

# Equity Valuation Models

# Valuation by Comparables

- FA
  - Identification of mispriced stocks
    - Relative to some „true value“
      - Derived from financial data
  - <http://www.sec.gov/edgar.shtml>
    - All public companies
      - Except foreign companies and companies with less than \$10 million in assets and 500 shareholders

# Table 18.1 Financial Highlights for Microsoft Corporation, March 8, 2006

**TABLE 18.1**

Financial highlights for Microsoft Corporation, March 8, 2006

Current Qtr Ended: Dec. 2005		Current Year Ended: Jun. 2005	
<b>Miscellaneous</b>			
Current price	26.910000	Comn sharehldrs (actual)	149668
Comn shares outstdg (mil)	10384.000	Employees (actual)	61000
Market capitalization (mil)	279433.440	S&P issuer credit rating	
<b>Latest 12 Months</b>	<b>Company</b>	<b>1 Yr Chng (%)</b>	
Sales (mil)	41359.000	7.5	
EBITDA (mil)	17935.000	8.1	
Net income (mil)	13057.000	30.6	
EPS from ops	1.25	12.6	
Dividends/share	0.320000	-89.9	
<b>Valuation</b>	<b>Company</b>	<b>Industry Avg</b>	
Price/EPS from ops	21.5		
Price/book	6.3	4.1	
Price/sales	6.8	6.0	
Price/cash flow	19.8	18.8	
<b>Profitability (%)</b>			
Return on equity	29.5	18.5	
Return on assets	19.4	12.1	
Oper profit margin	40.9	37.8	
Net profit margin	31.6	27.6	
<b>Financial Risk</b>			
Debt/equity		5.8	
Cash flow/share	1.4	27.5	
Interest coverage		98.9	

Source: COMPUSTAT Company Profiles, March 8, 2006. Copyright © 2006 Standard & Poor's, a division of the McGraw-Hill Companies, Inc. All rights reserved.

# Models of Equity Valuation

- Balance Sheet Models
  - Book Value
- Dividend Discount Models
- Price/Earning Ratios

# Limitations of Book Value

- Book value is an application of arbitrary accounting rules
- Can book value represent a floor value?
- Better approaches
  - Liquidation value
    - Amount of money that can be realized when company breaking up
  - Replacement cost
    - Assets less liabilities
    - **Tobin's q**

# Intrinsic Value and Market Price

- Intrinsic Value
  - Self assigned Value
  - Variety of models are used for estimation
- Market Price
  - Consensus value of all potential traders
- Trading Signal
  - $IV > MP$  Buy
  - $IV < MP$  Sell or Short Sell
  - $IV = MP$  Hold or Fairly Priced

- **Assessing value**
  - Return of cash dividends and capital gains or losses
  - ABC company
    - 1-year holding period
    - Exp. Dividends per share 4
    - Current price per share 48
    - Price at the end of year 52
    - Expected holding-period return
      - 16.7 %
    - ??? Required rate of return
      - E.g. CAPM model
- **Compare intrinsic value with market price**
  - Alfa factor

# Dividend Discount Models: General Model

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

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

$V_0$  = Value of Stock

$D_t$  = Dividend

$k$  = required return



# No Growth Model

$$V_0 = \frac{D}{k}$$

Stocks that have earnings and dividends that are expected to remain constant.

Preferred Stock

# No Growth Model: Example

$$V_0 = \frac{D}{k}$$

$$E_1 = D_1 = \$5.00$$

$$k = .15$$

$$V_0 = \$5.00 / .15 = \$33.33$$

# Constant Growth Model

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

$g$  = constant perpetual growth rate

# Constant Growth Model: Example

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

$$E_1 = \$5.00 \quad b = 40\% \quad k = 15\%$$

$$(1-b) = 60\% \quad D_1 = \$3.00 \quad g = 8\%$$

$$V_0 = 3.00 / (.15 - .08) = \$42.86$$

# Specified Holding Period Model

$$V_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} \dots + \frac{D_N + P_N}{(1+k)^N}$$

