text{equity}}$ are forecast to be fixed

⇒ implies sales, assets & debt will grow at g

→ RR usually fixed as well, ∴ div grows at g as well

Free Cash Flow Valuation

a. compare the free cash flow to the firm (FCFF) and free cash flow to equity (FCFE) approaches to valuation

b. explain the ownership perspective implicit in the FCFE approach

c. explain the appropriate adjustments to net income, earnings before interest and taxes (EBIT), earnings before interest, taxes, depreciation, and amortization (EBITDA), and cash flow from operations (CFO) to calculate FCFF and FCFE

d. calculate FCFF and FCFE

e. describe approaches for forecasting FCFF and FCFE

f. compare the FCFE model and dividend discount models

g. explain how dividends, share repurchases, share issues, and changes in leverage may affect future FCFF and FCFE

h. evaluate the use of net income and EBITDA as proxies for cash flow in valuation

i. explain the single-stage (stable-growth), two-stage, and three-stage FCFF and FCFE models and justify the selection of the appropriate model given a company's characteristics

j. estimate a company's value using the appropriate free cash flow model(s)

k. explain the use of sensitivity analysis in FCFF and FCFE valuations

l. describe approaches for calculating the terminal value in a multistage valuation model

m. evaluate whether a stock is overvalued, fairly valued, or undervalued based on a free cash flow valuation model

LOSs will match between the video and the PDFs, but may be in a different order than the CFAI readings

FCFF vs. FCFE

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- compare

- FCFF/E
  - not readily available
  - must be computed
  - forecasting more complicated

Recap/ ⇒ use FCF when:

- Company pays no dividend
- Company pays a dividend, but it shows no relationship with earnings or capacity to pay
- FCF has alignment with profitability over the forecast period

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- compare

$$\text{FCFF} = \underbrace{\text{CFO} + \text{Int}(1-t) - \text{CAPEX}}_{\text{CF available to suppliers of capital}}$$

$$\text{FCFE} = \underbrace{\text{FCFF} - \text{Int}(1-t) + \text{Net Borrowings}}_{\text{CF available to holders of common equity}}$$

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

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

$$\text{Value of Equity} = \text{Value of Firm} - \text{MV}_d$$

Should give the save value

$$V_0 = \text{Value of Equity} \Big/ \text{\#of shares}$$

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$$\text{Value of Firm} = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1+WACC)^t}$$

$$\text{Value of Equity} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r)^t}$$

$$\frac{MV_d}{MV_d + MV_e} r_d(1-t) + \frac{MV_e}{MV_d + MV_e} r$$

$r = r_f + \beta(ERP)$
$r = BY + RP$

- FCFF preferred if/
  - Levered company with FCFE < 0
  - Levered company with changing capital structure

  (WACC less sensitive to change than r is)
- FCFE preferred if/
  - Company capital structure is stable and FCFE > 0

FCFE

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FCFF = CFO + Int(1-t) - CAPEX

Cash flow available to:

Common stockholders

Debtholders

Preferred stockholder

FCFE = FCFF - Int(1-t) + Net Borrowings

Cash flow available to:

Common stockholders

Required Adjustments — NI, EBIT, EBITDA, CFO

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⇒ To Net Income/

FCFF = NI + NCC + Int(1-t) − FCInv − WCInv

(+ Pref. Div)

NI – after dep./am., int. exp., taxes, pref. div
NCC – net non-cash charges
Int(1-t) – after-tax interest exp.
FCInv – net investments in fixed capital — Long-term tangible & intangible Acquisitions (cash)
WCInv – net investments in working capital

Excludes cash/equiv. and any CL accts. that are debt

FCFE = FCFF − Int(1-t) + Net Borrowings
= NI + NCC − FCInv − WCInv + Net Borrowings

Net Borrowings = Debt issued − Debt repaid

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	2010	2011	2012
Earnings before interest, taxes, depreciation, and amortization (EBITDA)	$200.00	$220.00	$242.00
Depreciation expense	45.00	49.50	54.45
Operating income	155.00	170.50	187.55
Interest expense (at 7 percent)	15.68	17.25	18.97
Income before taxes	139.32	153.25	168.58
Income taxes (at 30 percent)	41.80	45.97	50.58
Net income	$97.52	$107.28	$118.00

	2009	2010	2011	2012
Cash	$0.00	$108.92	$228.74	$360.54
Accounts receivable	0.00	100.00	110.00	121.00
Inventory	60.00	66.00	72.60	79.86
Current assets	60.00	274.92	411.34	561.40
Fixed assets	500.00	500.00	550.00	605.00
Less: Accumulated depreciation	0.00	45.00	94.50	148.95
Total assets	$560.00	$729.92	$866.84	$1,017.45
Accounts payable	$0.00	$50.00	$55.00	$60.50
Current portion of long-term debt	0.00	0.00	0.00	0.00
Current liabilities	0.00	50.00	55.00	60.50
Long-term debt	224.00	246.40	271.04	298.14
Common stock	336.00	336.00	336.00	336.00
Retained earnings	0.00	97.52	204.80	322.80
Total liabilities and equity	$560.00	$729.92	$866.84	$1,017.45

FCFF	2010	2011	2012
NI	97.52	107.28	118.00
+NCC	45.00	49.50	54.45
+Int(1-t)	10.98	12.08	13.28
-FCInv	0	(50)	(55)
-WCInv	(56)	(11.60)	(12.76)
	97.50	107.26	117.97
	(100)	(10)	(11)
	(6)	(6.6)	(7.26)
	50	5	5.5

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	2010	2011	2012
Earnings before interest, taxes, depreciation, and amortization (EBITDA)	$200.00	$220.00	$242.00
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Total liabilities and equity	$560.00	$729.92	$866.84	$1,017.45

FCFF	2010	2011	2012
	97.50	107.26	117.97
FCFE	97.50	107.26	117.97
-Int(1-t)	(10.98)	(12.08)	(13.28)
+NetB.	22.40	24.64	27.10
	108.92	119.82	131.79

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- explain

⇒ To CFO/

FCFF = CFO + Int(1-t) - FCInv (+ Pref. Div)

Includes NCC
WCInv

Interest — Exp. / Rec.

Dividends — Pd. / Rec.

GAAP		IFRS	
CFO	—	CFO	CFF
CFO	—	CFO	CFI
CFF	—	CFF	CFO
CFO	—	CFO	CFI

adjustments required

No adjustments

FCFE = FCFF - Int(1-t) + Net Borrowings
= CFO + Int(1-t) - FCInv - Int(1-t) + Net Borrowings
= CFO - FCInv + New Borrowings

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	2010	2011	2012
Cash flow from operations			
Net income	$97.52	$107.28	$118.00
Plus: Depreciation	45.00	49.50	54.45
Increase in accounts receivable	(100.00)	(10.00)	(11.00)
Increase in inventory	(6.00)	(6.60)	(7.26)
Increase in accounts payable	50.00	5.00	5.50
Cash flow from operations	86.52	145.18	159.69
Cash flow from investing activities			
Purchases of PP&E	0.00	(50.00)	(55.00)
Cash flow from financing activities			
Borrowing (repayment)	22.40	24.64	27.10
Total cash flow	108.92	119.82	131.80
Beginning cash	0.00	108.92	228.74
Ending cash	$108.92	$228.74	$360.54
Notes:			
Cash paid for interest	($15.68)	($17.25)	($18.97)
Cash paid for taxes	($41.80)	($45.98)	($50.57)

FCFF	2010	2011	2012
CFO	86.52	145.18	159.69
+Int(1-t)	10.98	12.08	13.28
-FCInv	0	(50)	(55)
	97.50	107.26	117.97
FCFE	↓	↓	↓
FCFF	97.50	107.26	117.97
-Int(1-t)	(10.98)	(12.08)	(13.28)
Net. Borr.	22.40	24.64	27.10
	108.92	119.82	131.79

Tax rate = 30%

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⇒ a note on NCC
- starting with CFO
  - NCC reflected in CFO
- starting with NI
  - add back NCC – but which ones?
  - some NCCs can be buried in other line items

- Forecasting FCFF may require forecasting each component of NI, Int(1-t), FCInv, WCInv, NCC

What components?
- typically want to exclude unpredictable NCCs from forecasts

e.g./ NCCs:
- restructuring charges
- losses/gains
- am. of bond pr./disc.
- Dep/Amort.
- Def. Taxes (special attention) – usually ignored unless persistent

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⇒ a note on NCC

e.g./ NCCs: Con't.

- Employee share-based compensation

  IFRS/GAAP - exp. on I.S. (NCC)

  - determine impact on CFO

    ⇒ If they are not expected to persist, do not forecast them

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- explain

⇒ to EBIT/

$$FCFF = \underbrace{NI} + NCC + Int(1-t) - FCInv - WCInv$$

$$NI = (EBIT - Int)(1-t)$$
$$= EBIT(1-t) - Int(1-t)$$

$$FCFF = EBIT(1-t)[-Int(1-t) + Int(1-t)] + NCC - FCInv - WCInv$$
$$= EBIT(1-t) + \underbrace{NCC} - FCInv - WCInv$$

We assume the only NCC is Dep.

Why? - many non-cash charges are made after computing EBIT (or EBITDA)

$$FCFE = FCFF - Int(1-t) + \text{Net Borrowing}$$
$$= EBIT(1-t) + NCC - Int(1-t) - FCInv - WCInv + \text{New Borrowing}$$

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⇒ to EBITDA/

$$FCFF = \underbrace{NI} + NCC + Int(1-t) - FCInv - WCInv$$

$$NI = (EBITDA - Dep - Int)(1-t)$$
$$= EBITDA(1-t) - Dep(1-t) - Int(1-t)$$

$$FCFF = EBITDA(1-t)[- Dep + Dep(t) + NCC][- Int(1-t) + Int(1-t)] - FCInv - WCInv$$
$$= EBITDA(1-t) + Dept(t) - FCInv - WCInv$$

$$FCFE = FCFF - Int(1-t) + \text{Net Borrowings}$$

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- calculate

Statement of Cash Flows Year Ended 31 December	2012
Operating activities	
Net income	$240
Adjustments	
Depreciation	300
Changes in working capital	
Accounts receivable	(40)
Inventories	(30)
Accounts payable	15
Accrued taxes and expenses	10
Cash provided by operating activities	$495
Investing activities	
Purchases of fixed assets	400
Cash used for investing activities	$400
Financing activities	
Notes payable	(50)
Long-term financing issuances	(25)
Common stock dividends	160
Cash used for financing activities	$85
Cash and equivalents increase (decrease)	10
Cash and equivalents at beginning of year	190
Cash and equivalents at end of year	$200
Supplemental cash flow disclosures	
Interest paid	$100
Income taxes paid	$160

FCFF →	NI
NI	240
NCC	300
Int(1-t)	60
- FCInv	(400)
- WCInv	(45)
	155

Statement of Income Year Ended 31 December	2012
Total revenues	$3,000
Operating costs and expenses	2,200
EBITDA	800
Depreciation	300
Operating income (EBIT)	500
Interest expense	100
Income before tax	400
Taxes (at 40 percent)	160
Net income	240
Dividends	160
Change in retained earnings	80
Earnings per share (EPS)	$0.48
Dividends per share	$0.32

FCFE →	FCFF
FCFF	155
- Int(1-t)	(60)
+ Net B.	75
	170

FCFE →	NI
NI	240
NCC	300
- FC	(400)
- WC	(45)
+ Net B.	75
	170

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Statement of Cash Flows Year Ended 31 December	2012
Operating activities	
Net income	$240
Adjustments	
Depreciation	300
Changes in working capital	
Accounts receivable	(40)
Inventories	(30)
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Accrued taxes and expenses	10
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Cash and equivalents at end of year	$200
Supplemental cash flow disclosures	
Interest paid	$100
Income taxes paid	$160

FCFF →	CFO
CFO	495
Int(1-t)	60
- FCInv	(400)
	155

Statement of Income Year Ended 31 December	2012
Total revenues	$3,000
Operating costs and expenses	2,200
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Dividends per share	$0.32

FCFE →	CFO
CFO	495
- FCInv	(400)
+ Net B.	75
	170

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Statement of Cash Flows Year Ended 31 December	2012
Operating activities	
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Adjustments	
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Income taxes paid	$160

FCFF →	EBIT
EBIT(1-t)	300
+ NCC	300
- FCInv	(400)
- WCInv	(45)
	155

FCFE →	EBIT
EBIT(1-t)	300
NCC	300
- FCInv	(400)
- WCInv	(45)
- Int(1-t)	(60)
+ Net B.	75
	170

Statement of Income Year Ended 31 December	2012
Total revenues	$3,000
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Income before tax	400
Taxes (at 40 percent)	160
Net income	240
Dividends	160
Change in retained earnings	80
Earnings per share (EPS)	$0.48
Dividends per share	$0.32

FCFF →	EBITDA
EBITDA(1-t)	480
+ Dep(t)	120
- FCInv	(400)
- WCInv	(45)
	155

Forecasting FCFF/E

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- describe

1) apply a constant growth rate to a current level of FCF
   - if FCF has grown at some constant rate

And/

   - historical relationships between CF & fundamental factors are expected to continue

e.g./

	2012	2013	2014	2015
FCFF	$155M	178.25	204.99	235.74

g = 15%

$$\text{Value of the Firm} = \frac{\text{FCFF}_0(1+g)}{\text{WACC} - g}$$

One-stage model

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- describe

b) forecast each of the components/

EBIT - forecast directly or as some relationship with sales

t ← Effective tax rate

NCC
FCInv } (FCInv - NCC)
- basic assumption
- constant relationship to increase in size of company

* NCC assumed to be Dep/Am. only

WCInv ← $\frac{\text{WCInv}}{\Delta\text{Sales}}$

- Constant relationship
e.g./ 0.20 implies 20¢ of incremental WCInv for every $1 of sales

$$\therefore \text{forecast} = \frac{\text{WCInv}}{\Delta\text{Sales}} \times \text{Increase in \$ sales}$$

$$\frac{(\text{FCInv} - \text{NCC})}{\Delta\text{Sales}}$$

e.g./ Sales increase of $10M
WCInv = .2 × $10 = $2M

e.g./ .15 implies 15¢ of incremental (FCInv - NCC) for every $1 increase in Sales

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- describe

- if (FCInv - NCC) = 0, implies FCInv at a level necessary to maintain existing capacity

$$\therefore \frac{\text{FVInv} - \text{NCC}}{\Delta\text{ Sales}} = 0$$ Does not imply FCInv = 0

- (FCInv - NCC) > 0 ⇒ level of FCInv required to support growth
- (FCInv - NCC) < 0 ⇒ unsustainable

FCInv = $ to maintain capacity + $ to support growth

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- describe

$$FCFE = FCFF (- Int(1-t) + \underbrace{Net\ Borrowing}_{(FCInv - NCC) + WCInv})$$

$$FCFE = NI + NCC - FCInv - WCInv + Net\ Borrowing$$

$$= NI - (FCInv - NCC) - WCInv + DR\ (FCInv - NCC) + DR\ (WCInv)$$

$$= NI - (1-DR)(FCInv - NCC) - \underbrace{(1-DR)}_{\text{Proportion financed with CF (i.e. equity)}}(WCInv)$$

