## Chapter 12: Basics of Valuation

Problem 1

a. False. We can use it to value the firm by looking at the dividends that will be paid after the high growth period ends.

b. False. There is no built-in conservatism in the model. The value generated depends on the assumptions made regarding the growth rate and the required rate of return on equity.

c.False. This will be true if the stock market drop is not supported by a change in the fundamentals.

d. True. Portfolios of stocks that are undervalued using the dividend discount model seem to earn excess returns over long time periods.

e. True. The model is biased towards these stocks because of its emphasis on dividends.

Problem 2

The cost of equity = .0625+0.9(.055) = 11.2%

$$Price = \frac{3.56(1.055)}{0.112 - 0.055} = 65.89$$

$$Price = \frac{3.56(1+g)}{0.112 - g} = 80$$; Solving, we find g = 6.46%

Problem 3

a. This would suggest a higher growth rate

b. This would also suggest a higher growth rate, since the nominal growth = real growth rate + inflation rate.

c. The stable growth rate would not be affected, but the length of the high-growth period would be greater.

d. The stable growth rate would not be affected, but the growth rate in the high-growth period would probably go up.

Problem 4

The expected rate of return on equity after 1998 = 0.0625 + 1.1(0.055) = 12.3%

The dividends from 1993 onwards can be estimated as:

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| Earnings | 2.1 | 2.415 | 2.78 | 3.19 | 3.67 | 4.22 | 4.48 |
| Dividends | 0.69 | 0.794 | 0.913 | 1.048 | 1.206 | 1.387 | 2.91 |
| PV of dividends | | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | |

a. The price as of 1998 = 2.91/(.123-.06) = $46.19

b. The required rate of return upto 1998 = .0625+1.4(0.055) = 13.95%. The dividends upto 1998 are discounted using this rate. The current price = $5(0.70) + 46.19/(1.1395)^5$ = $27.54.

Problem 5

a. The payout ratio = 0.42/1.50 = 28% for 1993. The retention ratio = 1-0.28 = 72%. The Return on capital = EBIT(1-tax rate)/Book Value of Assets = (30-0.8)(1-0.385)/(7.6+160) = 10.71%.
The return on equity = 30/160 = 18.75%
Hence, the estimated growth rate in earnings = 0.72(.1875) = 13.5%
b. If the growth rate approaches 6% after 1998, and the return on assets approaches the industry average of 12.5%, then the payout ratio must approach = 1 - g/[ROA + D/E (ROA - i (1-tax rate))] = = 1 - .06/(.125+.25(.125 - .07(1-.385)) = 58.76%.
c. The expected beta after 1998 is related to the leverage ratio at that time. The current unlevered beta = 0.85/(1+(1-0.385)(0.05)) = 0.82. If the firm's leverage ratio approaches the industry average, and the unlevered beta remains constant, the levered beta will become 0.82(1+(1-0.385)(0.25)) = 0.95.
d. The required rate of return at that point would be 0.07 + 0.95(0.055) = 12.23%, assuming that the best estimate of the T-bond rate in 1998 is 0.07. The stock price at that time would then be $1.5(1.135)^5(1.06)(0.5876)/(0.1223-0.06) = \$28.25$.
e. The required rate of return at this time = 0.07 + 0.85(0.055) = 11.68%

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| Earnings | 1.5 | 1.61565 | 1.740217 | 1.874387 | 2.018903 | 2.17456 | 2.305034 |
| Dividends | 0.42 | 0.452382 | 0.487261 | 0.524828 | 0.565293 | 0.608877 | 1.198617 |
| Present value of dividends | | 0.405687 | 0.391863 | 0.378509 | 0.36561 | 0.353151 | |

Value per share using the Gordon Growth model = \$1.50(1.06)(0.5876)/(.1223 - .06) = \$15.00
Value Per Share With No Growth = \$1.50(0.5876)/.1223 = \$7.21
Value of Extraordinary Growth = \$18.47 - \$15.00 = \$3.47
Value of Stable Growth = \$15.00 - \$7.21 = \$7.79