$P_N$  = the expected sales price for the stock at time  $N$

$N$  = the specified number of years the stock is expected to be held

# Stock Prices and Investment Opportunities

- $p$ : dividend payment ratio
- $b$ : earning retention ratio
  - Plowback ratio
- $p + b = 1$  or  $p + b = 100$
- Low reinvestment plan
- High reinvestment plan
  - ROE
- PVGO present value of growth opportunities
  - $P_0 = \text{No-growth value per share} + \text{PVGO}$ 
    - $\text{ROE} > k$

# Estimating Dividend Growth Rates

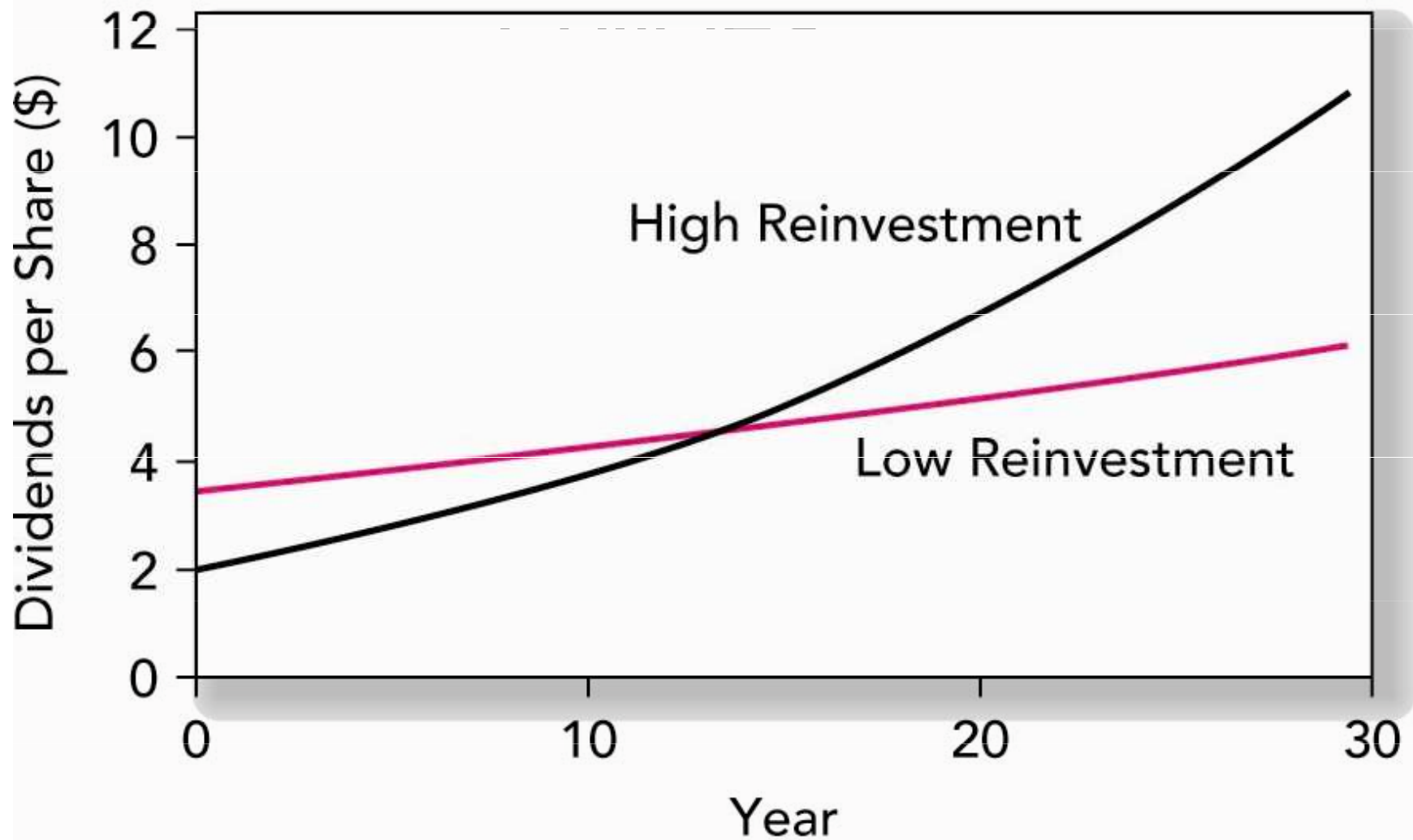
$$g = ROE \times b$$

$g$  = growth rate in dividends

$ROE$  = Return on Equity for the firm

$b$  = plowback or retention percentage rate  
(1- dividend payout percentage rate)

