Equity Securities

TOPIC 9: MARKET VALUATION

(ALL LECTURE SLIDES WITH SOLUTIONS)

LA TROBE UNIVERSITY

Student learning outcomes

9.1 Distinguish between the method of comparables and the method based on forecasted fundamentals as approaches to using price multiples in valuation, and discuss the economic rationales for each approach;

9.2 Discuss rationales for using each price multiple and dividend yield in valuation, discuss possible drawbacks to the use of each price multiple and dividend yield, and calculate each price multiple and dividend yield;

9.3 Calculate underlying earnings given earnings per share (EPS) and non-recurring items in the income statement and discuss the methods of normaliSing EPS, and calculate normaliSed EPS by each method;

9.4 Define a justified price multiple;

Student learning outcomes

9.5 Discuss the fundamental factors that influence each price multiple and dividend yield and calculate 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;

9.6 Define the benchmark value of a multiple;

9.7 Evaluate a stock by the method of comparables using each of the price multiples and explain the importance of fundamentals in using the method of comparables;

9.8 Calculate the P/E-to-growth ratio (PEG), and explain its use in relative valuation;

Student learning outcomes

9.9 Calculate and explain the use of price multiples in determining terminal value in a multi-stage discounted cash flow (DCF) model

9.10 Discuss alternative definitions of cash flow used in price multiples, and explain the limitations of each definition.

References

- **Pinto J.E., E. Henry, T.R. Robinson and D.D. Stowe. (2010).** Equity Asset Valuation. (2nd edition) John Wiley & Sons: New Jersey. Chapter 6.

Outcome 9.1

Price multiples

- Price multiples are ratios of a stock's market price to some measure of value per share
- Price multiples are premised on the idea that you cannot evaluate a stock's price without knowing what a share buys in terms of assets, earnings or some other measure of value
- Price multiples are among the most familiar and widely used valuation tools
- They are simple to use and easy to communicate
- They summarise in a single number the valuation relationship between a stock's price and a familiar quantity such as earnings, sales or book value per share

Outcome 9.2

Price multiples

- We can approach valuation using price multiples from two perspectives
  - **Method of comparables**: involves using a price multiple to evaluate whether an asset is fairly valued, undervalued or overvalued, relative to a benchmark value of the multiple
  - **Method based on forecast fundamentals**: involves expressing price multiples using a "price" which is equal to an intrinsic value for the stock based on a discounted cash flow model
- There are a range of different price multiples we can use to value a company:
  - Price to earnings
  - Price to book value
  - Price to sales
  - Price to cash flow
  - Enterprise value to EBITDA
  - Dividend yield

Outcome 9.2

Price to earnings (P/E) multiple

- The P/E ratio is the stock price divided by earnings per share

$$\text{P/E ratio} = \text{Stock Price} / EPS$$

- Rationales for using P/E multiples
  - Earnings power is a chief driver of investment value and denominator in the P/E ratio, EPS, is the chief focus of security analyst's attention
  - The P/E ratio is widely recognised and used by investors
  - Differences in P/Es may be related to differences in long-run average returns

Outcome 9.2

Price to earnings (P/E) multiple

- Drawbacks for using P/E multiples
  - EPS can be negative and the P/E doesn't make economic sense if it is negative
  - Earnings often have transient and volatile components that may distort the P/E
  - P/Es can be consciously distorted by management
- Stock price: The last traded price
- EPS: Two issues need to be considered in obtaining an EPS figure
  - The time horizon over which earnings is measured
  - Adjustments to be made to accounting earnings in order to ensure that the P/E is comparable

Outcome 9.2

Price to earnings (P/E) multiple

- The P/E ratio may be measured over two time horizons:
  - **Trailing P/E**, otherwise known as the **Current P/E**
    - Calculated using the EPS of the most recently announced four quarters, though some analysts use the last fiscal year
    - This is particularly relevant in the case of a company in which earnings are not predictable
  - **Leading P/E**, also called the **Forward P/E** or **Prospective P/E**
    - Calculated using the forecast EPS for the four quarters after the most recently announced four quarters results, though some analysts use the next fiscal year.
    - Usually preferred as valuation is a forward looking process
    - This is particularly relevant in the case of a company in which a major change has occurred, such as an acquisition, which makes comparisons with past multiples irrelevant

Outcome 9.2

Calculating a trailing P/E multiple

- Koninklijke Philips Electronics (PHG), which has a financial year ending 31 December, closed at $25.72 on 8 November 2001

	2001	2000	1999	1998	1997	1996	1995
EPS	(1.94)	2.11	1.15	0.87	1.16	0.55	1.14
BVPS	13.87	16.62	9.97	11.68	6.57	6.43	6.32
ROE	-	12.9%	10.4%	7.2%	16.8%	8.3%	17.9%

- **Calculate a normal EPS for PHG based on historical average EPS and then calculate its trailing P/E ratio based on this average**
- **Calculate a normal EPS for PHG based on average ROE and then calculate its P/E ratio**