Problem 6.

| Stage | Year | Growth rate in earnings | Payout ratio | Earnings | Dividends | Beta | Rate of return on equity |
|---|---|---|---|---|---|---|---|
| | 1993 | | | 3.95 | 0.68 | | |
| Growth | 1994 | 0.16 | 0.172152 | 4.582 | 0.7888 | 1.25 | 0.13125 |
| Growth | 1995 | 0.16 | 0.172152 | 5.31512 | 0.915008 | 1.25 | 1.13125 |
| Growth | 1996 | 0.16 | 0.172152 | 6.165539 | 1.061409 | 1.25 | 0.13125 |
| Growth | 1997 | 0.16 | 0.172152 | 7.152025 | 1.231235 | 1.25 | 0.13125 |
| Growth | 1998 | 0.16 | 0.172152 | 8.29635 | 1.428232 | 1.25 | 0.13125 |
| Transition | 1999 | 0.14 | 0.257722 | 9.457838 | 2.437489 | 1.2 | 0.1285 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Transition | 2000 | 0.12 | 0.343291 | 10.59278 | 3.636407 | 1.15 | 0.12575 |
| Transition | 2001 | 0.1 | 0.428861 | 11.65206 | 4.99711 | 1.1 | 0.123 |
| Transition | 2002 | 0.08 | 0.51443 | 12.58422 | 6.473706 | 1.05 | 0.12025 |
| Stable | 2003 | 0.06 | 0.6 | 13.33927 | 8.003565 | 1 | 0.1175 |
| Stable | 2004 | 0.06 | 0.6 | 14.13963 | 8.483779 | 1 | 0.1175 |

The share price at the end of 2003 = 8.48/(.1175 - .06) = $147.48
The share value today (at the end of 1993) equals the present value of all the dividends plus the present value of the share price at the end of 2003 = 12.77 + PV(Share price in 2003) = $ 57.36.
PV of price in 10 years = $147.48/$(1.13125)^5$ (1.1285)(1.12575)(1.123)1.12025)(1.1175)

Problem 7
a. The required rate of return on equity = 0.0625 + 1.05(0.055) = 12.025%
The DPS for 1993 is 1.70. Hence the price using the dividend discount model = 1.70(1.07)/(.12025-0.07) = 36.20.
b. The current debt to capital ratio = 1600/(160x51+1600) = 0.1639
The FCFE per share for 1993 = Net Income + (1-δ)(Capital Expenditures - Depreciation) + (1-δ)ΔWorking Capital) = 3.20 - (1-0.1639)(475-315)/160 =$2.36.
The estimated growth rate is the same. Hence the price per share = 2.36*1.07/(.12025-0.07) = $50.20.
c. The difference between the two prices is the value of control, or the additional value that could be realized if the firm were better run. Assuming that the probability of takeover is high, I would use the price based on the FCFE. However, if there were a lot of legal constraints on a takeover, the price based on dividends would be more appropriate.

Problem 8
Required rate of return on equity = 0.065 + 1(0.055) = 0.12
a. If Capital expenditures offset depreciation in stable growth

| Year | EPS | Cap Exp | Depr | D WC | FCFE | Term Price |
|---|---|---|---|---|---|---|
| 1 | $2.71 | $2.60 | $1.30 | $0.05 | $1.64 | |
| 2 | $3.13 | $3.00 | $1.50 | $0.05 | $1.89 | |
| 3 | $3.62 | $3.47 | $1.73 | $0.05 | $2.19 | |
| 4 | $4.18 | $4.00 | $2.00 | $0.06 | $2.54 | |
| 5 | $4.83 | $4.62 | $2.31 | $0.06 | $2.93 | $84.74 |
| 6 | $5.12 | $4.90 | $4.90 | $0.04 | $5.08 | |