Financed according to a target DR

e.g./ DR = 40%

$10M + $5M = $15M

.4(10) + .4(5) = $6M in new borrowing

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- describe

Statement of Cash Flows Year Ended 31 December	2012
Operating activities	
Net income	$240
Adjustments	
Depreciation	300
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Cash and equivalents at end of year	$200
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Interest paid	$100
Income taxes paid	$160

$$\frac{WCInv}{\Delta Sales} = \frac{45}{300} = 15\%$$

2013	
Sales	3,300
EBIT	550
EBIT(1-t)	330
- IncFC	(100)
- WCInv	(45)
$FCFF_{13}$	$185

2014	
Sales	3,630
EBIT	605
EBIT(1-t)	363
IncFC	(110)
WCInv	(49.50)
	$203.50

Statement of Income Year Ended 31 December	2012
Total revenues → Up $300M over 2011	$3,000
Operating costs and expenses	2,200
EBITDA	800
Depreciation	300
Operating income (EBIT)	500
Interest expense	100
Income before tax	400
Taxes (at 40 percent) t=40%	160
Net income	240
Dividends	160
Change in retained earnings	80
Earnings per share (EPS)	$0.48
Dividends per share	$0.32

$$EBIT = 500/3{,}000 = 16.67\%$$

$$\frac{(FCInv - Dep)}{\Delta\ Sales} = \frac{400 - 300}{300} = \frac{100}{300} = 33\,1/3\,\%$$

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- describe

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales growth	10.00%	10.00%	10.00%	10.00%	10.00%
EBIT margin	16.67%	16.00%	15.50%	15.00%	14.50%
Tax rate	40.00%	40.00%	40.00%	40.00%	40.00%
Incremental FC investment	33.33%	33.33%	33.33%	33.33%	33.33%
Incremental WC investment	15.00%	15.00%	15.00%	15.00%	15.00%
Prior-year sales	$3,000.00				
Sales forecast	$3,300.00	$3,630.00	$3,993.00	$4,392.30	$4,831.53
EBIT forecast	550.00	580.80	618.92	658.85	700.57
EBIT(1 – Tax rate)	330.00	348.48	371.35	395.31	420.34
Incremental FC	(100.00)	(110.00)	(121.00)	(133.10)	(146.41)
Incremental WC	(45.00)	(49.50)	(54.45)	(59.90)	(65.88)
FCFF	$185.00	$188.98	$195.90	$202.31	$208.05

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- describe

FCFE/

		- assumptions:
Sales	3,300	- Up 10%
+ NI	264	- 8% of sales
- IncFC	(100)	- $33\,^{1}/_{3}\,\%$ of ΔSales
- WCInv	(45)	- 15% of ΔSales
+ Net Borr.	72.50	- DR = 50% (100 + 45).50
	$191.50	

Note/ if the company has significant NCC other than Dep., this approach will result in inaccurate forecasts of FCFF/E (best to forecast each component separately i.e. - no relationship)

FCFE vs. Dividends

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- compare

$$V_0 = \frac{D_0(1+g)}{r-g} \qquad V_0 = \frac{FCFE_0(1+g)}{r-g}$$

- g need not be, and often is not, the same in both models

- dividends ⇒ the cash flow actually going to shareholders (when paid)
  - discretionary
- may imperfectly signal a company's long-term profitability

FCFE ⇒ the cash flow available to be distributed to shareholders without impairing the company's value

- if D_0 = $FCFE_0$ & both gs are equal, both models will yield the same V_0

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LOS g
- compare

FCFF = NI + NCC + Int(1-t) − FCInv − WCInv
FCFE = NI + NCC − FCInv − WCInv + Net Borrowings

Sources of cash
- cash flows available to providers of capital
- dividends, share repurchases ⇒ uses of those cash flows

∴ Transactions between a company and its shareholders (divs., buybacks, issuance) do not affect FCF

- changes in leverage − increase the interest: - expense
  - tax shield

- increases FCFE in year debt is issued, will decrease FCFE in subsequent years by Int(1-t)

Cash Flow Proxies

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- evaluate

FCFF = NI + NCC + Int(1-t) - FCInv - WCInv
= EBITDA(1-t) = Dep(t) - FCInv - WCInv

Vs.

EBITDA - as a proxy for CF available to capital providers

$$\frac{\text{EBITDA}}{(1+\text{WACC})}$$

- before tax measure

after-tax measure

FCFE = NI + NCC - FCInv - WCInv + Net Borrowings

Vs.

NI - as a proxy for CF available to common stockholders

Preferred Shares

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FCFF ⇒ + Pref. Div.
FCFE ⇒ if starting from FCFF ⇒ - Pref. Div.
if starting from NI ⇒ no adjustment
but/ + Net Pref. Issuance
(+ sh. issuance - sh. buyback)

e.g./

	MV	r			
Bonds	400	8%	NI = 110	Int. exp. = 32	NCC = 40
Pref.	100	8	WCInv = 20	FCInv = 70	Net. Borr. = 25
Comm.	500	12	t=30%	g_{FCFF} = 4%	g_{FCFE} = 5.4%
	1000				

WACC
= (.4)(.08)(.7) + .1(.08)+ .5(.12)
= 9.04%

FCFF = 110 + 40 + 32(.7) - 70 - 20 + 8
= 90.4

$$\text{Value of the Firm} = \frac{90.4(1.04)}{.0904 - .04} = 1865.40$$
$$- 500$$
$$1365.40$$

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e.g./

	MV	r			
Bonds	400	8%	NI = 110	Int. exp. = 32	NCC = 40
Pref.	100	8	WCInv = 20	FCInv = 70	Net. Borr. = 25
Comm.	500	12	t=30%	g_{FCFF} = 4%	g_{FCFE} = 5.4%
	1000				

$$\text{FCFE} = 110 + 40 - 70 - 20 + 25$$
$$= 85$$

$$\text{Value of Equity} = \frac{85(1.054)}{.12 - .054} = 1357.42$$

$$\text{Value of Equity} = \text{Value of Firm} - MV_d - MV_{Pr}$$
$$= 1865.40 - 400 - 100 = 1365.40$$

FCFF/E Models

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- explain

- single-stage (stable growth)
  - GGM

$$\text{Value of Firm} = \frac{FCFF_0(1+g)}{WACC - g}$$

$$\text{Value of Equity} = \text{Value of Firm} - MV_d$$

$$\text{Value of Equity} = \frac{FCFE_0(1+g)}{r - g} \longrightarrow V_0 = \frac{\text{Value of Equity}}{\#\text{ of shares}}$$

  - Multiples-based
- Two-stage growth model

Explicit forecast period — GGM / Multiples-based

$$\sum_{i=1}^{n} \frac{FCFF_0(1+g)}{(1+WACC)^i} + \left(\frac{FCFF_{n+1}}{WACC - g}\right)\left(\frac{1}{(1+WACC)^n}\right)$$

H-model

$$\sum_{i=1}^{n} \frac{FCFF_i}{(1+WACC)^i} + \left(\frac{FCFF_{n+1}}{WACC - g}\right)\left(\frac{1}{(1+WACC)^n}\right)$$

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- 3-stage growth model

Explicit forecast period — Explicit forecast period — GGM / Multiples-based

Explicit forecast period — H-model

	Stage 1	Stage 2	Stage 3
one-stage	• constant g		
two-stage	• constant g • declining g	• constant g	
three-stage	• constant g • growing g	• constant g • declining g	• constant g

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- estimate

e.g. 1/ 2-stage w/ constant g in each stage

$Sales_0$/sh =25 β =1.2 r_f =7% ERP =4.5%

g_{sales} =20% (-3yrs), 6% after

NI Margin =10%

(FCInv – Dep) =50% $ΔSales WCInv =20% $ΔSales

DR =40%

V_0=?

$$V_0 = \sum_{i=1}^{3} \frac{FCFE_i}{(1+r)^i} + \frac{FCFE_{n+1}}{r-g} \cdot \frac{1}{(1+r)^3}$$

r = .07 + 1.2(.045) = 12.4%

	30	36	43.20	45.792
FCFE	1	2	3	4
NI	3	3.6	4.32	4.5792
- (FCInv-Dep)	(2.50)	(3.0)	(3.60)	(1.296)
- WCInv	(1.00)	(1.20)	(1.44)	(0.518)
+ Net Borr.	1.40	1.68	2.016	0.726
	0.90	1.08	1.296	3.491

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- estimate

e.g. 1/ 2-stage w/ constant g in each stage

$Sales_0/sh$ =25 β =1.2 r_f =7% ERP =4.5%
g_{sales} =20% (-3yrs), 6% after
NI Margin =10%
(FCInv – Dep) =50% ΔSales WCInv =20% ΔSales
DR =40%

$$V_0 = \frac{0.90}{1.124} + \frac{1.08}{(1.124)^2} + \frac{1.296}{(1.124)^3} + \left(\frac{3.491}{.124 - .06}\right) \cdot \frac{1}{(1.124)^3}$$

$$= .801 + .855 + .913 + \frac{54.55}{(1.124)^3}$$

$$= 40.98$$

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LOS j
- estimate

e.g. 2/ 2-stage w/ declining g in stage 1 and constant g in stage 2

- EPS_{2012} = 2.40

	2013	2014	2015	2016	2017
g_{EPS}	30%	18%	12%	9%	7% →
(FCInv-Dep)	$3	2.50	2.00	1.50	1.00 →

- WCInv =50% of (FCInv-Dep)
- DR = 30% • r_f =6% • ERP =4.0% • β_{adj} =1.10

V_{2013} =?

P/E_{ttm} < 2013, 2017

As of Jan 1/13

$$V_{13} = \sum_{i=1}^{4} \frac{FCFE/sh_i}{(1+r)^i} + \frac{FCFE/sh_5}{r-g} \cdot \frac{1}{(1+r)^4}$$

$$r = .06 + 1.10(.04) = 10.4\%$$

$$FCFE/_{sh} = NI/_{sh} - (FCInv - Dep.) - WCInv + Net\ Borr.$$

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- estimate

e.g. 2/ 2-stage w/ declining g in stage 1 and constant g in stage 2

$EPS_{2012} = 2.40$

g_{EPS}	30%	18%	12%	9%	7% →
	1	2	3	4	5
NI/sh	3.12	3.682	4.123	4.494	4.809
- (FCInv-Dep)	(3)	(2.50)	(2)	(1.50)	(1)
- WCInv	(1.5)	(1.25)	(1)	(.75)	(.50)
+ Net Borr.	1.35	1.125	.90	.675	.45
	-.03	1.057	2.023	2.919	3.759

$$V_0 = \frac{-.03}{(1.104)} + \frac{1.057}{(1.104)^2} + \frac{2.023}{(1.104)^3} + \frac{2.919}{(1.104)^4} + \frac{3.759}{.104 - .07} \cdot \frac{1}{(1.104)^4}$$

$$V_0 = -.027 + .867 + 1.504 + 1.965 + {}^{110.56}/_{(1.104)^4}$$

$$V_0 = 78.73$$

2013

$$P/E_{ttm} = \frac{78.73}{2.40} = 32.80$$

2017

$$P/E_{ttm} = \frac{110.56}{4.494} = 24.6$$

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- estimate

e.g. 3/ 2-stage - declining sales growth plus declining Net. Pr. Margin

- $Sales_0$ = \$600M

	1	2	3	4	5	6
g_{sales}	20%	16%	12%	10%	8%	7% →
Net. Pr. Margin	14%	13%	12%	11%	10.5%	10% →

- (FCInv – Dep) =60% \$ΔSales
- WCInv =25% \$ΔSales
- DR =40%
- β =1.10
- r_f =6.0%
- ERP =4.5%
- 70M shares

MV_e =?
V_0 =?

$$\text{Value of Equity} = \sum_{i=1}^{5} \frac{FCFE_i}{(1+r)^i} + \frac{FCFE_6}{r-g} \cdot \frac{1}{(1+r)^5}$$

$r = r_f + \beta(ERP)$

	YR_1
NI	100.80
- (FCInv – Dep)	(72)
- WCInv	(30)
+ N.B.	40.8
	39.6

MV_e = \$1,401.9M V_0 = 20.02

Sensitivity Analysis

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- explain

Variable	Base-Case Estimate	Low Estimate	High Estimate	Valuation with Low Estimate	Valuation with High Estimate
Beta	1.2	1.0	1.4	BRL23.68	BRL16.13
Risk-free rate	5.20%	4.20%	6.20%	BRL23.19	BRL16.37
Equity risk premium	5.50%	4.50%	6.50%	BRL24.20	BRL15.90
FCFE growth rate	6.0%	4.00%	8.00%	BRL14.00	BRL29.84

$r = .052 + 1.2(.055) = 11.8\%$
$g = 6\%$

highlights which variables are most critical to final valuation

⇒ Recall ⇒ GGM very sensitive to values of r & g

⇒ Allows you to develop a range for fair value

Terminal Value

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- describe

1) GGM:

$$\text{Value of Firm}_n = \frac{FCFF_{n+1}}{WACC - g_L} = \frac{FCFF_n(1+g)}{WACC - g_L}$$

$$\text{Value of Equity}_n = \frac{FCFE_{n+1}}{r - g_L} = \frac{FCFE_n(1+g)}{r - g}$$

2) Multiples-based

e.g./ $V_n = EPS_n \times \text{multiple}$

Market-Based Valuation: Price and Enterprise Value Multiples

a. contrast the method of comparables and the method based on forecasted fundamentals as approaches to using price multiples in valuation and explain economic rationales for each approach

b. calculate and interpret a justified price multiple

c. describe rationales for and possible drawbacks to using alternative price multiples and dividend yield in valuation

d. calculate and interpret alternative price multiples and dividend yield

e. calculate and interpret underlying earnings, explain methods of normalizing earnings per share (EPS), and calculate normalized EPS

f. explain and justify the use of earnings yield (E/P)

g. describe fundamental factors that influence alternative price multiples and dividend yield

h. calculate and interpret the justified price-to-earnings ratio (P/E), price-to-book ratio (P/B), and price-to-sales ratio (P/S) for a stock, based on forecasted fundamentals

i. calculate and interpret a predicted P/E, given a cross-sectional regression on fundamentals, and explain limitations to the cross-sectional regression methodology

j. evaluate a stock by the method of comparables and explain the importance of fundamentals in using the method of comparables

k. calculate and interpret the P/E-to-growth (PEG) ratio and explain its use in relative valuation

l. calculate and explain the use of price multiples in determining terminal value in a multistage discounted cash flow (DCF) model

m. explain alternative definitions of cash flow used in price and enterprise value (EV) multiples and describe limitations of each definition

n. calculate and interpret EV multiples and evaluate the use of EV/EBITDA

o. explain sources of differences in cross-border valuation comparisons

p. describe momentum indicators and their use in valuation

q. explain the use of the arithmetic mean, the harmonic mean, the weighted harmonic mean, and the median to describe the central tendency of a group of multiples

r. evaluate whether a stock is overvalued, fairly valued, or undervalued based on comparisons of multiples

LOSs will match between the video and the PDFs, but may be in a different order than the CFAI readings

Comparables vs. Forecasted Fundamentals

Page 1
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- distinguish
- explain

- Comparables/
  - based on a multiple of similar assets
  (comparables, comps, guideline assets/companies)
  - relative valuation — over / fairly / under vs. - closely matched stock / - avg. value of a stock's peer group
- Law of One Price
  - 2 identical assets should sell at the same price

e.g./ A EPS = \$1.50
P_A = \$37.50
B P/E = 22

① $P_A = 1.50 \times 22 = \$33$ — relatively overvalued by (37.50-33)

or/

② $P/E_A = 37.50/1.50 = 25$ — relatively overvalued by $(25-22) \times 1.50$

Page 2
LOS a
- distinguish
- explain

⇒ Forecasted Fundamentals/

V_0 or Value of the firm
- arrived at by some DCF model

$P/_X$ → per share (EPS)
$P/_X$ → firm level (EBITDA)
→ fundamental forecasted value

e.g./
$V_0 = 10.20$
$E_1 = 1.20$

forward P/E = $10.20/1.20 = 8.5$

Justified Multiple

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LOS b
- calculate
- interpret

- the estimated fair value of that multiple

Recall/ $V_0 = \frac{D_1}{r-g}$ and letting $V_0 = P_0$, $P_0 = \frac{D_1}{r-g}$

- divide both sides by E_1 $\quad {P_0}/{E_1} = \frac{{D_1}/{E_1}}{r-g}$ forward

e.g./ P/B = 2.2 (peer group)

Comp. C. BV = \$23

V_0 = \$46 $\quad P_0 = 52$

$${P_0}/{E_0} = \frac{{D_0}/{E_0}(1+g)}{r-g}$$ trailing

- justified P/B based on V_0 = ${46}/{23} = 2.0$ → \$12
- justified P/B based on peer-group = $23 \times 2.2 = 50.60$ → \$11 × 1.5 = 16.50

P/E

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⇒ Rationale/

- earnings power is a chief driver of investment value
- widely recognized and used

⇒ Drawbacks/

- EPS can be zero, negative or very small vs. P_0
  ⇒ P/E will make no economic sense
- what to keep (recurring components) vs. what to take out can be difficult to forecast and adjust for
- EPS is a highly managed number

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⇒ Alternative Definitions/

$P_0/_{EPS}$

- Time Period:
  - trailing P/E ⇒ most recent 4 quarters (current)
    - if forecasts are not possible
    - logical elimination

⇒ must consider – potential dilution of EPS ①
– transitory effects on EPS
- company specific ②
- cyclicality ③

– differences in actg. methods ④

- forward P/E ⇒ next year's expected earnings (leading, prospective)
  - valuation is forward looking so it makes sense to use a forward P/E

Page 6

⇒ Trailing P/E/

① Potential Dilution
- Basic and Diluted EPS given
- for comparison purposes, used of diluted EPS compensates for differences in convertible sec.

