

Relative Valuation

Equity Analysis FN 451: Part II Fundamental Analysis

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Topics to be Discussed:

- I. The Essence of Relative Valuation
- II. Price Earnings Ratio (PE)
 1. Intrinsic PE Ratio
 2. Present Value of Growth Opportunities (PVGO)
 3. PEG Ratio
 4. Earnings Yield and Dividend Yield
 5. Cyclicalities of PE
- III. Enterprise Value to EBITDA Multiple (EV / EBITDA)
- IV. Book Value Multiples
- V. Price-to-Sales Multiple
- VI. Sector-Specific Multiples



The Essence of Relative Valuation

- In relative valuation, the value of an asset is compared to the values assessed by the market for **similar or comparable assets**.
 - **The law of one price** - the economic principle that two identical assets should sell at the same price.
- The problem with multiples is not in their use but in **their abuse**. If we can find ways to frame multiples right, we should be able to use them better.
- Every multiple is a function of the same three variables—**risk, growth, and cash flow generating potential (i.e. rate of return such as ROE)**. Firms with higher growth rates, less risk, and greater cash flow generating potential should trade at higher multiples than firms with lower growth, higher risk, and less cash flow potential.



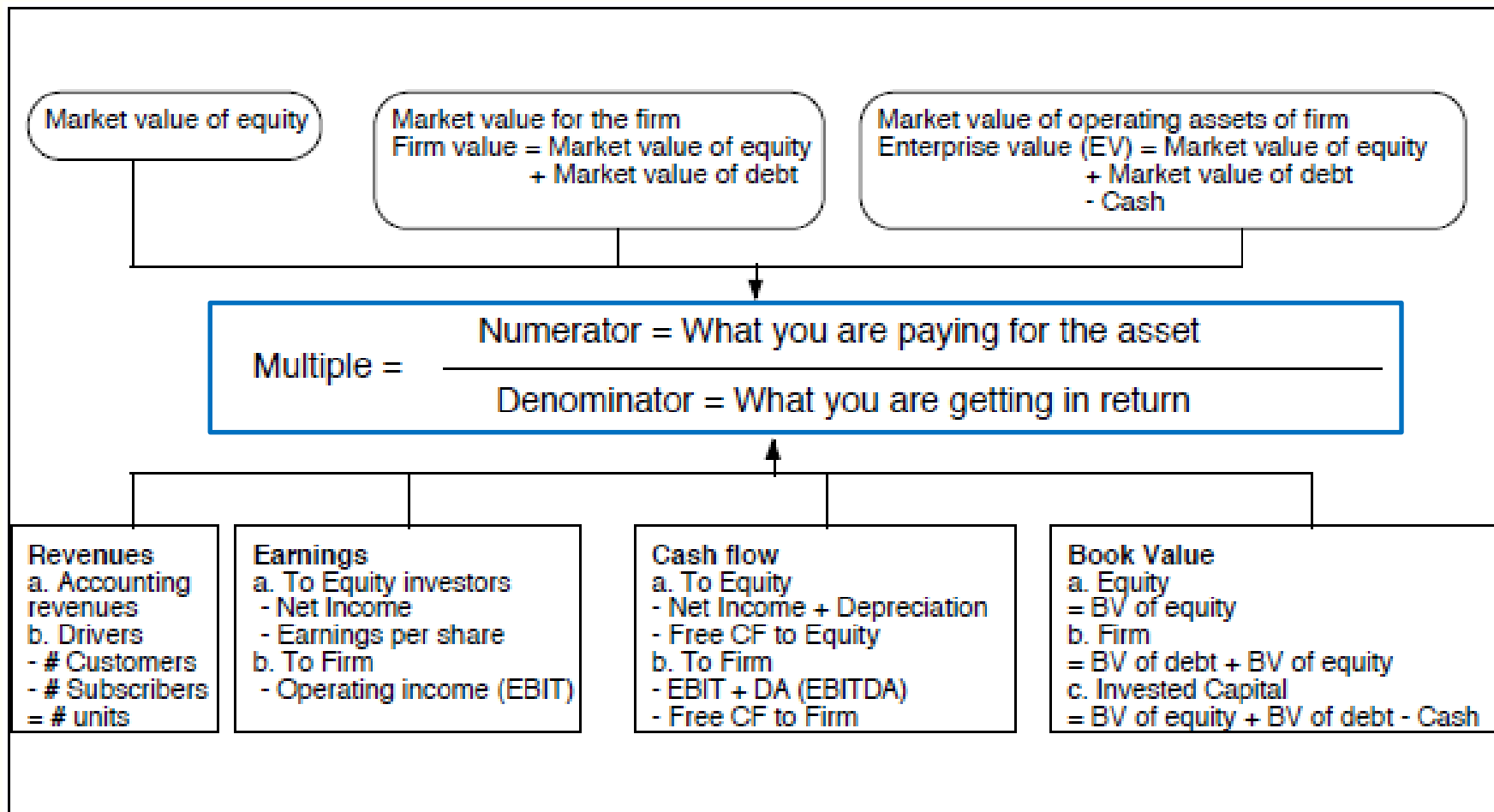
The Essence of Relative Valuation (cont.)