Present Value of FCFE for next 5 years = $ 7.71
Present Value of Terminal Price = $ 84.74/$1.12^5$ = $ 48.10
Total Value per share = $ 55.91

b. If Cap Expenditures continue to be twice depreciation in stable growth

| Year | EPS | Cap Exp | Depr | ΔWC | FCFE | Term Price |
|---|---|---|---|---|---|---|
| 1 | $2.71 | $2.60 | $1.30 | $0.05 | $1.64 | |
| 2 | $3.13 | $3.00 | $1.50 | $0.05 | $1.89 | |
| 3 | $3.62 | $3.47 | $1.73 | $0.05 | $2.19 | |
| 4 | $4.18 | $4.00 | $2.00 | $0.06 | $2.54 | |
| 5 | $4.83 | $4.62 | $2.31 | $0.06 | $2.93 | $52.09 |
| 6 | $5.12 | $4.90 | $2.45 | $0.04 | $3.13 | |

PV(FCFE upto 1998) = 7.81

PV of Terminal Price = $ 29.56

Value per Share = $ 37.36

a. The free cash flows to equity every year would be lower:

Since the debt ratio is lower, the firm should have a lower beta and cost of equity.

| Year | EPS | Cap Exp | Depr | Chg WC | FCFE | Term Price |
|---|---|---|---|---|---|---|
| 1 | $2.71 | $2.60 | $1.30 | $0.05 | $1.43 | |
| 2 | $3.13 | $3.00 | $1.50 | $0.05 | $1.66 | |
| 3 | $3.62 | $3.47 | $1.73 | $0.05 | $1.92 | |
| 4 | $4.18 | $4.00 | $2.00 | $0.06 | $2.23 | |
| 5 | $4.83 | $4.62 | $2.31 | $0.06 | $2.58 | $45.85 |
| 6 | $5.12 | $4.90 | $2.45 | $0.04 | $2.75 | |

If we used the same beta, the value of equity would be:
Present Value Per Share = $1.43/1.12 + 1.66/1.12^2 + 1.92/1.12^3 + 2.23/1.12^4 + (2.58 + 45.85)/1.12^5$ = $32.87

Problem 9
a.

| Year | EPS | Cap Ex | Deprec'n | Change in WC | FCFE | Terminal Price |
|---|---|---|---|---|---|---|
| 1 | $2.30 | $0.68 | $0.33 | $0.45 | $1.57 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | $2.63 | $0.78 | $0.37 | $0.48 | $1.82 | |
| 3 | $2.99 | $0.89 | $0.42 | $0.51 | $2.11 | |
| 4 | $3.41 | $1.01 | $0.48 | $0.54 | $2.45 | |
| 5 | $3.89 | $1.16 | $0.55 | $0.57 | $2.83 | $61.32 |
| 6 | $4.16 | $0.88 | $0.59 | $0.20 | $3.71 | |

Net capital expenditures (Cap Ex - Depreciation) and working capital change is offset partially by debt
The balance comes from equity. For instance, in year 1 -
FCFE = $2.30 - ($0.68 - $0.33) * (1 - 0.10) - $0.45 * (1 - 0.10) = $1.57)
b. Terminal Price = $3.71/ (.1305 - .07) = $61.32
c. Present Value Per Share = $1.57/1.136 + 1.82/1.136^2 + 2.11/1.136^3 + 2.45/1.136^4 + (2.83 + 52.69)/1.$
$39.61

Problem 10

*a.*

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Earnings | $0.66 | $0.77 | $0.90 | $1.05 | $1.23 |
| (CapEx-Deprec'n) * (1-δ) | $0.05 | $0.06 | $0.07 | $0.08 | $0.10 |
| Δ Working Capital * (1-δ) | $0.27 | $0.31 | $0.37 | $0.43 | $0.50 |
| FCFE | $0.34 | $0.39 | $0.46 | $0.54 | $0.63 |
| Present Value | $0.29 | $0.30 | $0.30 | $0.31 | $0.31 |