Outcome 9.2

Calculating a trailing P/E multiple

- **Calculate a normal EPS based on historical avg EPS**

$$EPS = \frac{2.11+1.15+0.87+1.16+0.55+1.14}{6} = \$1.16$$

- **Calculate its trailing P/E ratio based on this average**

$$\text{Trailing P/E} = \frac{25.72}{1.16} = 22.2$$

- **Calculate a normal EPS for PHG based on average ROE**

$$\text{ROE} = \frac{0.129+0.104+0.072+0.168+0.083+0.179}{6} = 12.25\%$$

- **Calculate its P/E ratio**

$$\text{Trailing P/E} = \frac{25.72}{0.1225 \times 13.87} = 15.1$$

Outcome 9.2

Calculating a leading P/E multiple

- A market price for the common stock of American Electric Power (AEP) in mid-November 2001 was $44.55
- AEP's fiscal year coincides with the calendar year
- According to Zacks Investment Research, the consensus EPS forecast for 2001 was $3.87 and for 2002 was $3.69
- **Calculate AEP's leading P/E based on a fiscal year definition and the 2001 and 2002 consensus forecast EPS**

$$P/E_{2001} = \frac{44.55}{3.87} = 11.5 \qquad P/E_{2002} = \frac{44.55}{3.69} = 12.1$$

Outcome 9.2

Calculating a leading P/E multiple

- Koninklijke Philips Electronics (PHG), which has a financial year ending 31 December, closed at $25.72 on 8 November 2001

Qtr End EPS	31 March	30 June	30 September	31 December
2001	0.08	(0.34)	(0.27)	E0.00
2002	E(0.05)	E0.10	E0.15	E0.30

- **Calculate PHG's leading P/E**
  - **Based on the next 4 quarters of forecast EPS**
  - **Based on current fiscal year forecast EPS**
  - **Based on next fiscal year forecast EPS**

Outcome 9.2

Calculating a leading P/E multiple

- **Calculate PHG's leading P/E**
  - **Based on the next 4 quarters of forecast EPS**

$$\text{Leading P/E} = \frac{25.72}{0.00 - 0.05 + 0.10 + 0.15} = 128.6$$

  - **Based on current fiscal year forecast EPS**

$$\text{Leading P/E} = \frac{25.72}{0.08 - 0.34 - 0.27 + 0.00} = -48.5$$

  - **Based on next fiscal year forecast EPS**

$$\text{Leading P/E} = \frac{25.72}{-0.05 + 0.10 + 0.15 + 0.30} = 51.4$$

Outcome 9.2

Calculating a trailing P/E multiple

- In calculating a trailing P/E multiple care must be taken in determining the EPS used in the denominator
- The following issues must be addressed:
  - Transitory, non-recurring components of earnings should be removed
  - Transitory components of earnings due to cyclicality should be removed by calculating EPS as an average of EPS earned over the cycle, or as the average ROE multiplied by the current book value per share
  - Differences in accounting methods between the stock and other stocks against which a P/E comparison is proposed should be removed
  - Adjustments to EPS need also to be made for the dilutionary effect of share issues

Outcome 9.2

Calculating a trailing P/E multiple

- American Electric Power (AEP) closed at $44.50 on 9 September 2001, when you need to calculate its trailing P/E ratio

Quarter Ended	EPS	Non-recurring items incl.
31 December 2001	E$1.00	E$0.00
30 September 2001	E$1.00	E$0.10
30 June 2001	$0.99	
31 March 2001	$0.91	
31 December 2000	$0.96	
30 September 2000	($0.01)	($0.69)

- **Calculate AEP's trailing P/E ratio**

Outcome 9.2

Calculating a trailing P/E multiple

Quarter Ended	EPS	Non-recurring items incl.	Adj. EPS
31 December 2001	E$1.00	E$0.00	E$1.00
30 September 2001	E$1.00	E$0.10	E$0.90
30 June 2001	$0.99		$0.99
31 March 2001	$0.91		$0.91
31 December 2000	$0.96		$0.96
30 September 2000	($0.01)	($0.69)	$0.68

- **Calculate AEP's trailing P/E ratio**

$$\text{Trailing P/E} = \frac{44.50}{0.99 + 0.91 + 0.96 + 0.68} = 12.57$$

Outcome 9.2

Price to book (P/B) multiple

- The P/B ratio is the stock price divided by book value per share

$$\text{P/B multiple} = \text{Stock Price} / \text{Book value per share}$$

- Rationales for using P/B multiples
  - We can generally use P/B even when EPS is negative, as the book value is a cumulative balance sheet value
  - Book value per share is more stable than EPS; hence it may be more meaningful when EPS is extreme or volatile
  - It is particularly useful in valuing companies in the finance sector comprised primarily of liquid assets, valued close to market value, and in valuing firms not expected to continue as a going concern
  - Differences in P/Bs may be related to differences in long-run average returns