- If we find that an asset is undervalued relative to a comparison assets, we may expect the asset to outperform the comparison assets on a **relative basis**.
- However, **what if the comparison assets not efficiently priced?** The stock may not be undervalued—it could be fairly valued or even overvalued on an absolute basis.



The Standardized Values and Multiples

Multiples are just standardized estimates of price



Method of Comparables

Benchmark Value of the
Multiple Choices

Industry
peers

Industry
or sector
index

Broad
market
index

Firm's
historical
values

Source: Equity Asset Valuation, 3rd edition, Jerald E. Pinto, Elaine Henry, Thomas R. Robinson, John D. Stove, John Wiley & Sons



II-1 PE Ratio: Understanding the Fundamentals

PE = Market Price per Share / Earnings per Share = P / EPS

- **Price** is usually the current price (though some like to use average price over last 6 months or year)
- **EPS:**
 - Time variants:
 - EPS in most **recent financial year (current)**;
 - EPS in **most recent four quarters (trailing)**,
 - EPS expected in **next fiscal year** or **next four quarters** (both called **forward**)
 - EPS in **any future year**
 - **Primary, fully diluted** or **partially diluted** or **weighted average**
 - **Before** or **after extraordinary items** or **normalized**
 - Measured using **different accounting rules**



II-1

Justified (Intrinsic) PE Ratio

- To understand the fundamentals, start with a basic equity discounted cash flow model. With a stable growth dividend discount model:

$$P_0 = \frac{DPS_1}{r - g_n}$$



- Dividing both sides by the **forward** earnings per share (EPS):



DPS1/EPS1

Forward EPS

$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio}_1^* (1 + g_n)}{r - g_n}$$

$$\frac{P_0}{EPS_1} = PE = \frac{\text{Payout Ratio}_1}{r - g_n}$$



* The model assumes stable payout ratio

- We can state the payout ratio as a function of the expected growth rate and return on equity and substituting back into the equation:

$$\text{Forward P/E} = \frac{P_0}{EPS_1} = \frac{\text{Payout Ratio}_s}{k_e - g_s} = \frac{1 - g_s/ROE_s}{k_e - g_s}$$

$$\text{Current P/E} = \text{Forward P/E} \times (1 + g_s)$$

*Current or Trailing EPS = EPS in the past year. Forward EPS = EPS in the coming year.



II-1

Justified Forward & Trailing P/E from Fundamentals (Using GGM to Derive)

Justified Forward (Leading) P/E from Fundamentals

$$V_0 = \frac{D_1}{r - g}$$

$$\frac{P_0}{E_1} = \frac{D_1 / E_1}{r - g}$$

$$\frac{P_0}{E_1} = \frac{1 - b}{r - g}$$

Justified Trailing P/E from Fundamentals

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

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

$$\frac{P_0}{E_0} = \frac{(1 - b)(1 + g)}{r - g}$$

Source: Equity Asset Valuation, 3rd edition, Jerald E. Pinto, Elaine Henry, Thomas R. Robinson, John D. Stove, John Wiley & Sons



- Other things held equal, **higher growth** firms will have **higher PE ratios** than lower growth firms.
- Other things held equal, **higher risk** firms will have **lower PE ratios** than lower risk firms
- Other things held equal, firms with **lower reinvestment** needs will have **higher PE ratios** than firms with higher reinvestment rates.
- Of course, other things are difficult to hold equal since **high growth firms, tend to have risk and high reinvestment rates.**
- For a **no growth firm**, P/E tells number of years it would take for the company to accumulate earnings equal to its share price (**payback period**).