② Transitory company-specific components
- items not expected to recur are usually removed
- gets at underlying earnings (persistent, continuing, core)
- companies usually report adjusted earnings (non-IFRS, non-GAAP, pro-forma)

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⇒ Trailing P/E/

② Transitory company-specific components

e.g./ P_0 = 50.11

	2012 Q2-Q4	2013 Q1
Diluted EPS	3.71	0.81
Core EPS	4.60	1.41

34¢ restructuring charge

26¢ amort. of intangible assets arising from acquisition

$$P/E_{ttm} = 50.11/4.52 = 11.1 \times \text{reported EPS}$$

$$P/E_{ttm} = 50.11/6.01 = 8.3 \times \text{core EPS}$$

③ Transitory business-cycle components

but repeatable

EPS_{ttm} — depressed at bottom of cycle – high P/E – Molodousky effect may signal – undervalued

EPS_{ttm} — high at top of cycle – low P/E – overvalued

counter-cyclical

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LOS e
- calculate
- interpret

⇒ Trailing P/E/

③ Transitory business-cycle components

- normalized EPS – level of EPS expected under mid-cycle conditions

historical avg. EPS over most recent full cycle (does not account for size)

(avg. ROE from most recent full cycle) × BVPS (if BVPS makes sense)

e.g./ P_0 = $18.21

Measure	2006	2007	2008	2009	2010	2011	2012
EPS (ADR)	$0.74	$0.63	$0.61	$0.54	$1.07	$0.88	$1.08
BVPS (ADR)	$3.00	$2.93	$2.85	$2.99	$3.80	$4.03	$4.82
ROE	24.7%	22.4%	21.8%	18.0%	28.1%	21.3%	22.9%

normalized EPS (his. avg. EPS) = $\frac{\sum_{2006}^{2012} EPS}{n} = 0.79$ $\quad P/E = 18.21/.79 = 23.1$

normalized EPS (avg. ROE) = $\frac{\sum_{2006}^{2012} ROE}{n} \times BVPS_{12} = 22.6\% \times 4.82 = \$1.09$

$P/E = 18.21/1.09 = 16.7$

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⇒ Trailing P/E/

- a note on adjustments/
  - analyst adj. EPS do not have to equal company adj. EPS
  - adjustments require detailed work
    - non-recurring charges may appear in continuing operations of I.S.

④ Differences in actg. methods
- usually done early in the analysis
  - i.e. LIFO to FIFO
  - Dep. methods, assumptions, etc…

Low, Zero, Negative EPS/

P_0/EPS
- small EPS = very large P/E
- cannot divide by zero
- neg. P/E makes no sense

Page 10
LOS f
- explain
- justify

⇒ Trailing P/E/

Low, Zero, Negative EPS/

EPS/P_0 ⇒ problem solved (inverse price ratio)

earnings yield

- can be done for all ratios of the form $P_0/X \Rightarrow X/P_0 \Rightarrow$ yield < Div. y. / CF y. etc…

e.g./

Company	Current Price	Diluted EPS (TTM)	P/E (TTM)	E/P (%)
Molson Coors Brewing Co.	49.19	3.14	15.7	6.38
Anheuser-Busch Cos.	94.73	8.04	11.8	8.49
Boston Beer Co.	223.57	4.73	47.3	2.12
Craft Brew Alliance, Inc.	12.30	0.02	615.0	0.16
Mendocino Brewing Company, Inc	0.29	–0.02	NM	–6.90

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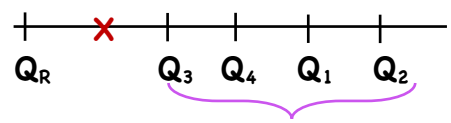
⇒ Forward P/E

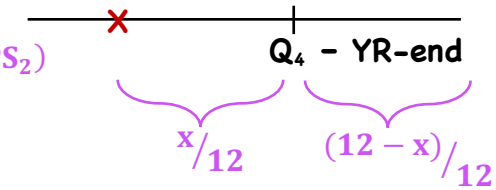
- next year's expected earnings
  - next 4 quarters

    EPS = $Q_3 + Q_4 + Q_1 + Q_2$



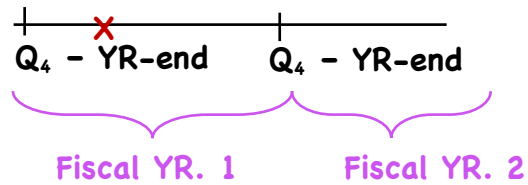
  - next 12 months

    $^{x}/_{12} \cdot E(EPS_1) + \frac{12-x}{12} \cdot E(EPS_2)$



$$\frac{184.15}{^{3}/_{12}(16.19) + {}^{9}/_{12}(18.35)} = 10.34$$

  - next fiscal year



e.g./ IBM $P_0 = 184.15$

- early Sep/13
- fiscal YR. = Cal. YR.
- consensus

  EPS (2013) = 16.19
- consensus EPS (2014) = 18.35

$PE_{13} = {}^{184.15}/_{16.19} = 11.4 \times$ YR 1

$PE_{14} = {}^{184.15}/_{18.35} = 10.0 \times$ YR 2

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⇒ Forward P/E

e.g./

	03/31	06/30	09/30	12/31	YR
2013	0.01	0.00	E (0.01)	E (0.05)	(.05)
2014	E 0.07	E 0.08	E 0.03	E (0.03)	0.15

Aug. 9/13 ⇒ $P_0 = 12.20$

1) next 4 Quarters/

   (.01) + (.05) + .07 + .08 = .09 $\quad {}^{12.20}/_{.09} = 135.6$

2) NTM P/E $\quad {}^{5}/_{12}(.05) + {}^{7}/_{12} \cdot 0.15 = .067 \quad$ P/E = ${}^{12.20}/_{.067} = 182.10$

3) Fiscal YR. 1 P/E = ${}^{12.20}/_{(.05)} = NM \quad (-244)$

4) Fiscal YR. 2 P/E = ${}^{12.20}/_{.15} = 81.3$

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Actual vs. Justified

P_0/EPS — ttm, ntm

V_0/EPS — ttm: justified trailing; ntm: justified forward

P_0, EPS } observed

V_0, E (EPS) } estimated

- lower WACC, r
- higher g

} higher justified P/E

e.g./

2013 — Sept. — 2014

Apr. 1 — March 31

$P_0 = 63.40$

$V_0 = 67.22$

Fiscal YR. EPS = 6.00

justified P/E

$= \frac{67.22}{6} = 11.2$

Predicted P/E

Page 13b

LOS i
- calculate
- interpret
- explain

Predicted

$$P/E = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

dependant variables

DPR, β, g — explanatory variables

e.g./ P/E = 12.12 + 2.25DPR - .2β + 14.43g

ABC β = .9 DPR = 0.45 g = 0.08

P/E = 12.12 + 2.25 (.045) - .2 (.9) + 14.43 (.08) = 14.1

Limitations/

- useful only for TTM (predictive power questionable)
- relationships between P/Es and fundamentals not stable over time
- multicollinearity

P/E

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⇒ Comparables/

some subjective adjustments perhaps

Benchmark value of P/E

avg. or median value of the P/E for the company's industry, sector, or peer group (or an index) vs. avg. past values of the P/E for the stock relative to the:

- industry
- sector
- peer group
- index

× target EPS
V_0 vs. P_0

vs. target P/E multiple
target P/E vs. benchmark P/E

are differences explained by differences in fundamentals

growth
- asset turnover
- profitability

risk
- liquidity
- coverage
- leverage

Page 15
LOS k
- calculate
- interpret

⇒ Comparables/

e.g./

Company	Trailing P/E
AT&T	25.73
BCE Inc.	14.49
Centurytel	18.86
Equinix	131.28
Frontier Communications Corp.	43.30
Verizon Communications	86.06
Windstream Corp.	36.91
Mean	50.95
Median	36.91

valuation metric

undervalued?

target company

which benchmark?

PEG ratio

$$\Rightarrow \frac{P/E}{g}$$

< 1 undervalued
= 1 fairly valued
> 1 overvalued

- assumes a linear relationship between P/E & g
- ignores risk
- does not account for differences in duration of g

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LOS k
- calculate
- interpret

⇒ Comparables/

Company	Trailing P/E	Forward P/E	Five-Year EPS Growth Forecast	Forward PEG	Beta
Equinix	131.28	43.97	25.30%	1.74	1.26
Frontier Communications Corp.	43.30	18.83	21.80	0.86	0.78
Verizon	86.06	14.40	10.22	1.41	0.38
AT&T	25.73	12.62	6.46	1.95	0.40
BCE Inc.	14.49	14.12	3.00	4.71	0.76
Centurytel	18.86	12.04	1.35	8.92	0.89
Windstream Corp.	36.91	18.66	−11.55	NM	0.89
Mean	50.95	19.23	8.08%	3.27	0.77
Median	36.91	14.40	6.46	1.85	0.78

under?

ranked by g

- Industry/Sector multiples/
  - the larger the comparison group, the more likely that mispricing of individual assets cancel out

Index e.g./

	A	B	C	SnP
P_0	23	50	80	1569.19
P/E	12.5	25.5	12.5	17.9
5-yr. avg. P/E	80%	120%	105%	100% (% of SnP)
Adj. SnP	14.32	21.48	18.795	

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⇒ Comparables/

- index P/E – often reported as $\sum_{i=1}^{n} \frac{MV_i}{TMV} \cdot P/E_i$
  - largest stocks heavily influence calculated P/E
  - use of median P/E for the index instead

⇒ is the index overvalued?

- comparison with historical avg. P/E ⇒ time frame important
  - ⇒ lower r/higher g ⇒ higher current P/E

Fed. Model/ – valuation of the equity market itself

E/P = YTM 10yr. T-Bond – fairly valued

< YTM – overvalued

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⇒ Comparables/

Fed. Model/ - fair value of SnP500 = $\frac{1}{(\text{YTM 10yr. T} - \text{Bond})}$

June/ 2016 10-yr. YTM = 1.4597

$$\text{Justified } {}^{P}/_{E_{SnP}} = \frac{1}{.014597} = 68.50$$

V_0 = 68.50 × 118.39 (est. 2016 earnings)

= 8109.71 (US 2001) ⇒ low rates fail

- ignores ERP
- inadequately reflects effects of inflation

Yardeni Model/

$$\text{CEY} = \text{CBY} - \underbrace{b}_{\text{growth weight}} \times \underbrace{\text{LTEG}}_{\text{consensus 5-yr. earnings growth rate}} + \text{Residual}$$

CEY - current E/P

CBY - current bond yield (A-rated corporate)

$$\text{justified } {}^{P}/_{E} = \frac{1}{\text{CBY} - b \times \text{LTEG}}$$

- lower corp. bond yield
- higher LTEG

} higher justified P/E

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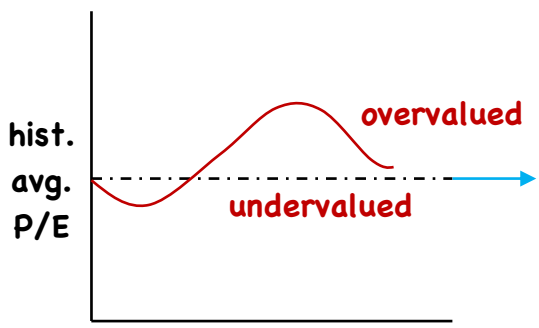
⇒ Comparables/

- own historical P/E



5-yr. avg. trailing P/E

- justified $V_0 = (\text{avg. } {}^{P}/_{E}) \times \left(\begin{matrix}\text{most}\\ \text{recent EPS}\end{matrix}\right)$

e.g./

2008	2009	2010	2011	2012	Mean	Median
35.8	19.8	10.0	23.1	15.8	20.9	19.8

may be considered an outlier

- changes in business mix? Leverage?
- changes in the inflationary environment over time?

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⇒ Comparables/

- inflation rates and pass-through ability

- assume $P_0 = \frac{E_0\,(1+\,I)}{r - I}$ - no growth, can only come from inflation $P_0 = \frac{E_0\,(1+\,g)}{r - g}$

- let λ represent pass-through proportion

$$P_0 = \frac{E_0\,(1+\,\lambda I)}{r - \lambda I} \qquad {}^{E_1}/_{r}$$

- now let ρ = real required rate of return

$$P_0 = \frac{E_0\,(1+\,\lambda I)}{\rho\,+\,(1-\lambda)\,I} \quad \text{and} \quad {}^{P_0}/_{E_1} = \frac{1}{\rho\,+\,(1-\lambda)\,I}$$

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⇒ Comparables/

$${}^{P_0}/_{E_1} = \frac{1}{\rho\,+\,(1-\lambda)\,I}$$

↓

justified forward P/E

e.g./

Company		M	P
	ρ	3%	3%
1.	λ	75%	75%
	I	6%	2%
2.	I	6%	6%
	λ	90%	70%

1. ${}^{P}/_{E_m} = \frac{1}{.03\,+(1-.75).06} = \frac{1}{.03+.015} = 22.2$

   ${}^{P}/_{E_p} = \frac{1}{.03\,+(1-.75).02} = \frac{1}{.03+.005} = 28.6$ - lower inflation

2. ${}^{P}/_{E_m} = \frac{1}{.03\,+(1-.9).06} = \frac{1}{.03+.006} = 27.8$ - higher-pass through

   ${}^{P}/_{E_p} = \frac{1}{.03\,+(1-.7).06} = \frac{1}{.03+\,0.018} = 20.8$

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LOS I
- calculate
- explain

⇒ Terminal P/Es/

- key condition of TV ⇒ must reflect sustainable LTEG

GGM

$V_n/E_n = PE_{ttm}$

$V_n/E_{n+1} = PE_{ntm}$

terminal price multiples based on fundamentals

$V_n = \text{benchmark } P/E_{ttm} \times E_n$

$V_n = \text{benchmark } P/E_{ntm} \times E_{n+1}$

terminal price multiples based on comparables

e.g./ r = 10%
avg. DPR = 0.45
Industry ROE = 13%
E_3 = 3.00
Industry avg. P/E = 14.3

① V_n =? $V_3 = 14.3 \times 3 = 42.90$

② V_n =? using GGM $V_3 = \dfrac{D_3(1+g)}{r-g}$

vs. 16.92

$g = ROE \times RR$
$= .13 \times .55$
$= 0.0715$

$= \dfrac{1.35\,(1.0715)}{.10 - .0715} = \$50.76$

P/B

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- book value represents, on a per share basis, the investment common shareholders have made in the company

$$BV/sh = \frac{\text{Sh. Equity} - \text{TV of equity claims senior to common}}{\text{\# of shares outstanding}}$$

Pr. Sh.