Outcome 9.2

Price to book (P/B) multiple

- Drawbacks for using P/B multiples
  - Assets other than those recognised in the balance sheet may be critical operating factors
    - E.g. human capital
  - Accounting effects on book value as a measure of the shareholder's equity in the company which reduce the comparability of the measure across companies
    - E.g. for companies expensing R&D, book value might be understated, distorting the P/B
  - Where book values are based on historical cost rather than current market value, book value can distort the value of the shareholders equity

Outcome 9.2

Calculating book value

- Book value per share equals shareholders' equity, less the total value of equity claims that are senior to common stock (e.g. preference capital), divided by the number of common shares outstanding
- Book value may be adjusted by the analyst for 2 reasons:
  - To make P/B more accurately reflect the value of shareholders' investment
  - To make P/B more useful for comparisons among different stocks
- The adjustments might include:
  - The deduction of goodwill or possibly all intangible assets, though the later may not be warranted
  - The addition of net off-balance sheet assets
  - Adjustment to historical cost assets to reflect current market value
  - Adjustment of accounting policies to ensure comparability

Outcome 9.3

Calculating book value

- **Calculate Ennis Business Forms book value per share and P/B ratio, based on a stock price of $8.42**

Ennis Business Forms Balance Sheet	28 Feb 2001 $000
Current assets	58,263
Non-current assets	84,591
Total assets	**142,854**
Current liabilities	17,908
Non-current liabilities	33,406
Total liabilities	**51,314**
Common stock ($2.50 par value. Authorised 40,000,000; issued 21,248,860)	53,125
Additional paid-in capital	1,040
Retained earnings	127,817
Treasury stock (4,979,095 shares repurchased)	-90,442
Total shareholders' equity	**91,540**
Total liabilities & shareholders' equity	**142,854**

Outcome 9.3

Calculating book value

- **Calculate Ennis Business Forms book value per share and P/B ratio, based on a stock price of $8.42**

$$\text{No. of shares on issue} = \text{Issued shares} - \text{Repurchased shares}$$
$$= 21{,}249{,}860 - 4{,}979{,}095$$
$$= 16{,}270{,}765$$

$$\text{Book value per share} = \frac{\text{Shareholders' equity}}{\text{No. of shares}}$$
$$= \frac{91{,}540{,}000}{16{,}270{,}765} = \$5.63$$

$$\text{P/B} = \frac{\text{Price}}{\text{BV per share}} = \frac{8.42}{5.63} = 1.5$$

Outcome 9.2

Price to sales (P/S) multiple

- The P/S ratio is the stock price divided by annual net sales per share, where net sales equals total sales less returns and customer discounts

$$\text{P/S multiple} = \text{Stock Price} / \text{Sales per share}$$

- Rationales for using P/S multiples
  - Sales are generally subject to less distortion than EPS or BV
  - Sales are positive even when EPS are negative
  - Sales are generally more stable than EPS; hence more meaningful when EPS is extreme or volatile
  - P/S has been viewed as appropriate for valuing the stock of mature, cyclical and zero-income companies
  - Differences in P/Ss may be related to differences in long-term average returns

Outcome 9.2

Price to sales (P/S) multiple

- Drawbacks for using P/S multiples
  - A business might show high growth in sales but not generate profits or free cash flow
  - P/S does not reflect differences in cost structures between firms
  - Revenue recognition practices do offer some potential to distort P/S

Outcome 9.2

Calculating sales

- Analysts usually use annual trailing sales; i.e. sales from the most recent year for which sales have been released, though the analyst may use forecast sales for the current year
- Although the determination of sales is more straightforward than the determination of earnings, the analyst should evaluate a company's revenue recognition practices, in particular those tending to speed up recognition of revenues

Outcome 9.2

Price to cash flow (P/CF) multiple

- The P/CF ratio is the stock price divided by one of several definitions of cash flow

  $$\text{P/CF multiple} = \text{Stock Price} / \text{Cash flow per share}$$

- Rationales for using P/CF multiples
  - Cash flow is generally less subject to manipulation than earnings
  - As cash flow is generally more stable than earnings, the P/CF is generally more stable than the P/E ratio
  - Using cash flow rather than earnings reduces the issue of differences in accounting conservatism
  - Differences in P/CFs may be related to differences in long-term average returns

Outcome 9.2

Price to cash flow (P/CF) multiple

- Drawbacks for using P/CF multiples
  - When an EPS plus non-cash charges approximation is used, items affecting cash flow from operations such as non-cash revenue and net changes in working capital are ignored
  - Theoretically free cash flow to equity (FCFE) rather than cash flow is the better approximation of cash flow, but FCFE has the possible drawback of being more volatile and more likely to be negative than cash flow