II-1 PE Ratio: The Perfect Undervalued Company

- If you were looking for the **perfect undervalued asset**, it would be one
 - With a **low PE ratio** (it is cheap)
 - With **high expected growth** in earnings
 - With **low risk** (and a low cost of equity)
 - And with **high ROE**
- In other words, **it would be cheap with no good reason for being cheap.**
- In the real world, **most assets that look cheap on a multiple of earnings basis deserve to be cheap.** In other words, one or more of these variables works against the company (It has low growth, high risk or a low ROE).
- When presented with a cheap stock (low PE), here are the key questions:
 - **What is the expected growth in earnings?**
 - **What is the risk in the stock?**
 - **How efficiently does this company generate its growth?**



II-1 Example: Using the Gordon Growth Model to Derive a Justified P/E

Stock price	\$50.00
Trailing earnings per share	\$4.00
Current dividends per share	\$1.60
Dividend growth rate	5.0%
Required return on stock	9.0%

Justified Forward (Leading) P/E

$$\frac{P_0}{E_1} = \frac{1 - b}{r - g}$$

$$\frac{P_0}{E_1} = \frac{1 - b}{r - g}$$

$$\frac{P_0}{E_1} = \frac{\$1.60 / \$4.00}{0.09 - 0.05} = 10.0$$

Justified Trailing P/E

$$\frac{P_0}{E_0} = \frac{(1 - b)(1 + g)}{r - g}$$

$$\frac{P_0}{E_0} = \frac{(\$1.60 / \$4.00)(1.05)}{0.09 - 0.05} = 10.50$$

$$\text{Actual P/E} = \$50.00 / \$4.00 = 12.50$$

Source: Equity Asset Valuation, 3rd edition, Jerald E. Pinto, Elaine Henry, Thomas R. Robinson, John D. Stove, John Wiley & Sons



II-2 Present Value of Growth Opportunities

$$V_0 = \frac{E_1}{r} + \text{PVGO}$$

$$\text{PVGO} = P_0 - \frac{E_1}{r}$$



$$\frac{P_0}{E_1} = \frac{1}{r} + \frac{\text{PVGO}}{E_1}$$

- The no-growth value per share is valued as the **perpetuity of E_1/r** .
- Essentially, we assume that **the market stock price reflects a no-growth value for a firm plus the PVGO (the value of growth)**.
- Firms with greater opportunities and those that have greater flexibility to modify projects through time (referred to as **real options**) will have higher PVGO. The real options allow firms to respond to changes in the marketplace.
- The formula can also be rearranged to solve for the **percent of the P/E related to the PVGO**.



Example: Present Value of Growth Opportunities

Stock price \$80.00

Expected earnings \$5.00

Required return on stock 10%

$$PVGO = P_0 - \frac{E_1}{r}$$

$$PVGO = \$80 - \frac{5}{0.10} = \$30$$

$$\frac{P_0}{E} = \frac{1}{r} + \frac{PVGO}{E}$$

$$\frac{P_0}{E} = \frac{1}{0.10} + \frac{30}{5}$$

$$16 = 10 + 6$$



- The PEG ratio is the ratio of **current price earnings** to **expected growth** in earnings per share.

$$\text{PEG} = \text{Current PE} / \text{Expected Growth Rate in Earnings}$$

- The growth rate used to compute the PEG ratio is the **expected growth** over the **coming year or longer (2 years, 5 years)**.
- Use the **current PE ratio**.
 - **The forward PE ratio should never be used** in this computation, since it may result in a **double counting of growth**.
- **PEG limitations:** assumes linear relationship; does not account for risk; does not account for growth duration



II-3

Example: The PEG Ratio (1)

- Assume that you have a firm with a current price of \$30 and current earnings per share of \$1.50. The firm is expected to **double its earnings per share over the next year** (forward earnings per share will be \$3.00) and then have **earnings growth of 5 percent a year for the following four years**. Calculate a **PEG ratio, using the growth next year and a PEG using average growth during the next five years**.
 - Current PE ratio** = current price/current EPS = $30/1.5 = 20x$
 - PEG₁** = $20/100 = 0.2$
 - Expected earnings growth during the next 5 years =
$$= [(1 + \text{Growth rate}_{\text{year 1}})(1 + \text{Growth rate}_{\text{years 2-5}})^4]^{1/5} - 1$$

$$= [2.00(1.05)^4]^{1/5} - 1 = .1944$$
 - PEG ratio_{5yrs}** = $20/19.44 = 1.02$



Example: The PEG Ratio (2)