# Figure 18.1 Dividend Growth for Two Earnings Reinvestment





# Partitioning Value: Example

$$\text{ROE} = 20\% \quad d = 60\% \quad b = 40\%$$

$$E_1 = \$5.00 \quad D_1 = \$3.00 \quad k = 15\%$$

$$g = .20 \times .40 = .08 \text{ or } 8\%$$

# Partitioning Value: Example

$$V_o = \frac{3}{(.15 - .08)} = \$42.86$$

$$NGV_o = \frac{5}{.15} = \$33.33$$

$$PVGO = \$42.86 - \$33.33 = \$9.52$$

**$V_o$  = value with growth**

**$NGV_o$  = no growth component value**

**$PVGO$  = Present Value of Growth Opportunities**

# Life Cycle and Multistage Growth Models

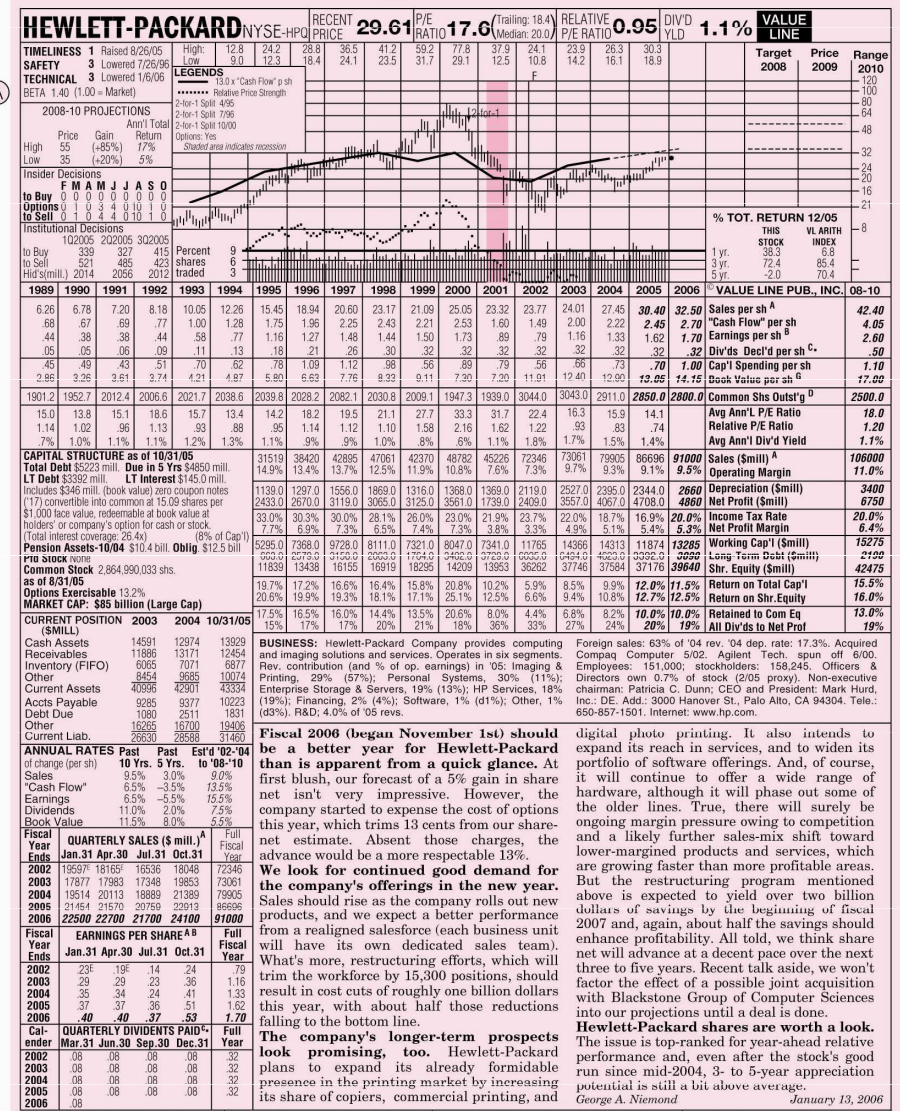
- $g$  - constant forever
  - Different dividend profiles