Outcome 9.2

Calculating cash flow

- In practice analysts often use simple approximations to cash flow from operations in calculating cash flow in P/CF
  - EPS plus depreciation, amortisation and depletion per share
  - Cash flow from operations less net interest multiplied by (1 – tax rate), and the effects of any other financing or investing activities, less any non-continuing cash flows
  - Free cash flow to equity
  - EBITDA, though as this represents cash flow to both debt and equity holders, the numerator should be debt plus equity, or enterprise value per share, rather than simply price

Outcome 9.2

Calculating cash flow

- **Using the financial information on the next two slides, calculate Dell Computer's:**
  - **P/CF (adjusting EPS)**
  - **P/CFO (adjusting CFO for the "tax benefits of employee stock plans" and financing effects)**
  - **P/FCFE**
  - **P/EBITDA**

Outcome 9.2

Calculating cash flow

Dell Computer Corporation Extract from Income statement	2 Feb 2001 $m
Income before tax	3,194
Taxes (30%)	-958
Net income	**2,177**
Additional information	
Shares outstanding	2,582
Income before tax includes:	
Interest expense	47
Actual cash interest paid	49
Closing price (16/4/01)	$27.11

Outcome 9.2

Calculating cash flow

Dell Computer Corporation Extract from cash flow statement	2 Feb 2001 $m
Net income	3,194
plus Depreciation and amortisation	240
plus Tax benefits of employee stock plans	929
plus Other adjustments to net income	849
Cash flow from operating activities	**4,195**
Additional information	
Capital expenditures	492
Net borrowing	0

Outcome 9.2

Calculating cash flow

- **Using the financial information on the next two slides, calculate Dell Computer's:**
  - **P/CF (adjusting EPS)**

$$\text{Cash flow} = \text{Net income} + \text{Depreciation \& Amortisation}$$
$$= 2{,}177 + 240 = \$2{,}417 \text{ million}$$

$$\text{Cash flow per share} = \text{Cash flow} / \text{No. of shares}$$
$$= \frac{2{,}417}{2{,}582} = \$0.94$$

$$\text{P/CF} = \frac{27.11}{0.94} = 28.8$$

Outcome 9.2

Calculating cash flow

- **Using the financial information on the next two slides, calculate Dell Computer's:**
  - **P/CFO (adjusting CFO for the "tax benefits of employee stock plans" and financing effects)**

Cash flow from operations	4,195.00
less Tax benefits of employee stock plans	–929.00
plus After-tax interest paid [49 x (1 – 0.3)]	34.30
Adjusted CFO	**3,300.30**

$$\text{Adjusted CFO per share} = \frac{3{,}300.3}{2{,}582} = \$1.28$$

$$\text{P/CF0} = \frac{27.11}{1.28} = 21.2$$

Outcome 9.2

Calculating cash flow

- **Using the financial information on the next two slides, calculate Dell Computer's:**
  - **P/FCFE**

Adjusted CFO	3,300.30
less Capital expenditure	–482.00
less After-tax interest paid [49 x(1 – 0.3)]	–34.30
FCFE	**2,784.00**

$$\text{FCFE per share} = \frac{2{,}784}{2{,}582} = \$1.08$$

$$\text{P/FCFE} = \frac{27.11}{1.08} = 25.1$$

Outcome 9.2

Calculating cash flow

- **Using the financial information on the next two slides, calculate Dell Computer's:**
  - **P/EBITDA**

Net income	2,177
plus Interest expense	47
plus Depreciation & amortisation	240
plus Taxes	958
EBITDA	**3,422**

$$\text{EBITDA per share} = \frac{3{,}422}{2{,}582} = \$1.32$$

$$\text{P/EBITDA} = \frac{27.11}{1.32} = 20.5$$

Outcome 9.2

Enterprise value to EBITDA multiple

- The EV/ EBITDA ratio is the total company value, represented by the market value of debt, common and preferred equity less the value of cash and investments divided EBITDA

$$\text{EV/EBITDA multiple} = \text{Enterprise Value} / \textit{EBITDA}$$

- Rationales for using EV/EBITDA multiples
  - EV/EBITDA may be more appropriate than P/E for comparing companies with different financial leverage
  - Often used to value capital intensive companies as they may differ significantly in their depreciation rates
  - EBITDA is frequently positive when EPS is negative

Outcome 9.2

Enterprise value to EBITDA multiple

- Drawbacks for using EV/EBITDA multiples
  - EBITDA will overestimate cash flows from operations if working capital is growing, as it is excluded
  - FCFE, which directly reflects the amount of required capital expenditures, has a stronger link to valuation theory than EBITDA, unless depreciation equals capital expenditures

Outcome 9.2

Calculating enterprise value

- Enterprise value is calculated as the
  - market value of common equity, i.e. the stock price times the number of common shares outstanding,
  - plus the market value of preferred equity, if any,
  - plus the market value of long-term debt,
  - less cash and investments
- Cash and investments are deducted as an acquirer of the firm can effectively reduce the net acquisition cost by applying cash and investments to reduce debt