PEG Ratios: The Beverage Sector

<i>Company Name</i>	<i>Trailing PE</i>	<i>Expected growth</i> <i>Growth</i>	<i>Std Dev</i>	<i>PEG</i>
Coca-Cola Bottling	29.18	9.50%	20.58%	3.07
Molson Inc. Ltd. 'A'	43.65	15.50%	21.88%	2.82
Anheuser-Busch	24.31	11.00%	22.92%	2.21
Corby Distilleries Ltd.	16.24	7.50%	23.66%	2.16
Chalone Wine Group Ltd.	21.76	14.00%	24.08%	1.55
Andres Wines Ltd. 'A'	8.96	3.50%	24.70%	2.56
Todhunter Int'l	8.94	3.00%	25.74%	2.98
Brown-Forman 'B'	10.07	11.50%	29.43%	0.88
Coors (Adolph) 'B'	23.02	10.00%	29.52%	2.30
PepsiCo, Inc.	33.00	10.50%	31.35%	3.14
Coca-Cola	44.33	19.00%	35.51%	2.33
Boston Beer 'A'	10.59	17.13%	39.58%	0.62
Whitman Corp.	25.19	11.50%	44.26%	2.19
Mondavi (Robert) 'A'	16.47	14.00%	45.84%	1.18
Coca-Cola Enterprises	37.14	27.00%	51.34%	1.38
Hansen Natural Corp	9.70	17.00%	62.45%	0.57
Average	22.66	13.00%	33.00%	2.00

Which stock is the most under-valued stock? Why?



II-3 Example: The PEG Ratio (2) (cont.)

- The average PEG ratio for the beverage sector is 2.00.
- The **lowest PEG ratio** in the group belongs to **Hansen Natural**, which has a **PEG ratio of 0.57**. Using this measure of value, Hansen Natural is the **most under valued stock** in the group
- **What other explanation could there be for Hansen's low PEG ratio?**



- **The earnings yield is the inverse of the P/E ratio.**
- The earnings yield shows the **percentage of each dollar invested in the stock that was earned** by the equity holders' of the company. It is used by many investment managers to determine **optimal asset allocations**.

$$\text{Earnings yield (\%)} = \text{EPS/share price} = 1/(\text{PE ratio})$$



How does the earnings yield be comparable to ROE?

- Earnings yield can be calculated based on the **current EPS** or **forward EPS**.



- **Dividend yield** is calculated by dividing the **annual dividend per share (DPS)** by the **price per share** or the **annual dividend** by the **market cap**. It can also be obtained by **multiplying earnings yield** by the **dividend payout ratio**.

$$\text{Dividend yield (\%)} = \text{DPS/share price} = \text{Earnings yield} * \text{Dividend payout ratio}$$

- Dividend yield can be calculated based on the **current** DPS or **forward** DPS.

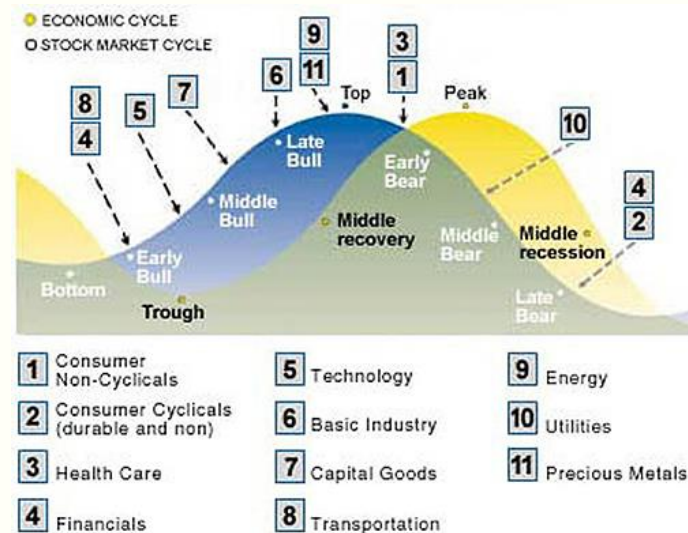


II-4 Example: Earnings Yield and Dividend Yield

- Assume that you have a firm with a current PE ratio of 10 times and a dividend payout ratio in the current year of 50%. Calculate **current year earnings yield and dividend yield** for the company.
- If the company has a stable growth rate of earnings per share and dividend per share of 5% and a stable dividend payout ratio of 50%, calculate **forward earnings yield forward dividend yield**.
 - Current earnings yield = $1/10 = 10\%$
 - Current dividend yield = $10\% * .5 = 5\%$
 - Forward PE ratio = $10/1.05 = 9.52$
 - Forward earnings yield = $1/9.52 = 10.5\%$
 - Forward dividend yield = $10.5\% * .5 = 5.25\%$



- **A countercyclical property of PEs** known as the **Molodovsky effect**. Named after Nicholas Molodovsky who wrote on this in the 1950s.
- For a cyclical company, **trailing earnings per share (EPS)** are often **depressed or negative at the bottom of the cycle** and unusually **high at the top of the cycle**.
- Empirically, PEs for cyclical companies are often **highly volatile over a cycle without any change in business prospects**: **high PEs on depressed EPS at the bottom of the cycle** and **low PEs on unusually high EPS at the top of the cycle**.
- **Normalized EPS** can be used to create **a normalized PE**.