Transition Period

| Year | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| Growth Rate | 14.60% | 12.20% | 9.80% | 7.40% | 5.00% |
| Cumulated Growth | 14.60% | 28.58% | 41.18% | 51.63% | 59.21% |
| Earnings | $1.41 | $1.58 | $1.73 | $1.86 | $1.95 |
| (CapEx-Deprec'n) * (1-δ) | $0.11 | $0.13 | $0.14 | $0.15 | $0.16 |
| ΔWorking Capital * (1-δ) | $0.45 | $0.39 | $0.30 | $0.22 | $0.13 |
| FCFE | $0.84 | $1.07 | $1.29 | $1.50 | $1.67 |
| Beta | 1.38 | 1.31 | 1.24 | 1.17 | 1.1 |
| Cost of Equity | 14.59% | 14.21% | 13.82% | 13.44% | 13.05% |
| Present Value | $0.37 | $0.41 | $0.43 | $0.44 | $0.43 |

*Since the cost of equity changes each year after year 6, discounting has to be done at the cumulated cost of equity.*

*Stable Growth Phase*

| | |
|---|---|
| Growth Rate: Stable Phase = | 5.00% |
| FCFE in Terminal Year = | $1.92 |
| Cost of Equity in Stable Phase = | 13.05% |
| Price at the End of Growth Phase = | $23.79 |

| | |
|---|---|
| PV of FCFE in High Growth Phase = | $1.51 |
| Present Value of FCFE in Transition Phase = | $2.08 |
| Present Value of Terminal Price = | $6.20 |
| Value of the Stock = | $9.79 |

7. b. If working capital stays at 60% of revenues, the FCFE for 1999 onwards will change:

| *Year* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| Earnings | $0.66 | $0.77 | $0.90 | $1.05 | $1.23 |
| (CapEx-Deprec'n)* (1-δ) | $0.05 | $0.06 | $0.07 | $0.08 | $0.10 |
| D Working Capital * (1-δ) | $0.27 | $0.31 | $0.37 | $0.43 | $0.50 |
| FCFE | $0.34 | $0.39 | $0.46 | $0.54 | $0.63 |
| Present Value | $0.29 | $0.30 | $0.30 | $0.31 | $0.31 |

Transition Period (up to ten years)

| Year | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| Growth Rate | 14.60% | 12.20% | 9.80% | 7.40% | 5.00% |
| Cumulated Growth | 14.60% | 28.58% | 41.18% | 51.63% | 59.21% |
| Earnings | $1.41 | $1.58 | $1.73 | $1.86 | $1.95 |
| (CapEx-Deprec'n)*(1-δ) | $0.11 | $0.13 | $0.14 | $0.15 | $0.16 |
| D Working Capital *(1-δ) | $0.50 | $0.48 | $0.43 | $0.36 | $0.26 |
| FCFE | $0.79 | $0.97 | $1.16 | $1.35 | $1.54 |
| Beta | 1.38 | 1.31 | 1.24 | 1.17 | 1.1 |
| Cost of Equity | 14.59% | 14.21% | 13.82% | 13.44% | 13.05% |
| Present Value | $0.34 | $0.37 | $0.39 | $0.40 | $0.40 |

*Stable Growth Phase*

| | |
|---|---|
| Growth Rate in Stable Phase = | 5.00% |
| FCFE in Terminal Year = | $1.78 |
| Cost of Equity in Stable Phase = | 13.05% |

Price at the End of Growth Phase = $22.09

PV of FCFE in High Growth Phase = $1.51
Present Value of FCFE in Transition Phase = $1.90
Present Value of Terminal Price = $5.76
Value of the Stock = $9.17