Div. in arrears to Pref. Sh. (cumulative)

Rationales/

- cumulative B.S. amount, ∴ BV > 0 even when EPS ≤ 0
- BV/sh. more stable than EPS
- appropriate for valuing companies composed chiefly of liquid assets (finance, investment, insurance, banks)

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Rationales/

- useful for companies not expected to continue as going concerns

Drawbacks/

- does not account for critical non-balance sheet factors (human capital, reputation)
- difficult to compare companies with asset-related business models (capital vs. labor intensive)
- accounting effects compromise usefulness of BV as a measure of shareholder investment
  - internally generated intangibles
  - internally generated brands
  - internally developed patents

  } not included as assets

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Drawbacks/

- BV reflects reported value of A&L

financial A/L → some reported at FMV – perhaps model derived???

non-financial A/L → some historical cost-accum. dep.

- Share repurchases/issuances

e.g./ Colgate-Palmolive (CG)

2008	Sep/13	
$P/E_{ttm} = 23.55$	$P/E_{ttm} = 24.84$	+ 5.5%
P/B = 15.94	P/B = 36.01	+125.9%
Sh.Eq. = $2.48B	Sh.Eq. = $1.53B	

when a company repurchases shares at a price > BV, overall BV/sh. drops

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- Determining BV

$$BV/_{sh} = \frac{\text{Sh. Eq.} - \text{senior equity claims}}{\text{\# of shares}}$$

- adjustments/ - make BVPS more accurately reflect the value of sh. investment
  - make P/B more useful for making comparisons

e.g./ • tangible BVPS

Sh.Eq. - reported intangible assets

if separate, perhaps keep in

non-separable, then omit i.e. Goodwill

- LIFO to FIFO
- significant off-balance-sheet assets/liab. included

Page 27

- Valuation/

a) forecasted fundamentals

(GGM) $$V_0 = P_0 = \frac{D_1}{r-g} = \frac{E_1 \times (1-RR)}{r-g}$$ → since ROE = E_1/B_0 ∴ $E_1 = B_0 \times ROE$

$$P_0 = \frac{B_0 \times ROE \times (1-RR)}{r-g}$$

divided by B_0

$$P_0/B_0 = \frac{ROE \times (1-RR)}{r-g}$$ → since g = RR × ROE, RR = g/ROE

$$P_0/B_0 = \frac{ROE \times \left(1 - g/ROE\right)}{r-g}$$

$$P_0/B_0 = \frac{ROE - g}{r-g}$$

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- Valuation/
  - a) forecasted fundamentals

$$P_0/B_0 = \frac{ROE - g}{r - g}$$

e.g./ ROE = 12%, r = 10%, g = 7%

justified P/B $= \frac{.12 - .07}{.10 - .07} = 1.67$

- just. P/B increasing function of ROE

⇒ 2 stocks with the same P/B, one with the higher ROE may be undervalued

$$P_0/B_0 = 1 + \frac{\text{PV of E (RI)}}{B_0}$$

if E(RI) = 0, $P_0/B_0 = 1$

b) Comparables

- BV – trailing metric
- must consider differences in ROE, r, g

P/S

Page 29

- Rationales/
  - sales less subject to distortion/manipulation
  - sales > 0 even when EPS ≤ 0
  - sales more stable than EPS
  - appropriate for mature, cyclical & zero-income firms
- Drawbacks/
  - a business must ultimately generate earnings and cash
  - share price reflects the effect of debt, sales do not, thus P/S is a logical mismatching
  - does not reflect differences in cost structures
  - revenue recognition can distort P/S

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- Sales × Net Profit Margin = NI
  - ⇒ P/E × Net Profit Margin = P/S

and $\frac{P/S}{P/E}$ = Net Profit Margin

e.g./ Sales = \$100/sh.
NI = 20
margin = 20%
P_0 = \$150

P/E = $^{150}/_{20} = 7.5$
P/E × NPM = P/S
$7.5 \times .2 = 1.5$
P/S = $^{150}/_{100} = 1.5$

relationships
S × % = NI
S = $^{NI}/_{\%}$
$^{1}/_{S}$ = $^{\%}/_{NI}$
$^{P}/_{S}$ = $^{P}/_{NI} \times \%$

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- Determining Sales/

$$^{P}/_{S} = \frac{\text{Price}}{\text{Annual net sales/sh.}}$$ → typically most recent fiscal year

e.g./ $Sales_0$ = \$10,814.8M # Shares = 786.6 P_0 = 6.72

$$^{P}/_{S} = \frac{6.72}{\left(^{10,814.8}/_{7866}\right)} = \frac{6.72}{13.71} = 0.490$$

- Revenue recognition issues/
  - barter
  - bill & hold

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- Valuation/

a) forecasted fundamentals

$$V_0 = P_0 = \frac{D_0(1+g)}{r-g}$$

$D_0 = E_0\ (1 - RR)$

so... $$P_0 = \frac{E_0\ (1-RR)(1+g)}{r-g}$$

- divide by S_0

$$P_0/S_0 = \frac{E_0/S_0\ (1-RR)(1+g)}{r-g}$$

E_0/S_0 = Net Profit Margin

thus, P_0/S_0 is an increasing function of Net Profit Margin and earnings growth rate

$$g = RR \times ROE = RR \times \frac{NI}{Sales} \times \frac{Sales}{TA} \times \frac{TA}{Sh.Eq.}$$

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- Valuation/

a) forecasted fundamentals

e.g./ $\frac{NI}{Sales}$ = 9.0% DPR = 35% g = 7% r = 9%

1) justified $$P/S = \frac{\left(E_0/S_0\right)(1-RR)(1+g)}{r-g} = \frac{.09(.35)(1.07)}{.09-.07} = 1.7$$

2) $S_1/Sh._{2013}$ = 108.9, find V_0? P = 1.7 × 108.9 = $185.13

3) P_0 = 196.2
under/over/fair?

$$\frac{185.13 - 196.2}{185.13} = -5.98\%$$

+/- 5% - over
+/- 10% - fairly

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- Valuation/
  - b) Comparables
    - most common – trailing sales
    - can use forecasted sales

e.g./

Measure	GETI	SN	BCR	
Price/Sales (ttm)	2.14	2.66	3.07	
Profit Margin (ttm)	8.82%	13.21%	6.25%	NIM
Quarterly Revenue Growth (yoy)	7.20%	4.40%	2.30%	g
Total Debt/Equity (mrq)	115.86	9.83	94.97	
Enterprise Value/Revenue (ttm)	2.79	2.73	3.28	

1) GETI ⇒ over/under/fair? – using P/S only!

2) SN or BCR? more closely comparable to GETI?

P/CF

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- Rationales/
  - CF less subject to manipulation
  - more stable than earnings
  - sidesteps issues related to actg. choices
- Drawbacks/
  - some definitions of cash-flow inadequate
  - FCFE most appropriate but also most volatile of CF definitions
  - CF still open to some manipulation
  - IFRS-CFO may not be readily comparable to GAAP-CFO

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LOS m
- explain
- describe

• Determining Cash Flow/

not technically accurate

- simple approximations typically used

e.g. 1/ $\underbrace{\text{EPS} + \text{Dep./Am./Depl.}}_{\text{last 4 quarters}} /_{\text{sh.}} = \text{CF}$

e.g./ EPS = 0.28 – from continuing operations
Dep./Am. = 1.53/sh. • P_0 = 24.06

$P_0/_{CF} = 24.06/_{1.81} = 13.3$

more technically accurate

e.g. 2/ CFO/sh.
→ adjustments as necessary — normalizing / non-recurring / IFRS to GAAP

e.g. 3/ FCFE/sh. – may be difficult to compare similar companies with differing timing of CAPEX

most accurate

e.g. 4/ EBITDA/sh.

Page 36b

• Valuation/

a) forecasted fundamentals

⇒ find V_0 using most suitable DCF model
(GGM, two-stage, H-model, 3-stage)

- divide V_0 by any definition of cash flow

justified P/C_F

$V_0/_{\text{cash flow}}$ — CF / CFO / FCFE / EBITDA

• P/C_F positively related to g and negatively related to r

e.g./ $FCFE_{ttm}$ = 7.96
CF_{ttm} = 12.00
g = 3
r = 12

$$V_0 = \frac{FCFE_0(1+g)}{r-g}$$

just. $P/_{CF} = 91.10/_{12} = 7.6 \quad = \frac{7.96(1.03)}{.12 - .03} = 91.10$

just. $P/_{CF} = P_0/_{FCFE} = \frac{91.10}{7.96} = 11.4$

Page 36c

- Valuation/
  - b) Comparables

e.g./

Company	Current Price (£)	Trailing CF per Share (£)	P/CF	Trailing FCFE per Share (£)	P/FCFE	Consensus Five-Year CF Growth Forecast (%)	Beta
Company A	17.98	1.84	9.8	0.29	62	13.4	1.50
Company B	15.65	1.37	11.4	–.99	NM	10.6	1.50

based on P/CF only, we would expect Company B to have the higher growth rate (or lower risk) (efficient pricing)

Company A actually has the higher g and both have the same r (β)

∴ Company A appears to be relatively undervalued/

P/D_0 & D_0/P

Page 37

- Rationale/
  - div. yield is a component of total return
  - div. less risky than cap. app.
- Drawbacks/
  - div. yield is only one component of total return
  - many stocks do not pay a dividend
- Calculation of Div. Yield/

Dividends

trailing — last Q × 4 (dividend rate)

Leading div. yield — next 4 Q's (forecasted)

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- Valuation/

a) forecasted fundamentals

$$V_0 = P_0 = \frac{D_0(1+g)}{r-g}$$

$$P_0(r-g) = D_0\,(1+g)$$

$$(r-g) = {}^{D_0}/_{P_0}\,(1+g)$$

$${}^{D_0}/_{P_0}\ \frac{(r-g)}{1+g}$$

rather than use ${}^{P_0}/_{D_0}$, we use ${}^{D_0}/_{P_0}$

b) Comparables

- relative yields considering r & g
- must also consider safety of dividend
  - high DPRs may be risky

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- Valuation/

b) Comparables

Company	Consensus Earnings Growth Forecast (%)	Beta	Dividend Yield (%)	Payout Ratio (%)
Duke Energy	3.66	0.34	4.4 ③	110
Pepco Holdings	3.82	0.37	5.6 ①	NMF
Portland General Electric Co.	6.45 Highest g	0.55 Low r	3.7	88 DPR < 100
PPL Corp.	−2.40	0.26	4.8 ②	58

3.7 + 6.45 = 10.15%

① POM ⇒ DPR = NMF ⇒ negative EPS $\left({}^{D_0}/_{EPS}\right)$ TR = 5.6 + 3.82 = 9.42%

② PPL ⇒ negative earnings growth 4.8 − 2.4 = 2.4%

③ DUK ⇒ DPR > 100% – not sustainable with low grow 4.4 + 3.66 = 8.06

EV Multiples

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① EV/EBITDA – most widely used
- a measure of pre-tax, pre-interest operating cash flow

(pre financial leverage & pre operating leverage measure)

$$EV = MV_e + MV_d + MV_{Pr} - Cash/Equiv. - Mkt.\ Sec.$$

Rationales/
- more appropriate for comparing companies with different financial leverage
- EBITDA controls for differences in capital intensiveness
- EBITDA usually positive even when EPS < 0

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① EV/EBITDA

⇒ Drawbacks/
- EBITDA will overestimate CFO if WCInv. > 0

- Determining EV/

$$EV = (P_0 \times \#\ of\ shares) + MV_d + MV_{Pr.} - (Cash/Equiv. + Mkt.\ Sec.)$$

if MV not available, use BV

- Determining EBITDA/

EBITDA = NI + Int. exp. (net of Int. Inc.) + IT + D/A

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① EV/ EBITDA

e.g./ Cash/Equiv. $4,060M

P_0 = 63.06 shares out. = 238M

CP/LTP 230

LTD 1,783

Item	Source	Year Ended 29 June 2012	Nine Months Ended 29 March 2013	Nine Months Ended 30 March 2012
Net income	Income statement	$1,612	$1,245	$867
Interest expense (net of interest income)	Income statement	14	35	8
Income tax provision	Income statement	145	207	88
Depreciation and amortization	Statement of cash flows	825	931	486

$$\text{EV/ EBITDA} = \frac{(63.06 + 238\text{M}) + (1,783 + 230) + \emptyset - 4,060}{1,990 + 41 + 264 + 1,270} = \frac{12,961}{3,565}$$

$$= 3.6$$

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① EV/EBITDA

⇒ Valuation/

a) forecasted fundamentals

justified $^{EV}/_{EBITDA}$
- positively related to (g in FCFF) & (ROIC) - $\frac{\text{Op.Pr. after tax}}{\text{Total Inv .Cap.}}$
- negatively related to WACC

$$TIC = MV_e + MV_d + MV_{Pr.}$$

b) Comparables

	A	B	C	D
TIC/EBITDA } difference	5.6	16.1	10.6	6.7
EV/EBITDA } difference	4.3	10.4	8.5	6.0
Debt/Equity (book)	24.8%	24.8%	30.0%	79.2%
Profit margin (TTM)	6.38%	8.17%	12.45%	12.81%
Quarterly revenue growth (year over year)	–21.6%	27.9%	5.7%	–23.6%

A = under/over/fair?

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2) Other EV Multiples/

EV/ · FCFF
· EBITDAR – rent exp.
· EBITA – amort. is the major NCC
· EBIT
→ D/A is not a major item

all add back interest

3) EV/Sales

vs. P/S – not all sales belong to a company's equity investor

	D/E
Company A.	80:20
Company B.	20:80

P/S_A not comparable to P/S_B

Since P_0 is after-tax, after interest

Cross-Border Valuation

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- explain

⇒ Sources of Difference/

· accounting methods – GAAP vs. IFRS
- even with convergence, the need for reconciliation will not disappear

· tax regimes – affect r_d vs. r_e
- level of financial leverage

· economic differences
- stage of business cycle
- labour laws/union strength
- forex effects

· cultural differences
- attitude to risk, debt, employees

Momentum Valuation Indicators

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1) Earnings surprise

- unexpected earnings

$$UE_t = EPS_t - \underbrace{E(EPS_t)}$$

consensus estimate

must consider range in estimates

i.e. 87¢ | vs 62¢ |

93¢ $1.21

surprises here more meaningful

$$\text{Scaled } UE_t = \frac{EPS_t - E(EPS_t)}{\sigma[E(EPS)]}$$

s.d. of the analyst's earnings forecasts

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2) Standardized unexpected earnings/

$$SUE_t = \frac{EPS_t - E(EPS_t)}{\sigma[EPS_t - E(EPS_t)]}$$

– s.d. of past earnings surprises

3) Relative strength indicators/

- compares a stock's performance during a particular period with its own past performance or some group of stocks

e.g./

$SnP500_0$ 2,085 $\frac{26.50}{2,085}$ = .012709 - div. by .012709 = 1

P_0 26.50

$SnP500_n$ 2,163 $\frac{29.72}{2,163}$ = .013740 $\frac{.01374}{.012709} = 1.0811$

P_n 29.72

rel. st. 8.11%

Averaging Multiples

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- explain

- arithmetic mean $\frac{\sum_{i=1}^{n} X_i}{n}$

- harmonic mean $\frac{n}{\sum_{i=1}^{n}\left(1/X_i\right)}$ - the reciprocal of the arithmetic mean of the reciprocals

↓

gives less weight to higher P/Es and more weight to lower P/Es

- harmonic mean < arithmetic mean

- weighted harmonic mean $\frac{1}{\sum_{i=1}^{n}\left(w_i/X_i\right)}$ - w_i are portfolio weights, $\sum = 1$