Enterprise Value to EBITDA Multiple Definitions

- The enterprise value (EV) to EBITDA multiple is a **firm value multiple**.
- EV/EBITDA ratio looks at the **market value of the operating assets** of the firm (**Enterprise value or EV**) relative to **operating earnings or pre-debt earnings (EBITDA)**.

$$\text{EV/EBITDA ratio} = \text{Enterprise value (or EV)} / \text{EBITDA}$$

$$\text{EV} = \text{Market value of equity} + \text{Market value of debt} - \text{Cash \& marketable sec.}$$

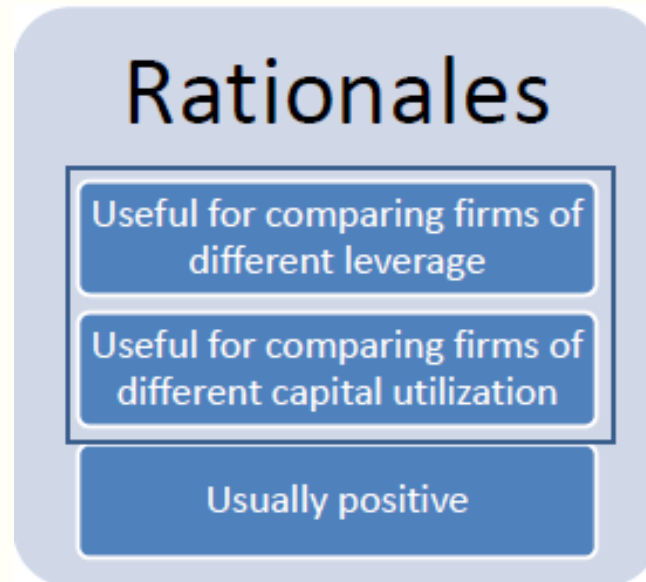
$$\text{EBITDA} = \text{EBIT} + \text{Depreciation and Amortization}$$

** Since cash & marketable securities is netting out of the EV, interest income from the cash is not counted as part of the EBITDA.

- **Enterprise value (EV):** **Cash and marketable securities** are not considered as parts of operating assets and an enterprise value is viewed as the value of the firm's operating assets. As a result, the EV does not include the value of cash and marketable securities.
- **Firm value:** If cash and marketable securities are netting out of firm value, interest income from the cash and marketable securities is not counted as part of the EBIT.



Enterprise Value/EBITDA Multiple Rationales



- EV/EBITDA multiple can be compared (firm value relative to earnings) across firms with different financial leverage
- EV/EBITDA multiple is particularly useful for firms in sectors that require large investments (capital intensive sectors) with long gestation periods.
 - Companies in capital intensive industries are likely to report negative earnings per share (EPS) during the start-up period of their investments due to large depreciation expenses.
 - Differences in depreciation methods across different companies can cause differences in operating income or net income but will not affect EBITDA.





Enterprise Value/EBITDA Multiple Rationales (cont.)

- This multiple can be compared (firm value relative to earnings) across firms with **different financial leverage**
- EV/EBITDA multiple is particularly useful for firms in sectors that require **large investments (capital intensive sectors)** in infrastructure with long gestation periods. Telecom companies or energy and petrochemical companies would be good examples.
 - Companies in capital intensive industries are likely to report **negative earnings per share (EPS) during the start-up period** of their investments due to **large depreciation expenses**.
 - **Differences in depreciation methods** across different companies can cause differences in operating income or net income but will not affect EBITDA.