Outcome 9.2

Calculating enterprise value

Ennis Business Forms Balance Sheet	28 Feb 2001 $000
Current assets	58,263
Non-current assets	84,591
Total assets	**142,854**
Current liabilities	17,908
Non-current liabilities	33,406
Total liabilities	**51,314**
Common stock ($2.50 par value. Authorised 40,000,000; issued 21,248,860)	53,125
Additional paid-in capital	1,040
Retained earnings	127,817
Treasury stock (4,979,095 shares repurchased)	-90,442
Total shareholders' equity	**91,540**
Total liabilities & shareholders' equity	**142,854**

The' current share price is $5.75

Current assets includes cash and investments of $12,500,000

EBITDA = $5,985,000

- **Calculate Ennis's EV/EBITDA**

Outcome 9.2

Calculating enterprise value

- **Calculate Ennis Business Forms' EV/EBITDA**

$$\begin{aligned}\text{Enterprise value} &= \text{Market value of common equity} \\ &\quad + \text{Market value of long-term debt} \\ &\quad - \text{Cash and investments} \\ &= (21{,}248{,}860 - 4{,}979{,}095) \times 5.75 \\ &\quad + 33{,}406 - 12{,}500 \\ &= \$93{,}572{,}000\end{aligned}$$

$$\text{EV/EBITDA} = \frac{93{,}572}{5{,}985} = 15.6$$

Outcome 9.2

Calculating dividend yield

- Trailing dividend is usually calculated as four times the most recent quarterly DPS, assuming there is no seasonality, divided by the current market price of the share
- The leading dividend yield is calculated as forecast dividends over the next year divided by current market price of the share

Outcome 9.2

Calculating dividend yield

- The following data relates to Ford Motor Company (F)

	Dividend Per Share
1Q:2002	$0.10
4Q:2001	$0.15
3Q:2001	$0.30
2Q:2001	$0.30
Total	$0.85

- **Given a current market price of $14.62, calculating the trailing dividend yield for Ford Motor Company**

$$\text{Dividend Yield} = \frac{4 \times \text{Qtrly Dividend}}{\text{Price}} = \frac{4 \times 0.10}{14.62} = 2.74\%$$

Outcome 9.4

Justified price multiple

- A justified price multiple is the estimated fair value of a multiple
- A price multiple may be justified based on either the method of comparables or the forecast fundamentals
  - The mean price multiple for the company's peer group may provide the justification of a price multiple based on the method of comparables
  - The intrinsic value of the stock, calculated using a discounted cash flow model, divided by a fundamental, such as the stock's EPS, may provide the justification of a price multiple based on the forecast fundamentals

Outcome 9.5

Leading justified P/E

- A leading justified P/E ratio can be derived from the GGM
  - It is leading in the sense that it is a P/E based on forecast earnings
  - It is justified in the sense that it is fair, warranted or justified on the basis of fundamentals, given that the valuation model is appropriate
- The GGM gives us $P_0 = D_1 / (r - g)$
- Hence:

$$\text{P/E} = \frac{P_0}{E_1} = \frac{D_1}{r-g} / E_1 = \frac{D_1 / E_1}{r-g} = \frac{1-b}{r-g}$$

where b = the retention ratio; i.e. the portion of earnings not paid out in dividends

Outcome 9.5

Trailing justified P/E

- A trailing justified P/E ratio can be derived from the GGM
  - It is trailing in the sense that it is a P/E based on current earnings
  - It is justified in the sense that it is fair warranted or justified on the basis of fundamentals, given that the valuation model is appropriate
- The GGM gives us $P_0 = D_0 (1 + g) / (r - g)$
- Hence:

$$\text{P/E} = \frac{P_0}{E_0} = \frac{D_0(1+g)}{r-g} / E_0 = \frac{D_0(1+g)/E_0}{r-g} = \frac{(1-b)(1+g)}{r-g}$$

Outcome 9.5

Justified P/E

- Using any DCF model, all else equal, justified P/E is:
  - Inversely related to the stock's required rate of return
  - Positively related to the growth rate of future expected cash flows, however defined

Outcome 9.5

Justified P/E

- Harry Trice wants to use the GGM to find a justified P/E for the French company Carrefour SA (CA), a global food retailer
- Its current price is €56.94, estimated current year EPS is €1.837, DPS for the current year is €0.575 and dividend growth is estimated to be 8.18%
- The risk-free rate is 5.34%, the equity risk premium is 5.32% and CA's beta estimated against the CAC index is 0.83

- **Calculated the justified leading and trailing P/E**
- **Is CA undervalued or overvalued in the market?**