- most accurate

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Security	Market Cap. $	Market Cap. %	E_0	P/E
A	715	55	71.50	10
B	585	45	29.50	20

$$P/E = \frac{715 + 585}{71.50 + 29.50} = \frac{1300}{110.75} = 12.90$$

AM

$$\frac{10 + 20}{2} = 15$$

HM

$$\frac{2}{\frac{1}{10} + \frac{1}{20}} = \frac{2}{3/20} = 13.33$$

WHM

$$\frac{1}{\frac{.55}{10} + \frac{.45}{20}} = \frac{1}{1.55/20} = 12.90$$

Residual Income Valuation

a. calculate and interpret residual income, economic value added, and market value added

b. describe the uses of residual income models

c. calculate the intrinsic value of a common stock using the residual income model and compare value recognition in residual income and other present value models

d. explain fundamental determinants of residual income

e. explain the relation between residual income valuation and the justified price-to-book ratio based on forecasted fundamentals

f. calculate and interpret the intrinsic value of a common stock using single-stage (constant-growth) and multistage residual income models

g. calculate the implied growth rate in residual income, given the market price-to-book ratio and an estimate of the required rate of return on equity

h. explain continuing residual income and justify an estimate of continuing residual income at the forecast horizon, given company and industry prospects

i. compare residual income models to dividend discount and free cash flow models

j. explain strengths and weaknesses of residual income models and justify the selection of a residual income model to value a company's common stock

k. describe accounting issues in applying residual income models

RI – EVA – MVA

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⇒ Residual Income/ a.k.a. economic profit
abnormal profit

RI = NI – estimated cost of equity capital (marginal)

e.g./ D = \$1M → 7%
E = 1M → 12%
TA = 2M
Tax = 30%

EBIT	200,000
- Int.	70,000
EBT	130,000
- Tax	39,000
NI	91,000

RI = 91,000 – (\$1M × 0.12) = -29,000

or/ Capital Charge:

12% of \$1M	120,000	NOP	200,000	NOPAT - Cap.Ch
7% (1 – 30%)\$1M	49,000	- Tx	60,000	= 140,000 – 169,000
	169,000	NOPAT	140,000	= -29,000

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⇒ Residual Income/

RI = NOPAT – (% Cap. Cost × Tot. Cap)

previous e.g./ WACC = $\underbrace{.50(.07)(.7)}_{= 2.45\%}$ + $\underbrace{.12(.5)}_{+ 6\%}$ = 8.45%

current cost of debt — marginal cost of equity

- if RI > 0 company is creating value
  RI < 0 company is destroying value

e.g./ P_0 = BVPS = \$10
100,000 shares

EPS = 0.91
DPR = 100%
g = 0

$$V_0 = \frac{D_1}{r} = \frac{0.91}{.12} = \$7.583/\text{sh}$$

to keep P_0 = \$10, r = 9.1%

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⇒ Residual Income/

- so when: RI < 0, shares will sell at a discount to BV
  RI > 0, premium to BV

⇒ Economic Value Added - EVA® (Stern Stewart & Company)

EVA = NOPAT - (C% × TC)
+ adjustments
- over 150 adjustments defined

common/
- operating leases treated as financing leases
- LIFO reserves added back to cap.
- Deferred taxes eliminated, only cash taxes treated as expense

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⇒ Economic Value Added - EVA®
+ adjustments
- R&D capitalized net of estimated amortization

e.g./

	YR1	YR2	YR3	YR4	
R&D Exp.	12k	10k	8k	15k	→ (NOP + 15k)
5yr. Amort.	2.4	2.4	2.4	2.4	
		2.0	2.0	2.0	
			1.6	1.6	
				3.0	
Carrying amount	9.6	15.2	17.2	23.2	→ (TC + 23.2k)

equity
- requires new WACC calculation

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⇒ Market Value Added – MVA

$$MVA = \underbrace{MV_{company}}_{MV_e + MV_d + MV_{Pr}} - BV_{TC} \text{ – total capital}$$

- sometimes just $MVA = MV_e - BV_e$
  - a company that generates positive economic profit should have MV > BV
    - 2 points here/ MVA measures the effectiveness of/
      ① numerator – the ability of mgmt. to generate excess returns
      ② denominator – the ability of mgmt. to manage perceived risk

Uses of RI Models

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- describe

- assess performance of an investment center (internal corporate performance)
- estimate intrinsic value of a stock – key focus
- measuring goodwill impairment
- determining executive compensation

RI Models

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LOS c
- calculate
- compare

$$V_0 = BVPS_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t} = BVPS_0 + \sum_{t=1}^{\infty} \frac{EPS_t - rBVPS_{t-1}}{(1+r)^t}$$

⇒ $BVPS_{t-1}$ - expected BVPS at any time t-1

e.g./ r = 2.8 + 1.5(4.2) = 9.1%

P_0 = 27.70

$BVPS_0$ = 8.77

Consensus Earnings	
2013	1.40
2014	1.60

Consensus Dividends	
2013	0.52
2014	0.60

1. forecast BVPS

2013 B_{t-1} = 8.77

B_t = 8.77 + 1.40 - .52 = 9.65

$B_{t-1} + E_1 - D_1$

2014 B_{t-1} = 9.65

B_t = 9.65 + 1.60 - .60 = 10.65

② calculate equity charge

2013 .091 × 8.77 = 0.80

2014 .091 × 9.65 = .88

2013 RI/sh = 1.40 - .80 = .60

2014 RI/sh = 1.60 - .88 = .72

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e.g. 2/ using the model

EPS ⇒ 2.00, 2.50 & 4.00 (next 3 yrs)

Div ⇒ 1.00, 1.25 & 12.25 (liquidating dividend)

$BVPS_0$ = $6.00 r = 10%

1) BVPS + RI (YR1-YR3)/

	1	2	3
B_{t-1}	6.00	7.00	8.25
+ EPS	2.00	2.50	4.00
- Div	(1.00)	(1.25)	(12.25)
B_t	7.00	8.25	0

EPS	2.00	2.50	4.00
- rB_{t-1}	.60	.70	.825
	1.40	1.80	3.175

②/ V_0 = ?

$$V_0 = B_0 + \sum_{t=1}^{3} \frac{EPS_t - rBVPS_{t-1}}{(1+r)^t}$$

$$= 6 + \frac{1.40}{1.1} + \frac{1.80}{(1.1)^2} + \frac{3.175}{(1.1)^3}$$

$$= 6 + 1.2727 + 1.4876 + 2.3854$$

$$V_0 = 11.15$$

③ DDM/

$$V_0 = \frac{1.00}{1.1} + \frac{1.25}{(1.1)^2} + \frac{12.25}{(1.1)^3}$$

$$= 11.15$$

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Note:

RI model $V_0 = 6 + 1.2727 + 1.4876 + 2.3854$

DDM model $V_0 = .9091 + 1.0331 + 9.2036$

- recognition of value typically occurs earlier in RI models

- clean surplus relation

$B_t = B_{t-1} + EPS_t - D_t$

$D_t = EPS_t - (B_t - B_{t-1})$

- earnings reflect all changes in the BV_e other than ownership transactions

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$D_t = EPS_t - (B_t - B_{t-1})$

DDM/

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{E_t - (B_t - B_{t-1})}{(1+r)^t}$$

$$= \frac{E_1 + B_0 - B_1}{1+r} + \frac{E_2 + B_1 - B_2}{(1+r)^2} + \frac{E_3 + B_2 - B_3}{(1+r)^3} + \ldots$$

$$= B_0 + \frac{E_1 - rB_0}{(1+r)} + \frac{E_2 - rB_1}{(1+r)^2} + \frac{E_3 - rB_2}{(1+r)^3} + \cdots$$

$$= B_0 + \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

$$= B_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - r)\, B_{t-1}}{(1+r)^t}$$

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① $$V_0 = \frac{E_1 + B_0 - B_1}{1+r} + \frac{E_2 + B_1 - B_2}{(1+r)^2} + \frac{E_3 + B_2 - B_3}{(1+r)^3} \ldots$$

use a zero-sum identity

② $$0 = B_0 + \frac{B_1 - (1+r)B_0}{1+r} + \frac{B_2 - (1+r)B_1}{(1+r)^2} + \frac{B_3 - (1+r)B_2}{(1+r)^3} \ldots$$

$$B_0 + \frac{B_1}{1+r} - \frac{(1+r)B_0}{(1+r)} + \frac{B_2}{(1+r)^2} - \frac{(1+r)B_1}{(1+r)^2} + \frac{B_3}{(1+r)^3} - \frac{(1+r)B_2}{(1+r)^3} \ldots$$

$$B_0 + \frac{B_1}{1+r} - B_0 + \frac{B_2}{(1+r)^2} - \frac{B_1}{(1+r)} + \frac{B_3}{(1+r)^3} - \frac{B_2}{(1+r)^2} \ldots$$

$$\lim_{t=\infty} \frac{B_t}{(1+r)^t} = 0$$

Add ① + ②

$$V_0 + 0 = B_0 + \frac{E_1 + B_0 - B_1 + B_1 - B_0 - rB_0}{1+r} + \ldots \Rightarrow V_0 = B_0 + \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

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e.g./ EPS ⇒ 2.00, 2.50, 4.00
Div ⇒ 1.00, 1.25, 12.25
B_0 = 6.00 r = 10%

find

$$V_0 = B_0 + \sum_{t=1}^{n} \frac{(ROE_t - r)\, B_{t-1}}{(1+r)^t}$$

	1	2	3
EPS	2.00	2.50	4.00
$\div B_{t-1}$	6.00	7.00	8.25
ROE	.333	.3571	.4848
- r	.10	.10	.10
$(ROE_t - r)$	.2333	.2571	.3848
$\times B_{t-1}$	6.00	7.00	8.250
	1.40	1.80	3.175

$$V_0 = 6 + \frac{1.40}{1.1} + \frac{1.80}{(1.1)^2} + \frac{3.175}{(1.1)^3}$$

$$= 11.15$$

Fundamental Determinants

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- explain

$$V_0 = P_0 = B_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - r)\, B_{t-1}}{(1+r)^t}$$

$$\Downarrow$$

$$P_0 = B_0 + \frac{(ROE_1 - r)B_0}{r - g}$$

- assume constant earnings and dividend growth (i.e. g)

div. by B_0 $\quad {P_0}/{B_0} = 1 + \frac{ROE - r}{r - g}$

- increasing function of ROE

$$ROE = \frac{NI}{Sales} \times \frac{Sales}{TA} \times \frac{TA}{Sh.\,Eq.}$$

RI Models

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LOS f
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- interpret

⇒ Single Stage RI (constant g)

$$V_0 = B_0 + \frac{ROE - r}{r - g} \cdot B_0$$

e.g./ B_0 = 26.24 $\quad$ expected LT-ROE = 11% $\quad$ r_e = 9.5%

P_0 = 34.68 $\quad$ LTEG = 5.5%

$$V_0 = 26.24 + \frac{.11 - .095}{.095 - .055} \cdot 26.24$$

$$= 26.24 + 9.84 = 36.08$$

Note:
${P_0}/{B_0} = {36.08}/{26.24}$
$= 1.375 > 1$
- since ROE > r

(LOS g)

using P_0 = 34.68 $\quad 34.68 = 26.24 + \frac{.11 - .095}{.095 - g} \cdot 26.24$

$$\left({P_0}/{B_0}\right) \rightarrow \quad 1.32164 = 1 + \frac{.015}{.095 - g}$$

$$.32164 = {.015}/{.095 - g} \quad \Rightarrow \quad g = 4.8364\%$$

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LOS f
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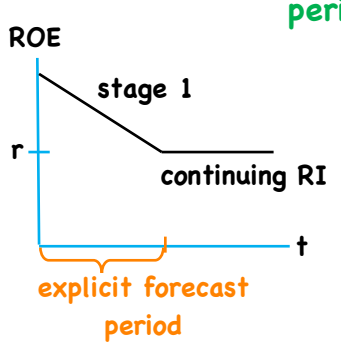
⇒ Single Stage RI (constant g)

- Drawback ⇒ assumes (ROE − r) > 0 persists
  - more likely LT − ROE ~ r and RI = 0

⇒ Multi-Stage RI/

B_0 + explicit forecast period + terminal value based on continuing residual income

typically, not a large component of V_0 (unlike other DCF models)



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⇒ Multi-Stage RI/

- assumptions about continuing RI:

→ one of/

$$V_0 = B_0 + \sum_{t=1}^{T} \frac{(E_t - rB_{t-1})}{(1+r)^t}$$

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{(E_t - rB_{t-1})}{(1+r)^t}$$

① RI continues indefinitely at some positive level

$$+ \frac{P_T - B_T}{(1+r)^T}$$

② RI = 0 from terminal year onwards

③ RI declines to 0 as ROE reverts to r

$$+ \frac{E_T - rB_{T-1}}{(1+r-\omega)(1+r)^{T-1}}$$

lower case omega

ω − persistence factor

④ RI reflects ROE reverting to some mean level

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- justify

⇒ Multi-Stage RI/ (RI = 0)

e.g./ P_0 = 95.60 ·r_e = 12% ·D_0 = 2.9995 ·B_0 = 28.8517

Forecasts — E 7.162 (2013) 8.356 (2014)
— D 2.9995 3.2995

ROE = 25% (2015-2019) 2020-2032 – 20% 2033 → RI = 0
↳ RR = 60%

	B_{t-1}		E_t	D_t	B_t	r	RI	PV(RI)
2012					28.8517			28.8517
2013	28.8517	+	7.162	– 2.9995	33.0142	3.4622	3.6998/(1.12)	3.3033
2014	33.0142	+	8.356	– 3.2995	38.0707	3.9617	4.3943/$(1.12)^2$	3.5031
2015	38.0707	+	9.5177	– 3.8071	43.7813	4.5685	4.9492/$(1.12)^3$	3.5227
2016	43.7813	+	10.9453	– 4.3781	50.3485	5.2538	5.6916	3.6171
	50.3485							⋮
2032	298.3296		59.6654	23.8664	334.1291	35.7996	23.8664	2.4741
								86.41

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⇒ Multi-Stage RI/ (RI > 0)

e.g./ P_0 = 95.60 ·r_e = 12% ·D_0 = 2.9995 ·B_0 = 28.8517

Forecasts — E 7.162 (2013) 8.356 (2014)
— D 2.9995 3.2995

ROE = 25% (2015-2019) 2020-2032 – 20% 2033 → RI = 0
↳ RR = 60%

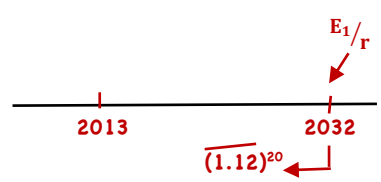
⇒ assume continuing residual income in 2033 is 2032

RI = 23.8664

$$V_0 = \underbrace{B_0 + \sum_{t=1}^{20} \frac{E_t - rB_{t-1}}{(1+r)^t}}_{86.41} + \frac{P_T - B_T}{(1+r)^T} \rightarrow \underbrace{\frac{\frac{23.8664}{.12}}{(1.12)^{20}}}_{\frac{198.8867}{(1.12)^{20}}} \; V_{20}$$

+ 20.6179

V_0 = 107.03



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⇒ Multi-Stage RI/ (RI decays to r)

e.g./ $P_0 = 95.60$ · $r_e = 12\%$ · $D_0 = 2.9995$ · $B_0 = 28.8517$

Forecasts			
	E	7.162 (2013)	8.356 (2014)
	D	2.9995	3.2995

ROE = 25% (2015-2019) → RR = 60% 2020-2032 - 20% 2033 → RI = 0

⇒ assume RI will decay at a rate of 40% beginning in 2033

$$V_0 = \underbrace{B_0 + \sum_{t=1}^{20} \frac{E_t - rB_{t-1}}{(1+r)^t}}_{86.41} + \frac{E_T - rB_{T-1}}{(1+r-\omega)(1+r)^{T-1}}$$