Issues in Using Enterprise Value Multiples

$EV = \text{Market value of stock} + \text{Debt} - \text{Cash} - \text{Investments}$

Justified EV/EBITDA

- Positively related to FCFF growth
- Positively related to ROIC
- Negatively related to WACC

Comparables May Use Total Invested Capital

Other EV Multiples

- EV/FCFF
- EV/EBITA
- EV/EBIT
- EV/S



Price-to-Book Value Multiple Definitions

$$P/BV = \text{Market Price per Share} / \text{BV per Share}$$

or

$$P/BV = \text{Market Value of Equity} / \text{Book Value of Equity}$$

Market value of Equity is the market capitalization of the stock:

$$\text{Market Capitalization of the Stock} = \text{Market Price per Share} \\ \times \text{Number of Shares}$$



IV

Intrinsic P/BV Ratio

- With a stable growth dividend discount model:

$$P_0 = \frac{D_1}{(k-g_1)} \quad , \text{and} \quad ROE_0 = \frac{EPS_0}{BV_0}$$

$$P_0 = \frac{BV_0 * ROE_0 * \text{Payout ratio}_0 * (1+g_1)}{(k-g_1)}$$

$$\frac{P_0}{BV_0} = \frac{ROE_0 * \text{Payout ratio}_0 * (1+g_1)}{(k-g_1)}$$

If the return on equity is based upon expected earnings in the next time period:

$$\frac{P_0}{BV_0} = \frac{ROE_1 * \text{Payout ratio}_0}{(k-g_1)}$$

, with

$$g_1 = (1 - \text{Payout ratio}_0) * ROE_1$$

$$\frac{P_0}{BV_0} = \frac{(ROE_1 - g_1)}{(k - g_1)}$$

What will be the P/BV if ROE = k?



IV

Concept Check: Intrinsic P/BV Ratio

- What will be the P/BV ratio if:
 - Earning power of the asset has increased since its acquisition?
 - Earning power of the asset has declined since its acquisition?
 - Earning power of the asset remains stable since its acquisition?



IV

Example: Intrinsic P/BV Ratio

- Vodafone paid out 4,468 million BP in dividends on net income of 7,968 million BP in 2010, giving it a payout ratio of 55.82% ($=4,468/7,968$).
- Based on its book value of equity of 90,810 million BP at the end of 2009, the return on equity (ROE) generated by the firm in 2010 was 8.77% ($=7,968/90,810$).
- The expected growth rate, based on maintaining this payout ratio and ROE, is 3.88% ($=(1-55.82%)*8.77%$), which we will assume is the growth rate forever.
- To estimate the cost of equity, we will use the risk-free rate in British pounds (4%), an equity risk premium of 5%, assume a beta of 1 for the company: Cost of equity = 4% + 1(5%) = 9%.

- Two ways we estimate the price-to-book ratio for the firm:

$$P/BV = (ROE \times \text{Payout ratio}) / (k-g) = (8.77\% \times 55.82\%) / (9\% / 3.88\%)$$

or = 0.96

$$P/BV = (ROE - g) / (k-g) = (8.77\% - 3.88\%) / (9\% - 3.88\%) = 0.96$$

Why the stock is expected to trade at slightly below BV?