Outcome 9.5

Justified P/E

- **Calculated the justified leading and trailing P/E**

$$r = R_F + \beta_i\left[E\left(R_M\right) - R_F\right] = 0.0534 + 0.83\left(0.0532\right) = 9.76\%$$

$$b = \frac{\text{Earnings} - \text{Dividend}}{\text{Earnings}} = \frac{1.837 - 0.575}{1.837} = 0.687$$

$$\text{Leading P/E} = \frac{1-b}{r-g} = \frac{1-0.687}{0.0976-0.0818} = 19.8$$

$$\text{Trailing P/E} = \frac{(1-b)(1+g)}{r-g} = \frac{(1-0.687)(1+0.0818)}{0.0976-0.0818} = 21.4$$

Outcome 9.5

Justified P/E

- **Is CA undervalued or overvalued in the market?**

$$\text{Actual P/E} = \frac{56.94}{1.837} = 31$$

The current P/E is higher than both the leading and trailing P/Es, indicating that the stock is overvalued.

Outcome 9.5

Justified P/B

- A justified P/B ratio can be derived from the GGM
- The GGM gives us $P_0 = E_1\,(1 - b) / (r - g)$
- Using the expression $g = b \times ROE$, and hence $b = g / ROE$:

$$\text{P/B} = \frac{P_0}{B_0} = \frac{E_1(1-b)/(r-g)}{B_0} = \frac{ROE\,(1-b)}{r-g}$$
$$= \frac{ROE\,(1-g/ROE)}{r-g} = \frac{ROE-g}{r-g}$$

where – *ROE* is the return on equity
– *r* is the required rate of return, or cost of equity
– *g* is the sustainable growth rate

Outcome 9.5

Justified P/B

- Using any DCF model, all else being equal:
  - Justified P/B is positively related to the stock's return on equity
  - As the numerator and denominator are differences of *ROE* and *r* from the same value, *g*, it is the difference between *ROE* and *r* which determines the P/B ratio
  - The larger the excess *ROE* over *r*, the higher the justified P/B
  - Note the implication that we cannot justify a P/B ratio without considering the firms profitability

Outcome 9.5

Justified P/S

- A justified P/S ratio can be derived from the GGM
- The GGM gives us $P_0 = E_1\,(1 - b) / (r - g)$; hence:

$$\text{P/S} = \frac{P_0}{S_0} = \frac{E_0(1-b)(1+g)/(r-g)}{S_0}$$
$$= \frac{E_0/S_0(1-b)(1+g)}{r-g}$$

where – *b* is the retention ratio
– *r* is the required rate of return, or cost of equity
– *g* is the sustainable growth rate

Outcome 9.5

Justified P/S

- Using any DCF model, all else being equal:
  - Justified P/S is an increasing function of the firm's profit margin and earning growth rate
  - Profit margin is a determinant of the justified P/S, not only directly, but also through its effect on *g*
  - See the three factor DuPont model for the factor *g*, which states that an increase in the profit margin produces a higher sustainable growth rate so long as sales do not decrease proportionately

Outcome 9.5

Justified P/CF

- A justified P/CF ratio can be calculated by calculating the intrinsic value of the stock based on the most suitable FCFE model and dividing by the cash flow

$$\text{P/CF} = \frac{V_0}{CF_0}$$

where
- V_0 is the intrinsic value of the firm, calculated using a FCFE model
- CF_0 is the cash flow of the firm

- Using a FCFE model, all else being equal, justified P/CF is:
  - Inversely related to the stock's required rate of return, and positively related to the growth rate of future expected cash flows, however defined

Outcome 9.5

Justified P/CF

- You are working on a valuation of Dell Computer (DELL)
- You have calculated FCFE per share for DELL, last year, of $1.39 and trailing CF (based on earnings plus non-cash charges) at $5.75
- Your required rate of return is 14.5% p.a., and 8.5% p.a. constant growth in FCFE
- As a first estimate of value you apply a FCFE model under a constant FCFE growth assumption

- **What is the intrinsic value of DELL according to the constant growth FCFE model**
- **What are the justified P/CF, and the justified P/FCFE, based on forecast fundamentals?**

Outcome 9.5

Justified P/CF

- **What is the intrinsic value of DELL according to the constant growth FCFE model**

$$V_0 = \frac{FCFE_0(1+g)}{r-g} = \frac{1.39(1+0.085)}{0.145-0.085} = \$25.14$$

- **What are the justified P/CF, and the justified P/FCFE, based on forecast fundamentals?**

$$\text{P/CF} = \frac{V_0}{CF_0} = \frac{25.14}{5.75} = 4.37$$

$$\text{P/FCFE} = \frac{V_0}{FCFE_0} = \frac{25.14}{1.39} = 18.1$$

Outcome 9.5

Justified dividend yield

- A justified dividend yield calculated in accordance with the GGM is as follows:

$$\text{D/P} = \frac{D_0}{P_0} = \frac{D_0}{D_0(1+g)/(r-g)} = \frac{r-g}{1+g}$$

- Using any DCF model, all else being equal, justified dividend yield is:
  - Positively related to the stock's return on equity, which implies that the selection of stocks with a relatively high dividend yield is consistent with an orientation to a value rather than a growth investment style
  - Negatively related to the expected rate of growth in dividends