T-1

$$\frac{E_{21} - rB_{20}}{(1.12-.6)(1.12)^{20}}$$

$$\frac{26.7304}{.52(1.12)^{20}}$$

$$\$ \quad \begin{array}{r} 86.41 \\ + \; 5.33 \\ \hline 91.74 \end{array}$$

$$RI_{21} = RI_{20}(1+g)$$
$$g = RR \times ROE$$
$$= .60 \times .20$$
$$= .12$$
$$RI_{21} = 23.8664(1.12)$$

2013 — 2032 (T) — 2033 (T+1)

Valuation Models

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- compare

• DDM/FCF

$$V_0 = \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} + TV$$

large

• RI

$$V_0 = B_0 + \sum_{t=1}^{T} \frac{RI_t}{(1+r)^t}$$

large

• recognition of value is different, but V_0 should be the same

e.g./ $E_0 = 1.00$/sh forever
$D_0 = E_0$
$B_0 = 6.00$/sh
$r = 10\%$

1) DDM $\quad V_0 = D/r = 1.00/.1 = 10$

2) RI $\quad V_0 = B_0 + RI/r$
$= 6 + \frac{1 - .1(6)}{.1}$
$= 6 + .4/.1$
$= 10$

Strengths/Weaknesses

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LOS j
- explain
- justify

+/
- TVs do not make up a large portion of total-PV
- RI models use readily available actg. data
- can be applied to non-div. companies or to FCF < 0 companies
- can be used when CFs are unpredictable

-/
- actg. data is subject to manipulation
- actg. data may require significant adjustments
- clean surplus relation must hold
- assumes cost of debt is appropriately reflected in interest expense

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- appropriate when/
  - company does not pay divs. or divs. are not predictable
  - expected FCFs are negative within the forecast horizon
  - great uncertainty exists in forecasting TVs using DDM/FCF models
- least appropriate when/
  - significant departures from clean surplus accounting exist
  - significant determinants of RI (BVPS, ROE) are not predictable

Accounting Issues

Page 22
LOS k
- describe

1) Violations of the clean surplus relation/
- when charges bypass the I.S. and are made directly to shareholder's equity

e.g./ 'available-for-sale' - GAAP ⇒ changes in market value not recorded as gains/losses on I.S.
- on B.S. at MV

⇒ CI = NI + OCI
- common items of OCI/
- unrealized changes in FMV of some fin. assets
- forex translation adjustments
- certain pension adjustments
- portions of gains/losses on certain hedges

etc …

Page 23
LOS k
- describe

1) Violations of the clean surplus relation/
- result/ - BV_e stated properly (includes accum. OCI)
- NI not stated accurately ∴ ROE not accurate

→ items that bypass I.S. are excluded from historical ROE data

- implication: if future OCI is expected to be significant relative to net income and if the year-to-year amounts of OCI are not expected to net to zero, attempt to incorporate these items (i.e. adjust NI)

$$\begin{aligned} & B_{t-1} \\ & + E_1 \\ & - D_1 \\ & - OCI_1 \\ \hline & = B_t \end{aligned}$$

$$RI = (E_t - OCI_t) - rB_{t-1}$$

- lacking a basis for explicit assumptions about future OCI, forecast 'clean surplus relation'

Page 24
LOS k
- describe

2) Balance Sheet adjustments for FV/

- off-balance sheet A/L – footnotes
  e.g./ Operating leases
- reported A/L should be adjusted to FV when possible
  e.g./ LIFO to FIFO

3) Intangible Assets/

- acquired, separable intangibles should be included

4) Nonrecurring Items/

- removed from operating earnings when forecasting residual income

Page 25
LOS k
- describe

5) Other Aggressive Actg. Practices/

- overstate assets (and BV)
- overstate revenues (and ROE)

6) International Considerations/

- if:
  1) reliable earnings forecasts are available
  2) clean surplus relation generally holds
  3) high quality actg. data exist
- then no problems.

Private Company Valuation

a. contrast important public and private company features for valuation purposes

b. describe uses of private business valuation and explain key areas of focus for financial analysts

c. explain cash flow estimation issues related to private companies and adjustments required to estimate normalized earnings

d. explain factors that require adjustment when estimating the discount rate for private companies

e. compare models used to estimate the required rate of return to private company equity (for example, the CAPM, the expanded CAPM, and the build-up approach)

f. explain and evaluate the effects on private company valuations of discounts and premiums based on control and marketability

g. explain the income, market, and asset-based approaches to private company valuation and factors relevant to the selection of each approach

h. calculate the value of a private company using income-based methods

i. calculate the value of a private company using market-based methods and describe the advantages and disadvantages of each method

Private Company Valuation

Page 1

Public v. Private

Public Companies are typically: mature, with liquid shares, extensive public disclosures, and have owner-manager separation

Valuation : Audited Financial Statements, extensive disclosures → Forecast Cash Flow → $V_0 = \frac{FCFF}{WACC - g}$

Private Companies are different.

Company Specific Factors (can be positive or negative)

Life Cycle Stage: early stage of development - minimal capital, assets = Risker r↑

Size: typically smaller, greater income variability, less diversification, limited growth prospects = r↑ g↓

Concentrated Ownership: reduction in principal-agent issue, allows for longer-term view

Lack of Disclosures: lack of audited results = less reliable information to calculate FCF r↑

Stock Specific Factors (negative)

Lack of Liquidity: Reduces value of shares

Concentration of Control: Allows for transactions which may disadvantage non-controlling shareholders

Sale Restrictions: Reduce marketability

[Summary: Range Risk/Return Reqmts wider, valuation assumptions and estimates more divergent]

Page 2

Uses of Private Company Valuations

Three Categories : Transaction , Compliance , Litigation

Transaction

Venture Capital Financing (early stage) - Highly uncertain future cash flows, less formal via negotiation

Private Equity Financing (growth/buyout stage) - Growth: companies with scalable & renewed growth
- Buyout: majority stake, optimize balance sheet

Debt Financing - Lenders determine ability to repay debt

IPO - Prospective investors, investment banks

Acquisitions/Divestitures - Purchase or sale of company or division

Bankruptcy - Viable as a going concern? Or liquidation

Share-Based Compensation - e.g. valuation of stock-options granted

Page 3

Uses of Private Company Valuations

Compliance

Financial Reporting - e.g. Impairment tests for goodwill after acquisitions

Tax Reporting - e.g. Estate and gift taxation requirements

Litigation

e.g. - Damages Claims
- Divorce
- Lost Profits
- Shareholder Disputes

Page 4

Areas of Focus

Three Key Areas:

1. Normalize Earnings/ Adjust Cash Flow

- Numerator adjusted for Normalized Earnings

e.g. Director's Salaries

$$\frac{\text{FCFF}}{(\text{WACC} - \text{g})} = V_0$$

2. Discount Rate

- Rates of Return likely to be higher
- Assumptions behind CAPM often don't apply

3. Potential Valuation Discount or Premium

- Benefit of Control
- Drawback of Liquidity

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Normalizing

Public Company Context: Normalized earnings address cyclicality, seasonality, non-recurring items

Private Company Context: Non-recurring, non-economic, ongoing anomalies

e.g.'s

Revenue - Pricing and terms for sales between related parties

Operating Expenses - Related party compensation rates, use of real estate and other assets

Depreciation/Amortization - On assets owned by related parties

Taxes - Require adjustment to account for adjusted earnings

Dividends/Distributions - Privately owned v. Publicly owned distribution policy

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Normalizing

Example:

Earnings as Reported

Revenues	50,000,000		50,000,000
Cost of Goods Sold	(30,000,000)		(30,000,000)
Gross Profit	20,000,000		20,000,000
SG&A Expenses	(5,000,000)	[Reduce by 1.0m + 300,000]	(3,700,000)
EBITDA	15,000,000		16,300,000
Depreciation and Amortization	(1,000,000)	[Reduce by 100,000]	(900,000)
Earnings before interest and taxes	14,000,000		15,400,000
Pro Forma Taxes (17%)	(2,380,000)		(2,618,000)
Operating Income after Taxes	11,620,000		12,782,000

- CEO takes a salary of 1.5m , estimated normalized salary is $0.5m
- Corporate Assets not required for the firm's operations generated SG&A expenses of 300,000 and depreciation of 100,000
- Interest expense did not reflect optimal levels of debt, hence it is excluded

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Normalizing For Real Estate

Real Estate owned by the firm e.g. unused property rented to third party

↳ not part of operating assets - separate from operating assets

Remove Revenue and Expenses from Income Statement

Value separately as a non-operating asset

Real Estate owned and used by the firm

↳ earnings should reflect market rate rental charge

Total Value Firm = Operating Assets + Non-Operating Assets

[DCF based on normalized I/S] [Market value of real estate]

e.g. CH: A family owned holding company owning/managing Real Estate

CO: A family owned luxury retailer using CH property rent free

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Cash Flow Estimation

Our two cash flow measures: FCFF (Firm) FCFE (Equity)

Assumptions used in calculating FCF differ according to the intended use of the valuation

e.g. Acquisition v. Minority Interest

For mature business - FCF calculated for a range of growth/profitability assumptions

- Range of outcomes for a private firm 'present a challenge'

IPO Acquisition Continue Private Bankruptcy

make use of scenario analysis

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Cash Flow Estimation

Example : Scenario analysis using WACC = 15% and a constant growth model

Biotech Start-Up: Probability (Preliminary approval for treatment at T_1) 80%

Probability (No approval at T_1) 20%

Probability (Full approval at T_2 | Preliminary approval at T_1) 40%

FCFF 200m g = 5%

Probability (Limited approval at T_2 | Preliminary approval at T_1) 40%

FCFF 50m g = 2%

Probability (No approval at T_2 | Preliminary approval at T_1) 20%

Value at T_2 : Full approval = $\frac{200(1.05)}{(0.15-0.05)}$ = 2,100m Probability = 0.8 × 0.4 = 0.32

Limited approval = $\frac{50(1.02)}{(0.15-0.02)}$ = 392.31m Probability = 0.8 × 0.4 = 0.32

V_2 = (0.32 × 2,100) + (0.32 × 392.31) = 797.54

Firm Value Today = V_0 = $\frac{797.54}{1.15^2}$ = 603.05

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Cash Flow Estimation

Example : Scenario analysis using WACC = 15% and a constant growth model

Biotech Start-Up: Probability (Preliminary approval for treatment at T_1) ~~80%~~ 60%

Probability (No approval at T_1) ~~20%~~ 40%

Probability (Full approval at T_2 | Preliminary approval at T_1) ~~40%~~ 60%

FCFF 200m g = 5%

Probability (Limited approval at T_2 | Preliminary approval at T_1) ~~40%~~ 20%

FCFF 50m g = 2%

Probability (No approval at T_2 | Preliminary approval at T_1) 20%

Value at T_2 : Full approval = $\frac{200(1.05)}{(0.15-0.05)}$ = 2,100m Probability = 0.6 × 0.6 = 0.36

Limited approval = $\frac{50(1.02)}{(0.15-0.02)}$ = 392.31m Probability = 0.6 × 0.2 = 0.12

V_2 = (0.36 × 2,100) + (0.12 × 392.31) = 803.08

Firm Value Today = V_0 = $\frac{803.08}{1.15^2}$ = 607.24 (increase of 4.2m from 603.05)

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Factors Affecting Discount Rates

Recall For Public Companies : WACC = $w_d r_d + w_e r_e$

Weighting of D using market values

Weighting of Equity using market values

After-tax Cost of Debt

CAPM : $r_e = r_f + \beta(r_m - r_f)$

Factors To Consider For Private Cos.:

Application of Size Premium :	Increase discount rate to reflect higher risk of smaller company
Relative debt availability/cost :	WACC likely higher due to reduced debt access, higher cost of debt
Acquisition Context :	Acquirer's cost of capital may be lower, but use target's (otherwise we are paying the target for value we bring)
Projection Risk :	Two Potential Sources - Lack of information compared to Public Companies - Lack of management's experience in making Forecasts Adjustments for Projection Risk are highly judgmental

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Required Rate of Return Models

Inappropriateness of CAPM : $[\, r_f + \beta(r_m - r_f)\,]$

Private Company may have little prospect of going public

Market-Based data from public companies not suitable

Beta Measures (and Rewards) only systematic risk, investors in private companies may not have diversified non-systematic risk

Alternatives : Expanded CAPM : $[r_f + \beta(r_m - r_f)]$ + Small cap stock premium + Company specific stock premium

[subjective based on analysis of industry, company, guideline Public Co.s]

Build up approach : r_f + Set of premia

Note: β is excluded. Typically an Equity Risk Premium $(r_m - r_f)$ is added as well as an industry risk premium

[useful when comparables are scarce]

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Required Rate of Return Models

e.g. r_f = 3.8%

$(r_m - r_f)$ = 5%

β = 1.1 [based on comparable Public Co.]

Small Stock Premium = 3%

Company-Specific Premium = 1%

Industry-Risk Premium = 0%

Pre-Tax Cost Debt = 7.5%

Debt/Total Capital = 20% [comparable companies]

Optimal debt/total capital = 10%

Actual debt/total capital = 2%

Tax Rate = 17%

CAPM : $r_f + \beta(r_m - r_f)$

Expanded CAPM: $r_f + \beta(r_m - r_f)$ + small + company

Build up: r_f + ERP + small + company + industry

Assuming r_e = 13% :

WACC (Current D/cap) : (13% × 0.98) + (6.225% × 0.02) = 12.9%

WACC (Optimal D/cap) : (13% × 0.90) + (6.225% × 0.10) = 12.3%

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Discounts/Premiums: Control and Marketability

Public Company Valuation Assumes : Liquid Shares ← Adjust for marketability

Non-Controlling Buyers/Sellers ← Adjust for (lack of) control

Valuation

Synergistic Control Premium

Control Premium

Discount for Lack of Control (DLOC)

Discount for Lack of Marketability (DLOM)

Strategic Control — Strategic Buyer, Value includes synergies

Financial Control — Financial Buyer, unable/unwilling to realize synergies

Comparable Public Co. Valuation

Non-Controlling, Minority Interest

Non-Controlling, Non-Marketable Minority Interest

Highly Subjective:

Does Co. pay divs.?

Prospect of IPO?

Disproportionate Returns?

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Lack of Control Discounts

DLOC : A Reduction from pro-rata share of 100% of the value of an equity interest to reflect the absence of control

→ unable to distribute cash, buy/sell assets, obtain finance etc.

$$\text{DLOC} = \left[1 - \frac{1}{(1 + \text{Control Premium})}\right]$$

← Control Premium calculated from public company acquisitions

e.g. Estimated unadjusted value = GBP 1.65 Billion

Control Premium estimated at 15%

$$\text{DLOC} = \left[1 - \frac{1}{(1 + 0.15)}\right] = 13\%$$

Adjusted Value = $1.65 \times (1 - 0.13)$ = GBP 1.4355 Billion

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Lack of Marketability Discounts

DLOM : Reflects lack of liquidity, opportunity cost on inability to redeploy funds

→ market conditions, restrictions on transfer, ownership concentration etc.