10.c. If the beta remains at 1.45 forever, but all other quantities are as in part a), then we have the same FCFE, but the following numbers will differ:

| *Year* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| Earnings | $0.66 | $0.77 | $0.90 | $1.05 | $1.23 |
| (CapEx-Deprec'n) * (1-δ) | $0.05 | $0.06 | $0.07 | $0.08 | $0.10 |
| Δ Working Capital * (1-δ) | $0.27 | $0.31 | $0.37 | $0.43 | $0.50 |
| FCFE | $0.34 | $0.39 | $0.46 | $0.54 | $0.63 |
| Present Value | $0.29 | $0.30 | $0.30 | $0.31 | $0.31 |

*Transition Period (up to ten years)*

| Year | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| Growth Rate | 14.60% | 12.20% | 9.80% | 7.40% | 5.00% |
| Cumulated Growth | 14.60% | 28.58% | 41.18% | 51.63% | 59.21% |
| Earnings | $1.41 | $1.58 | $1.73 | $1.86 | $1.95 |
| (CapEx-Deprec'n) * (1-δ) | $0.11 | $0.13 | $0.14 | $0.15 | $0.16 |
| Δ Working Capital * (1-δ) | $0.45 | $0.39 | $0.30 | $0.22 | $0.13 |
| FCFE | $0.84 | $1.07 | $1.29 | $1.50 | $1.67 |
| Beta | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 |
| Cost of Equity | 14.98% | 14.98% | 14.98% | 14.98% | 14.98% |
| Present Value | $0.36 | $0.40 | $0.42 | $0.43 | $0.41 |

*Stable Growth Phase*

Growth Rate in Stable Phase = 5.00%
FCFE in Terminal Year = $1.92
Cost Of Equity in Stable Phase = 14.98%
Price at End of Growth Phase = $19.19

PV of FCFE In High Growth Phase = $1.51
Present Value of FCFE in Transition Phase = $2.03

Present Value of Terminal Price = $4.75

Value of the Stock = $8.29

Problem 11

a.

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Earnings | $1.02 | $1.22 | $1.47 | $1.76 | $2.12 |
| (CapEx-Deprec'n)* (1-δ) | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Δ Working Capital * (1-δ) | $0.85 | $1.02 | $1.22 | $1.47 | $1.76 |
| FCFE | $0.17 | $0.20 | $0.24 | $0.29 | $0.35 |
| Present Value | $0.15 | $0.16 | $0.17 | $0.18 | $0.19 |

| Year | 6 | 7 | 8 |
|---|---|---|---|
| Growth Rate | 15.00% | 10.00% | 5.00% |
| Cumulated Growth | 15.00% | 26.50% | 32.83% |
| Earnings | $2.43 | $2.68 | $2.81 |
| (CapEx-Deprec'n)*(1-δ) | 0 | $0.00 | $0.00 |
| Δ Working Capital *(1-δ) | $1.59 | $1.22 | $0.67 |
| FCFE | $0.85 | $1.46 | $2.14 |
| Beta | 1.1 | 1.1 | 1.1 |
| Cost of Equity | 13.05% | 13.05% | 13.05% |
| Present Value | $0.41 | $0.62 | $0.80 |

*Stable Growth Phase*

Growth Rate in Stable Phase = 5.00%

FCFE in Terminal Year = $2.25

Cost of Equity in Stable Phase = 13.05%

Price at the End of Growth Phase = $27.92

PV of FCFE in High Growth Phase = $0.85

Present Value of FCFE in Transition Phase = $1.83

Present Value of Terminal Price = $10.46

| | |
|---|---|
| Value of the Stock = | $13.14 |

b. This would increase your working capital requirements, but the easier credit terms may also increase revenues. The net effect can be positive or negative.

c. Working capital is a high proportion of FCFE, and as such, the stock price estimate is likely to be very sensitive to changes in the working capital assumptions.