Outcome 9.6

Benchmark of a multiple

- The most common application of the market approach to valuation is to compare a stock's price multiple with a benchmark value of the multiple to determine whether the stock is relatively undervalued, relatively overvalued or relatively fairly valued
- The key assumption is that the benchmark value is efficiently priced, and represents fair value and the justified price multiple according to the method of comparables
- The economic rationale underlying the method of comparables is the law of one price: that two identical assets should sell at the same price

Outcome 9.7

Method of comparables

- According to the method of comparables
  - If the stock's price multiple is higher than the justified price multiple it is deemed to be overvalued
  - If the stock's price multiple is lower than the justified price multiple it is deemed to be undervalued
  - If the stock's price multiple is equal to the justified price multiple it is deemed to be fairly valued

Outcome 9.7

Method of comparables

- To apply the method of comparables using any multiple, an analyst needs to follow the following steps:
  - Select and calculate the price multiple that will be used in the comparison
  - Select the comparison asset or assets
  - Calculate the value of the multiple for the comparison asset, or for a group of assets, calculate the mean or median value of the multiple, which constitutes the benchmark multiple
  - Compare the stock's actual multiple with the benchmark value
  - When feasible, assess whether differences between the actual and benchmark multiples are explained by differences in the fundamental determinants of the price multiple and codify conclusions about relative valuation accordingly

Outcome 9.7

Method of comparables

- Choices for benchmark multiples:
  - The average past value of the multiple for the stock
  - The multiple of the most closely matched individual stock
  - The average or median value of the multiple for the company's peer group of companies within an industry
  - The average or median value of the multiple for the company's industry or sector
  - The multiple for a representative equity index

Outcome 9.7

Own historical P/E multiple

- A stock's current actual P/E multiple may be compared to its historical average P/E multiple
- This assumes that a stock's P/E multiple regresses to its historical average level
- A five or ten year average trailing P/E would be a typical benchmark
- Justified price equals the benchmark value of the stock's historical P/E multiplied by the stock's most recent EPS
- This is limited by changes in inflation and in the firm's business mix

Outcome 9.7

Own historical P/E multiple

- At the beginning of 2001, you are valuing the Bank of Nova Scotia (BNS), Canada's fourth largest bank in terms of assets
- You have calculated the P/E for the stock annually from 1996 to 2000 as 8.0, 11.0, 12.8, 11.1 and 9.7 respectively
- The 2000 EPS was CAD3.55
- **Calculate the value of BNS according to the method of comparables**

$$\text{Average P/E} = \frac{8.0 + 11.0 + 12.8 + 11.1 + 9.7}{5} = 10.5$$

$$\text{Price} = \text{P/E} \times EPS = 10.5 \times 3.55 = \text{CAD}37.28$$

Outcome 9.7

Peer company P/E multiple

- A business's most closely matched peer is sometimes used; however, this suffers from the potential of introducing bias into the benchmark
- A group of peers is preferred as the valuation errors are probably less likely due to the averaging
- Peers offer the advantage of being similar in their business mix
- The stock's actual P/E is compared to the mean or median P/E of the peer group to arrive at a relative valuation
- Alternatively, an absolute value of the firm can be estimated by multiplying the peer group average P/E by the EPS of the firm

Outcome 9.7

Peer company P/E multiple

- In practice the stock being valued may have some significant differences with the mean or median characteristics of the comparison assets
  - If the subject stock has higher-than-average (or median) expected earnings growth, a higher P/E than the benchmark P/E is justified
  - If the subject stock has higher-than-average (or median) risk (operating or financial), a lower P/E than the benchmark P/E is justified

Outcome 9.8

P/E-to-growth ratio (PEG)

- The PEG ratio measures the impact of earnings growth on a stock's P/E, and presents a stock's P/E per unit of expected growth

$$PEG = \frac{P/E_1}{g_1}$$ where g_1 = leading EPS growth

- Stocks with lower PEG ratios are relatively more attractive than stocks with higher PEG ratios
- Limitations of the PEG ratio include:
  - It assumes a linear relationship between P/E and growth, when in fact this relationship is non-linear
  - It does not factor in differences in risk
  - It does not account for difference in the duration of growth

Outcome 9.8

Peer company P/E multiple

- As a housing industry analyst, you are valuing Lennar Corp. (LEN), a U.S. builder of moderately priced homes

Company	Trailing P/E
Beazer Homes (BZH)	6.83
Centex Corp. (CTX)	7.36
Lennar Corp. (LEN)	7.20
Pulte Homes (PHM)	5.94
Ryland Group (RYL)	6.70
Toll Brothers (TOL)	6.29

- **Calculate the median trailing P/E benchmark and evaluate LEN**
- **Which stocks seem relatively undervalued?**

Outcome 9.8

Peer company P/E multiple

- **Calculate the median trailing P/E benchmark**

  From lowest to highest : 5.94, 6.29, 6.70, 6.83, 7.20, 7.36
  Median = 6.77 (Midway between 6.70 and 6.83)

- **Evaluate LEN**

  LEN's P/E is higher than the median peer company P/E, indicating that the stock is overvalued.