- often appropriate when DLOC also being applied

Calculation

Restricted Stock Transactions: Restricted Stock identical to freely traded stock except for trading restriction

IPOs : Relationship between stock sales prior to IPOs

Option-Based: Put option gives holder the right to sell. Premium for an ATM option (using forward price of stock) is a measure of the value of the ability to sell

e.g. 6 month time horizon, comparable public company (non-dividend paying) share price GBP 50.00

If R_F = 5% Forward Price = $50e^{(0.05 \times 0.5)} = 51.27$ ATM Put Option (Strike = 51.27) = GBP 8.40

DLOM = 8.40/50.00 = 16.8%

The combined effect of DLOC and DLOM is multiplicative not additive :

Total Discount = [1 - (1 - DLOC)(1 - DLOM)]

e.g. DLOC = 13% DLOM = 16.8% Total Discount = [1 - (1 - 0.13)(1 - 0.168)] = 27.6%

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Valuation Approaches

We've seen most of this before, terminology is just different

Three Primary Approaches :

Income Approach (DCF!)
- Free Cash Flow Valuation
- Two Stage DCF
- Capitalized Cash Flow
- Single Stage DCF
- Excess Earnings
- Residual Income Concept

Market Approach (Multiples!)
- Guideline Public Company Method (GPCM) - use price multiples from comparable GPC
- Guideline Transactions Method (GTM) - use price multiples from comparable GT
- Prior Transaction Method - Actual transactions in the stock of the subject company

Asset-Based (Asset-Based!)
- It's asset based

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Income Approaches

Free Cash Flow Valuation (Two stage (+) model) : Forecast FCFF for Forecast Period + Terminal Value → Capitalized CF (GGM) / Multiple / Excess Earnings

Flexible

Capitalized Cash Flow (Single stage/GGM) : $V_F = \frac{FCFF_1}{(WACC - g)}$ $V_E = V_F - V_D$ $V_E = \frac{FCFE_1}{(r_e - g)}$ Denominator = Cap Rate

Could be tricky

Quick Reminder : FCFF = NI + NCC + Int(1 - t) - FCInv - WCInv

= EBIT(1 - t) + NCC - FCInv - WCInv

May be given as Reinvestment Rate

Income Approaches

e.g. Most Recent FCFF BRL 15,000,000 FCFE BRL 14,500,000

R_E = 15% R_D = 10% Total Assets BRL 50,000,000 Debt/Total Capital = 10%

Analyst expects constant FCFF growth of 5% Tax Rate = 34%

single stage, capitalized cash flow

$$V_F = \frac{FCFF_1}{(WACC - g)}$$

WACC = (10%(1 - 0.34) × 0.1) + (15% × 0.9) = 14.16%

$$V_F = \frac{15,000,000(1.05)}{(0.1416 - 0.05)} = 171,943,231$$

At 2% growth = $\frac{15,000,000(1.02)}{(0.1416 - 0.02)}$ = 125,822,368

Income Approaches

Income Approach (continued...)

Excess Earnings Method: Earnings remaining after deducting required returns to working capital and fixed assets are used to value intangible assets

(A Residual Income Approach)

Firm Value = Value Tangible Assets + Value Intangible Assets

PV(Excess Earnings)

e.g. Working Capital	EUR	200,000	Required Return	5%	5% × 200,000 = 10,000
Fixed Assets	EUR	800,000	Required Return	11%	11% × 800,000 = 88,000
Normalized Earnings	EUR	120,000			

Intangible Assets Required Return 12% Growth Rate 3%

Excess Earnings = 120,000 - 10,000 - 88,000 = 22,000

Value Intangible Assets = $\frac{22,000(1.03)}{(0.12 - 0.03)}$ = 251,778

Value Tangible Assets (200,000 + 800,000) = 1,000,000

Value = 1,251,778

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Market Based Approaches

Direct comparisons to public companies, use EV/EBITDA, EV/Sales

Readily available, actual market data, favored for compliance, litigation purposes

Key Measure: Enterprise Value: Flexibility to deal with changes in capital structure

Key Issue : Comparability of the Comparable : Risk? Growth? Life Cycle? Leverage?

Guideline Public Company Method (GPCM)

Adjusting For Leverage : When using a β obtained from a public company with different leverage we can 'unlever' the beta (Remove the Public Co. Financial Risk) and then 'relever' the beta (to put the subject Co.s Financial Risk in)

(useful for income approach)

Starting Point: Public Company β_L [correct business risk, wrong financial risk]

Unlever it : $\beta_{unlevered} = \dfrac{\beta_L}{\left[1 + (1 - t)\left(\frac{D}{E}\right)\right]}$

Remove 'wrong' Fin. Risk

β_L : Bus. Risk √ Fin. Risk X

β_{un} : Bus. Risk √ Fin. Risk zero

Relever it : $\beta_L{}^* = \beta_{un}\left[1 + (1 - t^*)\left(\frac{D}{E}\right)^*\right]$

$\beta_L{}^*$: Bus. Risk √ Fin. Risk √

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Market Based Approaches

e.g. Guideline Public Company Means : Beta 1.21 EV/EBIT 17.3

D/E 50% EV/Sales 2.0

Tax Rate 21.6%

Target Company: Sales 250,000,000 EBIT 35,000,000 Tax Rate 18% D/E = 25%

Calculating Beta for Income Approach:

$$\beta_{un} = \frac{\beta_L}{\left[1 + (1 - t)\left(D/E\right)\right]} = \frac{1.21}{\left[1 + (0.784 \times 0.5)\right]} = 0.8693$$

$$\beta_L{}^* = \beta_{un}\left[1 + (1 - t)\left(D/E\right)\right] = 0.8693\left[1 + (0.82 \times 0.25)\right] = 1.0475$$

Valuation using Comparables:

Mean EV/EDITDA Ratio = 17.3 Target EV = 17.3 × 35,000,000 = 605,500,000

Mean EV/Sales Ratio = 2.0 Target EV = 2.0 × 250,000,000 = 500,000,000

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Market Based Approaches

For target companies operating in multiple industries, comparables may need to be sourced from more than one group of comparables

e.g.

Target Company Sectors	Revenue	Assets	EBITDA	Comparable Sector Means EV/Sales	Comparable Sector Mean EV/EBITDA
Marine Navigation	700	1,560	187.5	2.8	8.2
Logistics Services	250	400	75.0	1.1	8.1
Energy Solutions	50	40	(12.5)	8.0	20.0
	1,000	2,000	250		

Composite EV/Sales Multiple : $\left(\frac{700}{1,000} \times 2.8\right) + \left(\frac{250}{1,000} \times 1.1\right) + \left(\frac{50}{1,000} \times 8.0\right)$ = 2.635

Composite EV/EBITDA Multiple = $\left(\frac{187.5}{250} \times 8.2\right) + \left(\frac{75.0}{250} \times 8.1\right) + \left(\frac{(12.5)}{250} \times 20.0\right)$ = 7.58

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Market Based Approaches

Multiples based on market prices for GPC typically reflect trading in minority holdings
So do we need to add a premium to reflect control?

Type of Transaction : Is the acquisition strategic or financial?
↑ Larger Premium

Industry Factors : If M&A activity is high in the sector, prices may reflect a premium already

Form of Consideration : Share Based - Not as relevant as may be a result of acquirer's management believing their shares are overvalued

In Summary - assess results of adding any control premium for reasonableness

Market Based Approaches

Guideline Transactions Method (GTM)

Similar to GPCM but uses multiples derived from acquisitions (public or private)

↳ data available from public filings, transaction databases

Advantage → transaction reflects control premium

Factors to Consider : Synergies - We may have them, GT may not

Contingent Consideration - Reflects uncertainty in price/performance

Non-cash Consideration - What is the cash equivalent of a large block of stock?

Availability of Transactions - Is there enough up to date data?

Prior Transactions Method

Major issue - Availability of data on subject company stock transactions

Income Based Example

- Estimate WACC using comparable public companies and the CAPM, an expanded CAPM, or a build-up approach
- Develop a base-year estimate of FCFF
- Estimate EV from forecasted FCFF and an expected terminal value
- Apply appropriate discounts/premiums to complete the valuation

Step 1. Estimate WACC

Dev Khan calculated discount rates for FLI's business as summarized in the following table:

Calculated variable	Approach	Result
Required return on equity	CAPM	9.3%
Required return on equity	Expanded CAPM	13.3%
Required return on equity	Build-up approach	12.8%
WACC	Using FLI actual debt ratio	12.8%
WACC	Using FLI optimal debt ratio	12.3%

FLI's Normalized Operating Income after Taxes

As of 31 December (in SGD)	As Adjusted
Revenues	50,000,000
Cost of goods sold	30,000,000
Gross profit	20,000,000
SG&A expenses	3,700,000
EBIT	16,300,000
Depreciation and amortization	900,000
Earnings before interest and taxes	15,400,000

Additional Info: Tax Rate 17%

CAPEX 1,200,000

Increase in Working Capital 500,000

FCFF = EBITDA(1 – t) + NCC(t) – CAPEX – WCInv

= 16,300(0.83) + 900(0.17) – 1,200 – 500

= 11,982

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Income Based Example

$FCFF_0$ = 11,982,000 WACC = 12.55% Estimated MV of Debt 2.5m

Stage one growth, 5 years: Downside 2% Base 5% Upside 8%

Terminal Value using Perpetual Growth 3%

Downside :	$FCFF_1$	12,221,640	
(5 Yr. Horizon)	$FCFF_2$	12,466,073	
	$FCFF_3$	12,715,394	
	$FCFF_4$	12,969,702	
	$FCFF_5$	13,229,096	
PV @ 12.55%		45,025,831	

Downside : (Terminal Value) $\frac{13,229,096 \times 1.03}{(0.1255 - 0.03)}$ = 142,680,302 (at T_5)

PV @ 12.55% 79,001,716

Estimated value firm 45.026 + 79.002 = 124.03m

Less estimated market value of debt (2.5m)

Estimated value of Equity 121.53m

Assuming no adjustment for lack of control, 18% discount for lack of marketability:

Estimated Value of Equity (after DLOM) = 121.53m (1 - 0.18) = 99.65m

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Market Based Example

Target Company Sectors	Revenue	Assets	EBITDA	Comparable Sector Means EV/Sales	Comparable Sector Mean EV/EBITDA
Marine Navigation	700	1,560	187.5	2.8	8.2
Logistics Services	250	400	75.0	1.1	8.1
Energy Solutions	50	40	(12.5)	8.0	20.0
	1000	2,000	250		

Composite EV/Sales Multiple (0.7 × 2.8) + (0.25 × 1.1) + (0.05 × 8.0) = 2.635

Composite EV/EBITDA Multiple = (0.75 × 8.2) + (0.3 × 8.1) + (-0.05 × 20.0) = 7.58

Using Composite Multiples: Estimated Value = (EV/Sales) 2.635 × 1,000 = 2,635,000

Using Sector Multiples : Estimated Value = (EV/Sales) (700 × 2.8) + (250 × 1.1) + (50 × 8.0) = 2,635,000

If the analyst estimates a discount for lack of control of 13%, and for lack of marketability 16.8%:

Total Discount : 1 - [(1 - DLOC)(1 - DLOM)] = 27.6%

Estimated Value: 2,635,000 × (1 - 0.276) = 1,907,740

REVIEW

Equity Valuation: Applications & Processes

Review - 1

Price vs. Intrinsic Value

observable unobservable

- undertaking valuation assumes mispricing exists

Grossman-Stiglitz paradox

$$V_e - P = (V - P) + (V_e - V)$$

estimated value — price — true mispricing (α) — error — forecasts / model

convergence → over some holding period horizon

→ requires a catalyst

Values/

① going concern value - company will continue operations

② liquidation value — immediate / orderly liquidation } financial distress

Review - 2

Values/ ③ Intrinsic value - focus of valuation here

④ Fair market value - asset/liability would trade hands
- willing buyer/seller, no compulsion
- both informed

⑤ Investment value - value to a particular buyer

Uses/ 1) Selecting stocks

2) Inferring market expectations Price = $Var_1 + Var_2 + Var_3 + X$

solve for X

3) evaluating corporate events (M&A, spin-off)

4) rendering fairness options

etc...

Review - 3

- Valuation Process/
  - understand the business - Porter's 5-forces
  - forecast company performance
  - select the appropriate valuation model
  - arrive at valuation
  - conclusions

Valuation models/

1) Absolute valuation models → $IV = \sum_{i=1}^{n} \frac{CF_i}{(1+r)^i}$

   → asset-based valuations
   - MV of assets/resources

2) Relative valuation models
   - price multiples or enterprise multiples

Review - 4

⇒ sum of the parts - few synergies between segments
- useful for valuing spin-offs

⇒ Conglomerate Discount - companies operating in multiple unrelated businesses

- Valuation Approach - consistent w/ the characteristics of the company
- appropriate given available data
- consistent w/ the purpose of valuation

Valuation/ - sensitivity analysis
- situational adjustments

Discounted Dividend Valuation

Review - 1

- definitions of cash flow
  - dividends
  - free cash flow
    - to the firm
    - to equity
  - residual income

DDM/suitable

- company pays a div.
- div. policy bears an understandable relationship with profitability
- non-control perspective

FCFF/FCFE/suitable

- company has no div.
- company has a div., but no relationship with FCF
- company's FCF aligns with profitability
- control perspective

Review - 2

Residual Income/suitable

- company has no div.
- expected FCFs negative

DDM/ Single Period $$V_0 = \frac{D_1 + P_1}{(1+r)}$$

Multiple Periods $$V_0 = \sum_{i=1}^{n} \frac{D_i}{(1+r)^i} + \frac{P_n}{(1+r)^n} \longrightarrow \sum_{i=1}^{\infty} \frac{D_i}{(1+r)^i}$$

- 2 approaches to using DDM
  1) GGM 2-stage, H-model, 3-stage
  2) explicit forecast period + terminal value
     from 1) above or multiple based

GGM/

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

Review - 3

GGM/ $r = r_f + \beta \cdot ERP$ sust: $g = ROE \cdot RR$ $g \rightarrow$ the rate of capital appreciation (cap. gains yield)

Total return = $g + {}^{D_1}/_{P_0}$

cap. gain yield div. yield (constant through time)

implied g/ $V_0 = P_0 = \dfrac{D_0(1+g)}{r-g}$ - solve for g

$V_0 = \dfrac{D}{r}$ - perpetuity (g = 0)

Present Value of Growth Opportunities/PVGO

$$\underbrace{P_0 = {}^{E_1}/_{r}}_{\text{value of company without reinvestment DPR = 100\% (DPS = EPS)}} + PVGO$$

$${}^{P_0}/_{E_1} = \frac{1}{r} + \frac{PVGO}{E_1}$$

value of P/E for no growth company

P/E component related to growth

Review - 4

$V_0 = \dfrac{D_0(1+g)}{r-g}$ (divide by EPS) E_1 - exp. E_0 - hist.