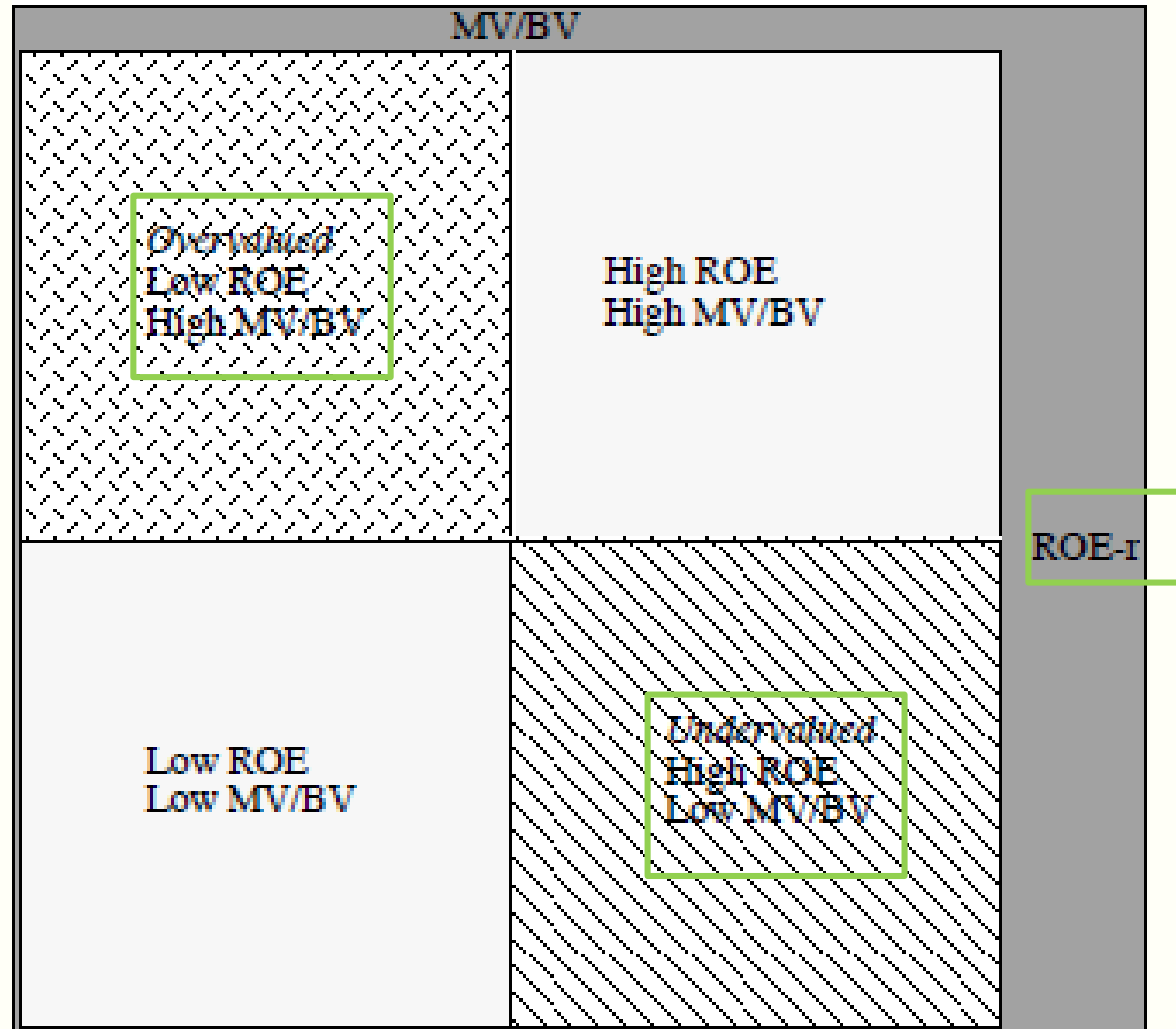


IV P/BV Ratio: The Perfect Undervalued Company

- Given the relationship between price-book value ratios and returns on equity, the firms which should draw attention from investors are those which provide **mismatches of price-book value ratios and returns on equity - low P/BV ratios and high ROE or high P/BV ratios and low ROE.**
- We are looking for stocks that trade at **low price to book ratios, while generating high returns on equity, with low risk.**