Problem 12.
A. Both models should have the same value, as long as a higher growth rate in earnings is used in the dividend discount model to reflect the growth created by the interest earned, and a lower beta to reflect the reduction in risk.
B. The dividend discount model will overstate the true value, because it will not reflect the dilution that is inherent in the issue of new stock.
C. Both models should provide the same value.
D. Since acquisition, with the intent of diversifying, implies that the firm is paying too much (i.e., negative net present value), the dividend discount model will provide a lower value than the FCFE model.
E. If the firm is over-levered to begin with, and borrows more money, there will be a loss of value from the over-leverage. The FCFE model will reflect this lost value, and will thus provide a lower estimate of value than the dividend discount model.

Problem 13
a. From the information given, we can work out the following information:

| | |
|---|---|
| EBITDA | 2483.125 |
| Depreciation | 960 |
| EBIT | 1523.125 |
| Interest | 320 |
| EBT | 1203.125 |
| Taxes | 433.125 |
| Net Income | 770 |

Hence Free Cash Flow to the Firm = EBIT(1-tax rate) +Depreciation - Capital Expenditures - Change in Working Capital = 1523.125(1-0.36) + 960 - 1200 = $734.8m.

b. The value of the equity = 200m. x $60 = $12b. The value of the debt = $4b. Hence, the value of the firm at the end of 1993 = $16b.

a. Return on capital = 1523.125(1-0.36)/(4000+5000) = 10.83%
Reinvestment Rate = (1200-960)/(1523.125(1-.3) )= 10.09%
Expected Growth Rate in Operating Income = 10.83% (.1009) = 1.09%
The required rate of return on equity = 7% + 1.05(5.5%) = 12.775%; the cost of debt after-tax = 8%(1-0.36) = 5.12; the WACC = (4/16)(5.12) + (12/16)(12.775) = 10.86%.

Assuming that the firm can grow at 1% a year forever, the value of the firm at the end of 1993 would be 734.8*1.0109/(.1086-.0109) = $7,527 Million.
The value of equity would then be$3,527 million., with a per-share price of $ 17.63.

Problem 14
a., b. From the information given, we can compute the following:

| Yr | EBITDA | Deprec'n | EBIT | EBIT (1-t) | Cap Exp. | ∂ WC | FCFF | Terminal Value |
|---|---|---|---|---|---|---|---|---|
| 0 | $1,290 | $400 | $890 | $534 | $450 | $82 | $402 | |
| 1 | $1,413 | $438 | $975 | $585 | $493 | $90 | $440 | |
| 2 | $1,547 | $480 | $1,067 | $640 | $540 | $98 | $482 | |
| 3 | $1,694 | $525 | $1,169 | $701 | $591 | $108 | $528 | |
| 4 | $1,855 | $575 | $1,280 | $768 | $647 | $118 | $578 | |
| 5 | $2,031 | $630 | $1,401 | $841 | $708 | $129 | $633 | $14,326 |
| Terminal Yr | $2,112 | $655 | $1,457 | $875 | $655 | $60 | $815 | |

The WACC in 1993 can be computed as 9.37%, using the cost of equity of 13.05% based on the current beta of 1.1.
Given the current beta and the current D/E ratio of 3200/3968, the unlevered beta = 0.74. If we assume that the operations of the firm do not change until after 1988, we can infer that the WACC for the firm is constant until 1998. After 1998, the stock beta changes to 0.74(1+(1-0.4)0.5) = 0.96 implying a cost of equity of 12.29% for 1999 and beyond. This is turn can be used to compute a WACC of 9.69%.

WACC after year 5 = 12.29% (2/3) + 7.5% (1-.4) (1/3) = 9.69%

We can discount the FCFF to the firm from 1994 to 1998 at the WACC of 9.37, and thereafter at the rate of 9.69%. This yields the following:

Value of the Firm = $440/1.0937 + 482/1.0937^2 + 528/1.0937^3 + 578/1.0937^4 + (633 + 14957)/1.0937^5 = \$11,172$

b. Value of Equity in the Firm = ($11172 - Market Value of Debt) = 11172 - 3200 =$7,972

Value Per Share = $7972/62 = $128.57

The shares are grossly underpriced.