- **Which stocks seem relatively undervalued?**

  The P/E for RYL, PHM and TOL are less than the median, indicating that they are relatively undervalued.

Outcome 9.8

Peer company P/E multiple

- As a housing industry analyst, you are valuing Lennar Corp. (LEN), a U.S. builder of moderately priced homes

Company	Trailing P/E	Leading P/E	EPS g Est	Leading PEG	Beta
Pulte Homes (PHM)	5.94	6.08	11.7%	0.52	1.05
Toll Brothers (TOL)	6.29	6.43	14.6%	0.44	1.05

- **Of PHM and TOL, which appears to be most undervalued?**
- **Evaluate TOL if price is $35.25, consensus EPS forecast is $5.48 and justified P/E is 7.5**

Outcome 9.8

Peer company P/E multiple

- **Of PHM and TOL, which appears to be most undervalued?**

  TOL appears to be most undervalued, because:
  - It has a higher EPS growth forecast
  - It has a lower PEG
  - The risk is the same (as measured by beta)

- **Evaluate TOL if price is $35.25, consensus EPS forecast is $5.48 and justified P/E is 7.5**

  $V_0 = P/E \times EPS = 7.5 \times \$5.48 = \$41.10$

  Since the estimate of value is greater than the current share price, TOL appears to be undervalued on an absolute basis.

Outcome 9.8

Industry, sector & market multiples

- Mean and median industry P/Es, as well as economic sector P/Es and equity market indices, are frequently used in relative valuation
- The mechanics of the valuation process are the same as for a peer group
- Limitations
  - It is questionable as to whether the benchmark is efficiently priced
  - Equity market indices are often capitalisation-weighted, which biases them towards large cap stocks
  - Differences in underlying factors over time may change the relationship between the benchmark and the stock; e.g. changes in interest rates and expected growth rates
  - Hence, two potential justifications for higher P/Es are lower interest rates and higher expected growth rates

Outcome 9.8

Industry, sector & market multiples

- You are analysing three large-cap European stock issues with approximately equal earnings growth prospects and risk

	Stock A	Stock B	Stock C	FTSE
Current price	23	50	260	1229
P/E 2003E	20	25.5	20	23.2
5-yr avg P/E as pct of FTSE P/E	80%	110%	105%	

- **Based on the data provided, which stock appears relatively undervalued against the FTSE?**
- **State the assumption underlying the five-year average P/E comparisons**

Outcome 9.8

Industry, sector & market multiples

- **Based on the data provided, which stock appears relatively undervalued against the FTSE?**

  Stock C. Stocks A and C are trading at a P/E that is less than the market, but Stock A has traditionally traded at a discount to the market while Stock C has traded at a premium.

- **State the assumption underlying the five-year average P/E comparisons**

  Using historical relative valuation information for investment decisions assumes stable underlying economic relationships (i.e. the past can be relied upon to predict the future).

Outcome 9.8

Method of comparables and other price multiples

- Calculation of a justified multiple or benchmark multiple using other price multiples follows the same procedure as for calculating a justified P/E multiple
- **Price-to-book**: trailing book value is the most popular method
- **Price-to-sales**: trailing sales is the most popular method, though most analysts will have sales forecasts, which should also be used
- **Price-to-cash flow**:
- **EV/EBITDA**:

Outcome 9.8

Method of comparables and other price multiples

- As a technology analyst you have been asked to compare the valuation of Compaq (CPQ) with Gateway (GTW)

	Price	Trailing CF per share	P/CF	Trailing FCFE	P/FCFE	Consensus growth forecast	Beta
CPQ	$17.98	$1.84	9.8	$0.29	62	13.4%	1.50
GTW	$15.65	$1.37	11.4	-$1.99	n/m	10.6%	1.45

- **Compare the values of CPQ and GTW, using the P/CF multiples**

  CPQ's P/CF multiple is less than that of GTW, even though the consensus growth forecast is 2.8% greater. This indicates that CPQ is relatively undervalued compared to GTW.

Outcome 9.9

P/Es and terminal values

- P/Es are used to estimate a terminal value in a multi-stage discount
- The key condition that must be satisfied is that the terminal value reflects earnings growth that the company can sustain in the long run
- Alternatives available to the analyst include:
  - Terminal price multiples based on fundamentals
  - Terminal price multiples based on comparables, which has the advantage that it is entirely grounded in market data; however, if the benchmark is mispriced the valuation is meaningless
- Analysts use various multiples, including:
  - Median industry P/E
  - Average industry P/E
  - Average of own past P/Es