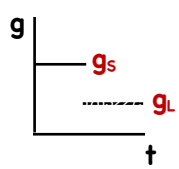
$${}^{V_0}/_{E_0} = \frac{{}^{D_0}/_{E_0}(1+g)}{r-g} = \frac{(1-RR)(1+g)}{r-g}$$

${}^{V_0}/_{EPS_0}$ trailing justified P/E

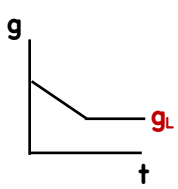
$${}^{V_0}/_{E_1} = \frac{1 - RR}{r-g}$$

${}^{V_0}/_{EPS_1}$ forward

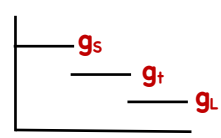
⇒ Multi-Stage DDM/ 2-stage



H-model



3-stage



Review - 5

2-stage/

$$V_0 = \sum_{t=1}^{n} \frac{D_0(1+g_S)^t}{(1+r)^t} + \frac{V_n}{(1+r)^n} \qquad V_n = \frac{(D_0(1+g_S)^t)(1+g_L)}{r-g_L}$$

3-stage/

$$V_0 = \sum_{a=1}^{m} \frac{D_0(1+g_S)^a}{(1+r)^a} + \sum_{b=m+1}^{n} \frac{D_0(1+g_S)^m(1+g_t)^b}{(1+r)^b} + \frac{V_n}{(1+r)^n}$$

$$V_n = \frac{D_0(1+g_S)^a(1+g_t)^b(1+g_L)}{r-g_L}$$

H-model/

$$V_0 \approx \frac{D_0(1+g_L)}{r-g_L} + \frac{D_0 H(g_S-g_L)}{r-g_L}$$

H - half life in years

or/

V_n = EPS_n × multiple

$$\frac{D_0(1+g_L) + D_0 \cdot H(g_S-g_L)}{r-g_L}$$

Review - 6

Single Stage — GGM
multiples-based

2-stage — explicit forecast period - Single Stage
H-model

3-stage explicit forecast period - 2-Stage

Required Return/ (price implied) - efficient market required return

GGM/ $r = {}^{D_1}/_{P_0} + g \qquad P_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$

H-model/ $r = \left({}^{D_0}/_{P_0}\right)[(1+g_L) + H(g_S - g_L)] + g_L$

$r - g_L$

2-stage/3-stage - IRR - iterative approach

Review - 7

g_L/

$$g = ROE \times RR$$

$$g = \frac{NI}{Sh.\ Eq.} \times RR$$

$$g = \frac{NI}{Avg.\ As.} \times \frac{Avg.\ As.}{Sh.\ Eq.} \times RR$$

$$g = \frac{NI}{Sales} \times \frac{Sales}{Avg.\ As.} \times \frac{Avg.\ As.}{Sh.\ Eq.} \times RR$$

(ROA × leverage)

(pr. margin × turnover × leverage)

$$g = \underbrace{\frac{NI - Div.}{NI} \times \frac{NI}{Sales} \times \frac{Sales}{Avg.\ As.} \times \frac{Avg.\ As.}{Sh.\ Eq.}}_{\text{PRAT model}}$$

$$g = RR \times ROA \times leverage$$

Free Cash Flow Valuation

Review - 1

- company pays no dividend, or div. shows no relationship with earnings or capacity to pay
- control perspective

Net Income/ FCFF = NI + NCC + Int(1-t) - FCInv - WCInv

FCFE = FCFF (-Int(1-t) + Net Borrowing) - always

$$FCFF = \sum_{i=1}^{n} \frac{FCFF(1+g)^i}{(1+WACC)^i} + \left[\frac{FCFF(1+g)^{n+1}}{WACC - g}\right] / (1+WACC)^n$$

$$FCFE = \sum_{i=1}^{n} \frac{FCFE(1+g)^i}{(1+r)^i} + \left[\frac{FCFE(1+g)^{n+1}}{r - g}\right] / (1+r)^n$$

& FCFE = FCFF - MV_d - $MV_{Pr.}$

NOTE:
① FCInv = net investment (additions less sales)
② WCInv - excludes cash/equiv. and any CL accts that are debt.

Review - 2

CFO/ FCFF = CFO + Int(1-t) - FCInv
FCFE = FCFF - Int(1-t) + Net Borrowing

(NI + NCC - WCInv) = CFO

EBIT/ FCFF = EBIT(1-t) + NCC - FCInv - WCInv
FCFE = FCFF - Int(1-t) + Net Borrowing

NI = (EBIT - Int)(1-t)

EBITDA/ FCFF = EBITDA (1-t) + Dep(t) - FCInv - WCInv
FCFE = FCFF - Int(1-t) + Net Borrowing

NI = (EBITDA - NCC - Int)(1-t)

FCFF/
- levered company with FCFE < 0
- levered company with changing capital structure

FCFE/
- stable capital structure
- FCFE > 0

Review - 3

Remember/
- FCFF discounted by WACC - more stable than r
- FCFE discounted by r
- CFO → if IFRS & GAAP follow the same allocations, no adjustments required

		GAAP	IFRS		
Interest	Pd	CFO	CFO	CFF	adjustments
	Rec	CFO	CFO	CFI	
Dividends	Pd	CFF	CFF	CFO	
	Rec	CFO	CFO	CFI	

no adjust

- NCC - could be more than just Dep/Amort.
  - if we start at EBIT, we assume the only NCC is Dep. (since many NCC come after EBIT)

Review - 4

Forecasting FCFF/E

1) apply a constant g to a current level of FCF

$$V_{firm} = \frac{FCFF(1+g)}{WACC - g}$$ one-stage model

2) forecast each of the components

EBIT - some relationship w/sales

↑

NCC
FCInv
WCInv

(FCInv - NCC) - constant relationship with size of company

$$\frac{(FCInv - NCC)}{\Delta Sales}$$

$$\frac{WCInv}{\Delta Sales}$$ ← WCInv

Net Borrowing

[(FCInv - NCC) + WCInv] DR

↓

Debt Ratio

(FCInv - NCC) < 0 - unsustainable
- ↳ $ maintenance CAPEX
- ↳ $ growth CAPEX

Review - 5

vs. Dividends/

$$V_0 = \frac{D_0(1+g)}{r-g}$$

- CF going to shareholders
- non-control perspective

$$V_0 = \frac{FCFE_0(1+g)}{r-g}$$

- CF available to shareholders
- control perspective

- g need not be the same

- Dividends/Share Buybacks - do not affect FCFF/E
- Changes in Leverage - does not affect FCFF
  - increases FCFE in year new debt raised, lowers FCFE in subsequent years

- EBITDA (as proxies for cash flow) - NI

FCFF = EBITDA (1-t) + Dep(t) - FCInv - WCInv
vs EBITDA

FCFF = NI + NCC + Int(1-t) - FCInv - WCInv
vs NI

Review - 6

- Models/ single stage
  - GGM

$$\text{value of firm} = \frac{FCFF_0(1+g)}{WACC-g}$$

$$\text{value of equity} = \frac{FCFE_0(1+g)}{r-g}$$

Value of equity - MV_d - MV_{Pr}

$$V_0 = \frac{\text{Value of equity}}{\#\text{ shares}}$$

  - multiples based

- two-stage
  - explicit forecast period
    - GGM
    - multiples based
  - H model

$$\sum_{i=1}^{n} \frac{FCFF(1+g)^i}{(1+WACC)^i} + \frac{FCFF(1+g)^{n+1}}{WACC-g} \times \frac{1}{(1+WACC)^n}$$

- 3-stage
  - explicit forecast period
    - explicit forecast period
      - GGM
      - multiples based
    - H model

Market-Based Valuation: Price & Enterprise Value Multiples

Review - 1

Comparables - multiple of similar assets (relative valuation)

P_0/x → some fundamental value

vs./

Forecasted Fundaments - $V_0 = \frac{D_0(1+g)}{(r-g)}$ or $V_E = FCFE\,(1+g)(r-g)$

V_0/x EV/x

justified multiples

① P/E - widely recognized and used

⇒ EPS can be zero or negative

⇒ highly managed number

⇒ non-recurring adjustments required

$P_0/E_1 = \frac{D_1/E_1}{r-g}$ or $P_0/E_0 = \frac{D_0/E_0\,(1+g)}{r-g}$

forward trailing

P_0/EPS — trailing (most recent 4 Q) - when forecasts are not possible

— forward - valuation is forward looking

Review - 2

① P/E A) trailing - must consider:

- potential dilution (use diluted EPS)
- transitory effects (adjusted EPS) - non-recurring events
  - normalized EPS (mid-cycle) - business cycle
    (historical avg. EPS or avg. ROE × BV/sh.)
- differences in actg. methods

Low, Zero or Negative EPS → use earnings yield EPS/P_0

B) forward - next 4 quarters

- next 12 months → $x/12 \cdot EPS_0 + \frac{12-x}{12} EPS_1$
- next fiscal YR. → EPS_1

P/E drivers: $P/E_0 = \frac{D_0/E_0\,(1+g)}{(r-g)}$

lower r ⇒ $r_f + \beta \cdot ERP$

higher g ⇒ ROE × RR

Review - 3

① P/E Benchmark P/E - avg. P/E for
- industry
- market
- peer group

use of median P/E avoids outliers

adjustments
(× target EPS)

$$\text{PEG ratio} = \frac{P/E}{g}$$

vs target P/E
< 1 under
= 1 fairly
> 1 over

must consider past values relative to the avg.

Fed Model/ E/P on Index vs. YTM 10-yr. bond

= fairly valued
< overvalued

- fair value of SnP = $\frac{1}{\text{YTM } 10-\text{yr.}}$ (ignores ERP, inflation)

Yardeni Model/ $\text{CEY} = \text{CBY} - \text{b} \times \underbrace{\text{LTEG}}_{\text{consensus 5-yr. growth rate}} + \text{Residual}$

corporate

growth weight

$$\text{justified P/E} = \frac{1}{\text{CBY} - \text{b} \times \text{LTEG}}$$

- lower CBY
- higher LTEG

higher justified P/E

Review - 4

① P/E inflation pass through $P_0/E_1 = \frac{1}{\rho + (1-\lambda)\,I}$ λ - pass through proportion

- higher justified P/E
- lower inflation
- higher pass-through

different countries, different strategies

⇒ Terminal P/E

V_0/E_n - trailing $\quad V_n = \text{benchmark } P/E_{ttm} \times E_n$

V_0/E_{n+1} - forward $\quad V_n = \text{benchmark } P/E_{ntm} \times E_{n+1}$

② P/B $\quad \text{BV/sh.} = \frac{\text{Sh. Equity} - \text{Equity claims senior to common}}{\text{\# of shares outstanding}}$

- BV/sh. > 0 even when EPS < 0
- more stable than EPS
- appropriate for valuing
  - windups/liquidations
  - financials, insurance
  - EPS not suitable

Review - 5

② P/B $\quad {P_0}/{B_0} = \dfrac{ROE - g}{r - g}$ $\quad B_0 \times ROE = EPS_1$

$EPS_1\,(1 - RR) = D_1$

- justified ${P_0}/{B_0}$
  - higher ROE, g
  - lower r

- 2 stocks with same ${P_0}/{B_0}$, higher ROE undervalued

③ P/S → less subject to manipulation
- S > 0 even when EPS < 0
- S more stable than EPS
- mature, cyclical, zero-profit firms

-/ P_0 reflects effect of debt, Sales do not

- revenue recognition can distort P/S

P/S = P/E × net profit margin so, $\frac{P/S}{P/E}$ = NPM

Justified ${P_0}/{S_0} = \dfrac{{E_0}/{S_0}\,(1 - RR)(1 + g)}{r - g}$

- higher NPM, g → RR × ROE
- lower r

Review - 6

④ P/CF
- CF less subject to manipulation
- more stable than earnings

-/ some definitions of CF inadequate
FCFE most appropriate, but most volatile

CF/sh. = $EPS + \dfrac{Dep./Amort./Depl.}{sh.}$ - not technically accurate
CFO/sh.
FCFE/sh. - most accurate
EBITDA/sh.

- Justified $P/CF = {V_0}/{cashflow}$

⑤ ${P_0}/{D_0}$ $\quad {D_0}/{P_0} = \frac{r-g}{1+g}$

div. yield

Review - 7

EV Multiples/ $EV = MV_e + MV_d + MV_{Pr.} - Cash/Equiv. - Mkt.\ Sec.$

$EV/EBITDA$ - most widely used

- comparing companies with different leverage — financial / operating
- EBITDA usually > 0 when EPS < 0

justified $EV/EBITDA$ - positively related to g & ROIC
- negatively related to WACC

$TIC/EBITDA$ - Total Invested Capital $(MV_e + MV_d + MV_{Pr.})$

Others/ EV/
- FCFE
- EBITDAR
- EBITA
- EBIT

Review - 8

⇒ Cross Border Valuation/

- sources of differences — actg. methods / tax regimes / economic differences / cultural differences

⇒ Momentum Valuation Indicators/

1) Earnings surprise $UE_t = EPS_t - E(EPS_t)$ ← consensus estimate

$$\text{Scaled earnings surprise} = \frac{EPS_t - E(EPS_t)}{\sigma(E(EPS))}$$

- s.d. of analyst's forecasts

2) Relative strength indicators

- comparison of a stock's performance during a period of time with
  ① its own past performance
  ② some group of stocks

Review - 9

⇒ Averaging Multiples/

- arithmetic mean $\frac{\sum X_i}{n}$

- harmonic mean $\frac{n}{\sum\left(1/X_i\right)}$ - gives less weight to higher P/E & more weight to lower P/E

harmonic mean < arithmetic mean

- weighted harmonic mean

$$\frac{n}{\sum\left(w_i/X_i\right)}$$

- w_i are portfolio weights

$\left[w_i\left(1/X_i\right)\right]$

$\sum w_i = 1$

• most accurate

Residual Income Valuation

Review - 1

⇒ Residual Income (economic profit)

Net Income$_t$ − $r_e B_{t-1}$

or/ NOPAT$_t$ − (WACC × TC)

if RI > 0 - company is creating value (shares will sell at a premuim to BV)

RI < 0 - company is destroying value (shares will sell at a discount to BV)

⇒ Economic Value Added

EVA = NOPAT − (WACC × TC) +/- adjustments

⇒ Market Value Added

$$MVA = \underbrace{MV_{company}}_{MV_e + MV_d + MV_{Pr}} - BV_{TC}$$

- total capital

• if RI > 0, $MV_e > BV$

Review - 2

⇒ RI models/

$$V_0 = B_{t-1} + \underbrace{\sum_{i=1}^{\infty} \frac{RI_t}{(1+r)^t}}_{\sum_{i=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}}$$

⇒ (earnings - equity charge)

E - EPS
B - BVPS
t - end of YR
t-1 - beg of YR.

$B_{t-1} + E_t - D_t = B_t$ - clean surplus relation ⇒ earnings reflect all changes in BV other than ownership transactions

$E_t - rB_{t-1} = RI_t$

$D_t = E_t - (B_t - B_{t-1})$

⇒ DDM

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{E_t - (B_t - B_{t-1})}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

$$= B_0 + \sum_{t=1}^{\infty} \frac{(ROE - r)\, B_{t-1}}{(1+r)^t}$$

Review - 3

$$V_0 = P_0 = B_0 + \sum_{t=1}^{\infty} \frac{(ROE - r)\, B_{t-1}}{(1+r)^t}$$

$B_0 = B_{t-1}$

- constant E&D growth $\quad V_0 = P_0 = B_0 + \frac{(ROE_t - r)\, B_0}{r - g}$

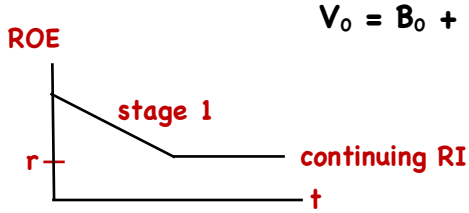
divide by B_0 $\quad P_0/B_0 = 1 + \frac{ROE - r}{r - g}$ (justified P/B)

⇒ Single Stage RI/ $\quad V_0 = B_0 + \frac{(ROE - r)\, B_0}{r - g}$

- assumes (ROE-r) > 0 persists
- LR → ROE → r
  RI → 0

⇒ Multi-Stage RI/

V_0 = B_0 + explicit forecast period + TV based on continuing RI



Review - 4

⇒ Multi-Stage RI/

$$V_0 = B_0 + \sum_{t=1}^{T} \frac{E_t - rB_{t-1}}{(1+r)^t} + \frac{P_T - B_T}{(1+r)^T}$$

premium overlook $\left(ie.\ E_1/r\right)$

RI continues indefinitely at some positive level

ROE = r

+ 0

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{E_t - rB_{t-1}}{(1+r)^t} + \frac{E_T - rB_{T-1}}{(1+r-\omega)(1+r)^{T-1}}$$

ω - persistence factor

- RI declines to 0 as ROE reverts to r

+/ · can be used when FCF < 0 & no dividends
· can be used when CFs are unpredictable

-/ · clean surplus relation must hold
· relies on actg. data

Review - 5

⇒ Violations of clean surplus/ · when charges bypass the I.S. and are made directly to equity

CI = NI + OCI
- BV stated properly
- NI overstated ∴ ROE not accurate

- if future OCI is expected to be significant and are not expected to net to zero ⇒ adjust NI

$B_{t-1} + E_t - D_t - OCI_t = B_t$ when (OCI < 0)

$RI = (E_t - OCI_t) - rB_{t-1}$

Other Adjustments/ · Balance Sheet adjustments for FV (op leases, LIFO to FIFO)
· Nonrecurring Items - removed from OP Inc.