# Table 18.2 Financial Ratios in Two Industries

	Return on Assets	Payout Ratio	Growth Rate 2005–2008
<b>Computer Software</b>			
Adobe Systems	21.5%	1.0%	8.2%
Cognizant	19.0	0.0	22.8
Compuware	10.5	0.0	17.6
Intuit	19.0	0.0	8.0
Microsoft	31.5	35.0	15.4
Novell	8.5	0.0	51.8
Oracle	33.0	0.0	18.6
Red Hat	17.0	0.0	17.6
Parametric Tech	20.0	0.0	33.9
SAP	22.5	18.0	13.8
<i>Median</i>	19.5%	0.0	17.6%
<b>Electric Utilities</b>			
Central Hudson G&E	6.0%	78.0%	5.1%
Central Vermont	7.5	60.0	8.0
Consolidated Edison	5.0	75.0	1.0
Duquesne Light	8.0	85.0	7.7
Energy East	6.0	74.0	4.1
Northeast Utilities	5.0	59.0	14.0
Nstar	8.5	61.0	3.2
Pennsylvania Power	11.0	52.0	9.3
Public Services Enter.	7.0	62.0	1.7
United Illuminating	5.0	113.0	1.3
<i>Median</i>	6.5%	68.0%	4.6%

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# Figure 18.2 Value Line Investment Survey Report on Hewlett Packard



(A) Fiscal year ends Oct. 31st. (B) Weighted average through '93, then diluted. Quarters may not add to total. Excludes nonrecurring losses: '92, '92c; '95, '96, '99, '10. (C) Dividends historically paid in early January, April, July and October. (D) In millions, adjusted for splits. (E) Restated. (F) Compaq acquired 5/02 (G) Includes intangibles. © 2006 Value Line Publishing, Inc. All rights reserved. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product. To subscribe call 1-800-833-0046.

# Price Earnings Ratios

- P/E Ratios are a function of two factors
  - Required Rates of Return ( $k$ )
  - Expected growth in Dividends
- Uses
  - Relative valuation
  - Extensive Use in industry

# P/E Ratio: No Expected Growth

$$P_0 = \frac{E_1}{k}$$

$$\frac{P_0}{E_1} = \frac{1}{k}$$

- $E_1$  - expected earnings for next year
  - $E_1$  is equal to  $D_1$  under no growth
- $k$  - required rate of return