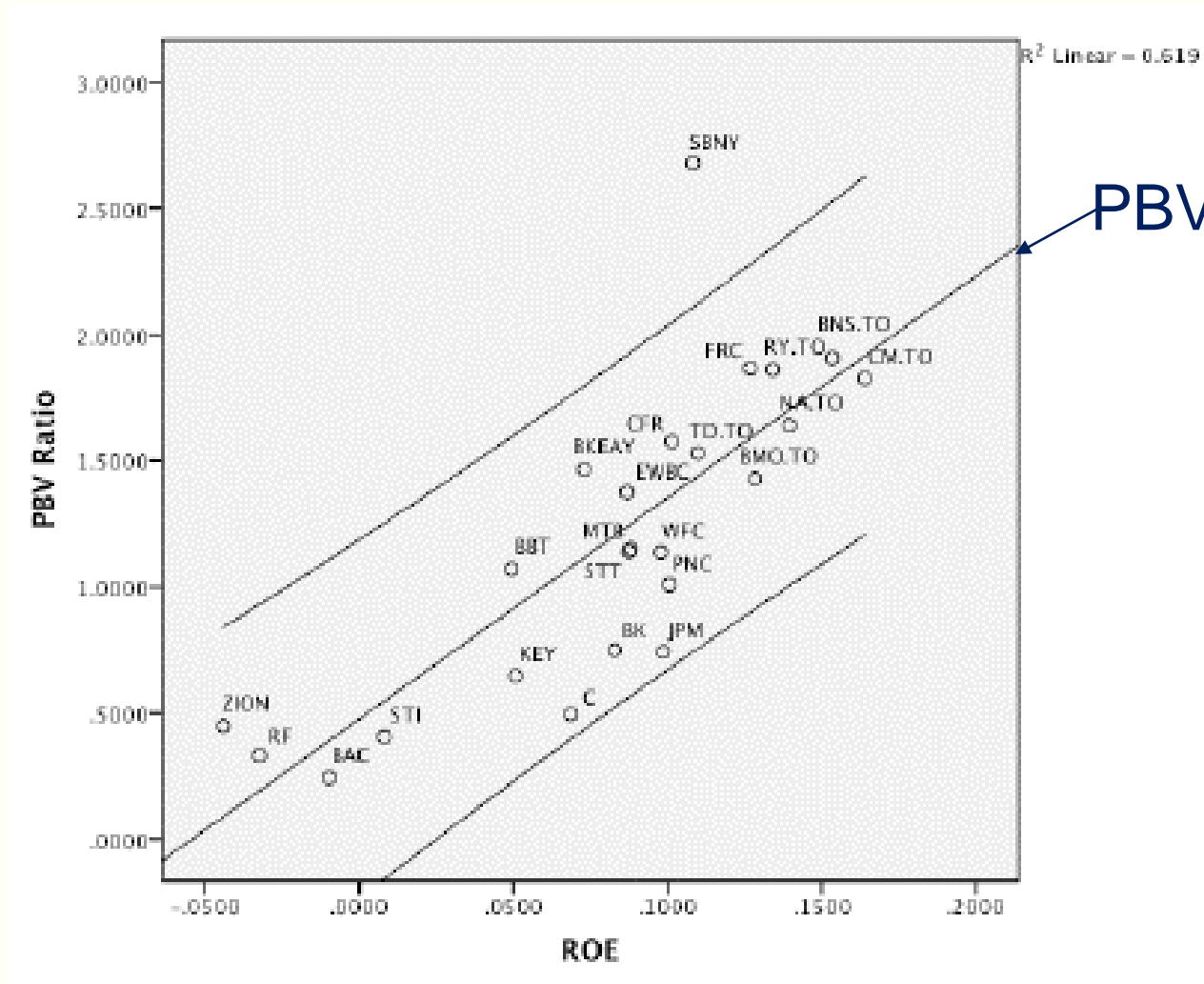


IV P/BV Ratio: The Valuation Matrix



IV P/BV Ratio: Price to Book vs ROE

U.S. Banks in January 2012



$PBV = a + b ROE$



Price-to-Sales Multiple Rationales

Sales Less Easily Manipulated

Sales Are Always Positive

P/S Appropriate For Mature, Cyclical, and Distressed Firms

P/S More Stable Than P/E

Can Explain Stock Returns

Empirical research finds that differences in the P/S are significantly related to differences in long-term stock returns.

* Comparing P/S ratios carries the implicit assumption that all firms in the comparison have an identical **operating profit margin** and **capital structure**.



Price-to-Sales Multiple Drawbacks

Sales \neq Earnings and Cash Flow

Numerator and Denominator Not Consistent

P/S Does Not Reflect Cost Differences

P/S Can Be Misleading Because of Accounting Practices

Stock prices are net the cost of debt (interest expense). However, sales is a pre-debt (pre-interest expense) figure, so the P/S numerator and denominator are not consistent. For this reason, some analysts prefer the enterprise-value-to-sales ratio because enterprise value incorporates debt value.



Sector-Specific Multiples

- Sector-specific multiples vary from sector to sector. In general, though, they share some general characteristics:
 - The **numerator** is usually **enterprise value**—the market values of both debt and equity netted out against cash and marketable securities.
 - The **denominator** is defined in terms of the **operating units that generate revenues and profits** for the firm (i.e. the **key earnings drivers of the firm**).
- For example:
 - The value of **steel companies** can be compared based on **market value per ton of steel produced**.
 - The value of **electricity generators** can be computed on the basis of **kilowatt hour (kwh) of power** produced.
 - The value of new technology firms can be compared based on multiples that range from **value per subscriber for online service** providers to **value per web site visitor for Internet portals** to **value per member for social media companies**.



VI

Sector-Specific Multiples: Understanding the Fundamentals

- In each of the cases we have discussed, the underlying reason that we use a sector-specific multiple is because **the units** (whether they be barrels of oil, kwh "of electricity, or subscribers) **generate similar revenues**, i.e. **the units used to scale value are homogeneous**.
- Sector multiples become much more problematic when the units used to scale value are not homogeneous.



Assignments:

Damodaran, A., 2012, Investment Valuation: Tools and Techniques for Determining the Value of any Asset, 3rd Edition

- Read Chapter 17 – Fundamental Principles of Relative Valuation (pages 453 – 455, 460-461), Chapter 18 – Earnings Multiples (pages 470 – 471, 487 – 488, 500 – 501), Chapter 19 – Book Value Multiples (pages 511 – 516), Chapter 20 (pages 571 - 573)