Problem 15
a. The after tax cost of debt is 7.5(1-0.4) = 4.5%, while the cost of equity = 7 + 1.15(0.55) = 13.325%. Using a debt ratio of 20%, we find that the cost of capital for the health division = (.2)(4.5) + (0.8)13.325 = 11.56%
b.

| Year | Deprec'n | EBIT | EBIT(1-t) | Cap Ex | FCFF | Term Val |
|---|---|---|---|---|---|---|
| 0 | $350 | $560 | $336 | $420 | $266 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | $364 | $594 | $356 | $437 | $283 | |
| 2 | $379 | $629 | $378 | $454 | $302 | |
| 3 | $394 | $667 | $400 | $472 | $321 | |
| 4 | $409 | $707 | $424 | $491 | $342 | |
| 5 | $426 | $749 | $450 | $511 | $364 | $5,021 |
| TY | $443.04 | $778.96 | $468 | $531.44 | $379.60 | |

Value of the Division = $283/1.1156 + 302/1.1156^2 + 321/1.1156^3 + 342/1.1156^4 + (364 + 5021)/1.1156^5$ = $ 4,062 million

c. If the acquirer perceives some synergy between its existing business and the health division, it might be willing to pay more. Also, if the health division is currently mismanaged or if there are currently negative synergies, then an acquirer who hopes to improve on this situation might be willlling to pay more.

Problem 16

1. The price of the stock is given by the simple Gordon growth model. Hence, P = 1.06(1.06)/(.12775-.06) = $16.58. According to this, the P/E ratio should be 16.58/2.40 = 6.91. Alternatively, one can directly estimate the PE as follows:

PE = Payout (1+g)/(r-g) = 0.4417(1.06)/(.12775-.06) = 6.91

b. The actual P/E ratio of 10 implies a price of $24. This implies a growth rate of g, where 1.06(1.06)/(.12775-g) = 24. Hence g = 8%.

Problem 17

a. The average P/E ratio = 13.2, while the median P/E ratio = 12.25, which is the average of the 7th ranking and 8th ranking firm's P/E ratios. The fact that the mean and the median are relatively close to each other means that there is no appreciable skewness: there are no great extreme values. We can, therefore, interpret either number as a means of the market's valuation of earnings

b. This would be true if Thiokol's riskiness were equal or less than that of the industry, on average. Another reason for Thiokol to have a lower P/E ratio even with no underpricing is if it were a low growth stock, say, because of a high payout ratio.

c. These kinds of differences can be controlled for using the regression approach. Using this approach, the second to last column gives us the estimated P/E ratios based on the payout ratio, risk and growth. The last column, which represents the difference between the actual P/E ratio and the estimated P/E ratio gives us an estimate of relative under- or over-valuation. Positive values imply overvaluation, while negative values imply undervaluation:

P/E = -2.33 + 35.74 Growth Rate + 11.97 Beta + 2.90 Payout Ratio

| Company | Actual P/E | Expected Growth | Beta | Payout | Estimated P/E ratio | Difference |
|---|---|---|---|---|---|---|
| Thiokol | 8.7 | 5.5 | 0.95 | 15 | 11.44 | -2.74 |
| Northrop | 9.5 | 9 | 1.05 | 47 | 14.82 | -5.32 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lockheed Corp. | 10.2 | 9.5 | 0.85 | 37 | 12.31 | -2.11 |
| United Industrial | 10.4 | 4.5 | 0.7 | 50 | 9.11 | 1.29 |
| Martin Marietta | 11 | 8 | 0.85 | 22 | 11.34 | -0.34 |
| Grumman | 11.4 | 10.5 | 0.8 | 37 | 12.07 | -0.67 |
| Raytheon | 12.1 | 9.5 | 0.75 | 28 | 10.85 | 1.25 |
| Logicon | 12.4 | 14 | 0.85 | 11 | 13.17 | -0.77 |
| Loral Corporation | 13.3 | 16.5 | 0.75 | 23 | 13.21 | 0.09 |
| Rockwell | 13.9 | 11.5 | 1 | 38 | 14.85 | -0.95 |
| General Dynamics | 15.5 | 11.5 | 1.25 | 40 | 17.90 | -2.40 |
| GM- Hughes | 16.5 | 13 | 0.85 | 41 | 13.68 | 2.82 |
| Boeing | 17.3 | 3.5 | 1.1 | 28 | 12.90 | 4.40 |
| McDonnell Doug. | 22.6 | 13 | 1.15 | 37 | 17.15 | 5.45 |

Problem 18

a. The current payout ratio = 2/4 = 0.5. Assume that this ratio will be kept constant. The return on equity = 4/40 = 10%. If we use the Gordon growth model, the price is estimated at 2(1.06)/(.11675-.06) = $37.36. The price/book value ratio = 37.36/40 = 0.934. Alternatively, use the formula directly:

$$PBV = .10*.5*1.06/(.11675-.06) = 0.934$$

b. The actual share price is $60. We can use this to solve for the value of g in the equation 60 = 2(1+g)/(.11675-g). Solving, we find g = 8%. If g = 8%, then we need a Return on Equity, such that .08 = .5(Return on Equity); i.e. the required Return on Equity = 16%. This approach focuses on the price element in the price/book value ratio, since book value is an accounting quantity and is not necessarily directly related to market pricing.

Problem 19

a. The average Price/Book Value ratio = 1.66. I wouldn't necessarily use this ratio to price the new issue because of the heterogeneity amongst these firms. In particular, even though most of the firms have zero payout ratios like our firm, nevertheless, some of them have high payout ratios, such as Browning Ferris and Safety-Kleen. Growth rates also vary quite a bit. These factors affect the Market Value to Book Value ratio.

b. I would regress the Price/Book Value ratio on the other factors and use to come up with a ratio that's more appropriate for our company. I would also use the data on the debt/equity ratios of the companies to estimate a beta for our company and use that to price it as well. I would use this as an additional input to price the new issue. I would expect that our firm having a lower payout ratio and a higher growth rate than the average

would also have a higher Price/Book Value ratio. The lower beta also suggests a higher price to book-value ratio.

Problem 20

a. The price can be estimated as 1.12(1.06)/(.07+.9(.055)-.06)) = $19.95. Hence the price/sales multiple = 19.95/122 = 0.1635. Alternatively,

PS= .02 * 0.4571 * (1.06)/(.1195 - .06) = 0.163

Where the profit margin = 2.45/122 = 2%

b. If the stock is trading at $34, then the price-sales multiple is 34/122 = 0.2787. If this price is correct, then the earnings per share would have to increase (assuming that the payout ratio remains constant). We would need to have dividends this year of D(1.06) /(.07+.9(.055)-.06)) = $34, or D = 1.90. Hence, we would need earnings of (2.45/1.12)1.90 = $4.17 per share. With sales of $122, this implies a profit margin of 4.17/122 = 3.42%

Problem 21

Yes. There are several reasons why Walgreen might have a high Price to Sales ratio and still be fairly priced; however, they don't seem to apply here. One reason might be that the firm expects higher sales in the future. However, Walgreen's expected growth rate of 13.5% is less than the average of the firms, which is 14.5. Furthermore, the payout ratio is higher than the average for the sample (22.3). On the other hand, the firm's beta is higher than the average for the sample (0.9) and so is the firm's profit margin of 2.7 relative to 1.9. However, on balance, the firm does seem to be overpriced, at least compared with firms such as Arbor Drugs, which has a higher profit margin, a lower payout ratio *and* a higher expected growth rate.