# P/E Ratio with Constant Growth

$$P_0 = \frac{D_1}{k - g} = \frac{E_1(1 - b)}{k - (b \times ROE)}$$

$$\frac{P_0}{E_1} = \frac{1 - b}{k - (b \times ROE)}$$

b = retention ratio

ROE = Return on Equity



# Numerical Example: No Growth

$$E_0 = \$2.50 \quad g = 0 \quad k = 12.5\%$$

$$P_0 = D/k = \$2.50/.125 = \$20.00$$

$$PE = 1/k = 1/.125 = 8$$

# Numerical Example with Growth

$$b = 60\% \quad \text{ROE} = 15\% \quad (1-b) = 40\%$$

$$E_1 = \$2.50 (1 + (.6)(.15)) = \$2.73$$

$$D_1 = \$2.73 (1-.6) = \$1.09$$

$$k = 12.5\% \quad g = 9\%$$

$$P_0 = 1.09 / (.125 - .09) = \$31.14$$

$$\text{PE} = 31.14 / 2.73 = 11.4$$

$$\text{PE} = (1 - .60) / (.125 - .09) = 11.4$$

# Table 18.3 Effect of ROE and Plowback on Growth and the P/E Ratio

**TABLE 18.3**

Effect of ROE and plowback on growth and the P/E ratio

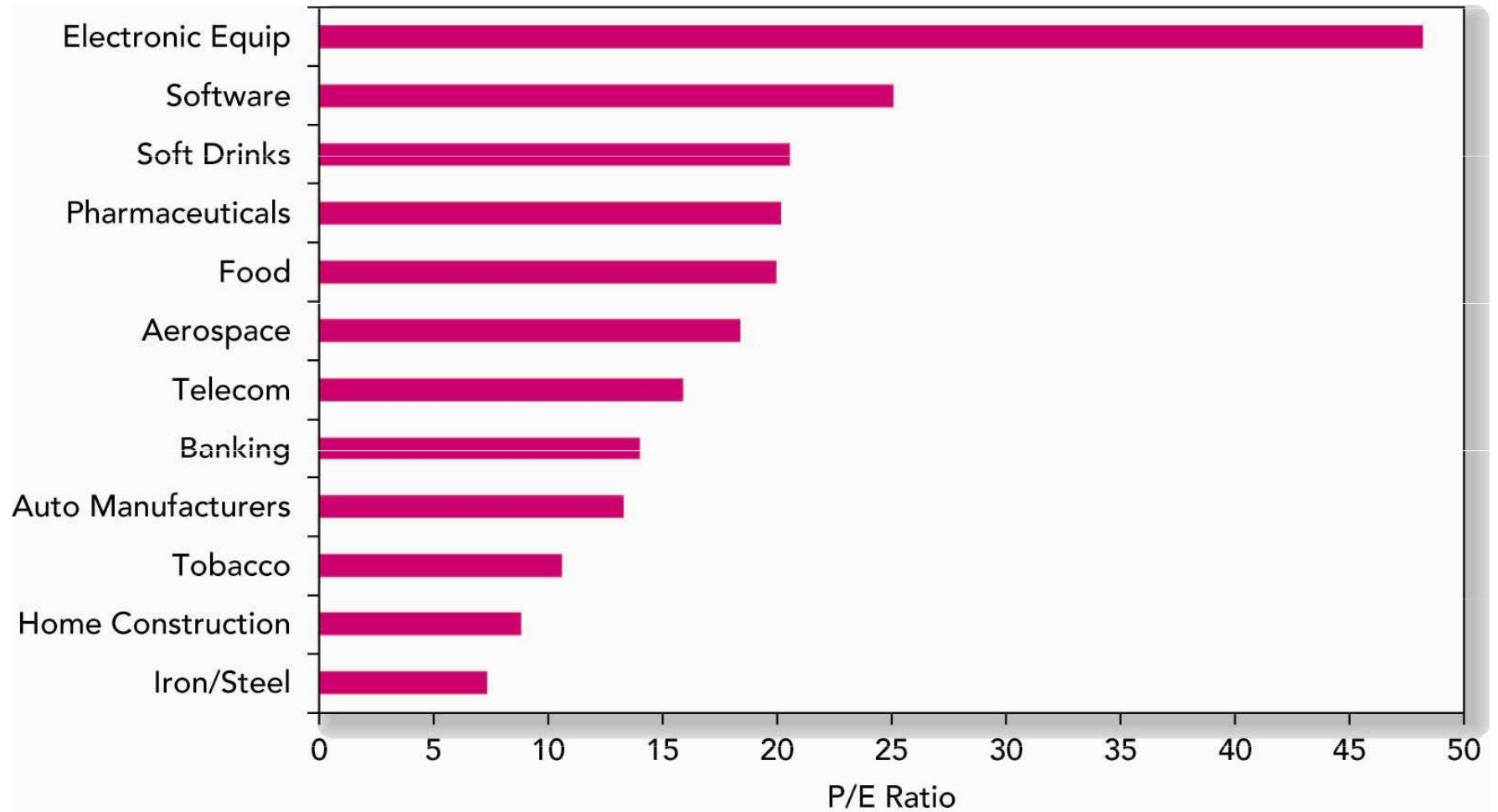
ROE	Plowback Rate ( <i>b</i> )			
	0	.25	.50	.75
<b>A. Growth rate, <i>g</i></b>				
10%	0	2.5%	5.0%	7.5%
12	0	3.0	6.0	9.0
14	0	3.5	7.0	10.5
<b>B. P/E ratio</b>				
10%	8.33	7.89	7.14	5.56
12	8.33	8.33	8.33	8.33
14	8.33	8.82	10.00	16.67

Assumption:  $k = 12\%$  per year.

# Pitfalls in P/E Analysis

- Use of accounting earnings
  - Earnings Management
  - Choices on GAAP
- Inflation
- Reported earnings fluctuate around the business cycle.

# Figure 18.6 P/E Ratios for Different Industries, 2006



# Other Comparative Value Approaches

- Price-to-book ratio
- Price-to-sales ratio
- Price-to-cash-flow ratio

# Figure 18.7 Market Valuation Statistics

