CHAPTER 1 - SOLUTIONS

INTRODUCTION TO VALUATION

Problem 1

e. All of the above

Problem 2

d. Value is determined by investor perceptions, but it is also determined by the underlying earnings and cash flows. Perceptions must be based upon reality.

Problem 3

e. Either a,b, or c.

CHAPTER 2- SOLUTIONS

INTRODUCTION TO VALUATION

Problem 1

A. False. The reverse is generally true.

B. True. The value of an asset is an increasing function of its cash flows.

C. True. The value of an asset is an increasing function of its life.

D. False. Generally, the greater the uncertainty, the lower is the value of an asset.

E. False. The present value effect will translate the value of an asset from infinite to finite terms.

Problem 2

A. It might be difficult to estimate how much of the success of the private firm is due to the owner's special skills and contacts.

B. Since the firm has no history of earnings and cash flow growth and, in fact, no potential for either in the near future, estimating near term cash flows may be impossible.

C. The firm's current earnings and cash flows may be depressed due to the recession. Other measures, such as debt-equity ratios and return on assets may also be affected.

D. Since discounted cash flow valuation requires positive cash flows some time in the near term, valuing troubled firms, which are likely to have negative cash flows in the foreseeable future, is likely to be difficult.

E. Restructuring alters the asset and liability mix of the firm, making it difficult to use historical data on earnings growth and cash flows on the firm.

F. Unutilized assets do not produce cash flows and hence do not show up in discounted cash flow valuation, unless they are considered separately.

Problem 3

a. Value of Equity = $ 3,224 (Discount cashflows to equity at the cost of equity – 12%)

b. Value of Firm = $ 5,149 (Discount cashflows to the firm at the cost of capital of 9.94%)

Problem 4

A. Average P/E Ratio = 31.98

B. No. Eliminate the outliers, because they are likely to skew the average. The average P/E ratio without GET and King World is 25.16.

C. You are assuming that

(1) Paramount is similar to the average firm in the industry in terms of growth and risk.

(2) The marker is valuing communications firms correctly, on average.

CHAPTER 3

UNDERSTANDING FINANCIAL STATEMENTS

Problem 1

a. Marketable securities are valued at book or market, whichever is lower. Hence marketable securities are probably assessed at close to market value. Near-cash must also be close to market value. Cash, of course, by definition is at market value.

b. Fixed Assets are valued at historical cost. Hence they were probably purchased for the gross book value of fixed assets, i.e. 5486+199 = $5685.

   From the value of $2016 for accumulated depreciation, we see that about 36.75% of the value of the depreciable fixed assets has been written off in depreciation. Hence, if we can assume that Coca-Cola uses straight-line depreciation, about two-fifths of the life of the estimated life of these assets is over. If we know the average life of assets in this industry, we can use that to estimate the age of these assets.

c. There are several reasons why current assets are more prominent in Coca-Cola's balance sheet than fixed assets. One, there is a large amount of cash and near-cash: this might be due to impending expansion, perhaps investment in bottling operations. Two, the Other Assets item includes investment in other Coca-Cola companies, which are primarily manufacturing operations, such as bottlers. Hence, if the fixed assets and current assets parts of these investments were included, the ratio of fixed to current assets would probably be larger.

d. Even though the companies were sold off, Coca-Cola presumably still has some ownership stake in these companies. To the extent that Coca-Cola does not have a majority stake in these companies, they would not be consolidated into Coca-Cola's balance sheet. If these companies were primarily manufacturing companies, their relatively large fixed-asset structure would not appear on Coca-Cola's balance sheet anymore.

Problem 2

a. Total interest-bearing debt would equal short-term borrowings plus long-term borrowings, i.e. 4462+687 = 5149m.

b. The paid-up capital represents the amount that Coca-Cola originally obtained for the equity that it issued. This amount equals $3060m.
c. The larger the amount of time that has elapsed since the equity was originally issued, the greater the proportion of shareholder equity that would be represented by Retained Earnings, particularly for a firm that has plowed back a lot of its earnings into its operations.
d. The book value of equity is $8.403 billion, which is much less than the market value of $140 billion. This is because a large portion of Coca-Cola's market value is the present value of future growth and branc name value. This is not reflected in the book value.

Problem 3

Coca-Cola's brand name value does not appear in its balance sheet. Even though there is an item called "Non-depreciable Fixed Assets," it is too small, and cannot represent the brand name value; it's probably land. One way to adjust the balance sheet to reflect the value of this asset is for Coca-Cola to set up a separate subsidiary that would buy the rights to the brand name. The brand name value would then show up as an asset for the subsidiary, which would then be reflected in Coca-Cola's balance sheet as well, even if the financial statements were consolidated.

Problem 4

a. The net working capital equals the difference between Current Assets and Current Liabilities, i.e. 6380 - 8640 = - 2260.

Non-cash working capital removes Cash and Near Cash from the Current Assets computation and interest-bearing short-term borrowings from the liabilities side. This gives us - 2260 - 1648 + 4462 = 554.

b. The current ratio equals Current Assets/Current Liabilities = 6380/8640 = 73.84%

c. The firm's quick ratio equals (1648+159)/8640 = 20.91%

d. It is possible to draw some preliminary conclusions about Coca Cola's riskiness to a supplier or a short-term lender from these numbers. The conclusions would be negative since the current and quick ratios are low. However, we should also look at the standard

for the industry. Manufacturing firms tend to have high working capital requirements because of inventories. Since Coca-Cola has sold off many of its manufacturing operations, its working capital requirements would be lower than before, and this might explain the low current ratio.

Problem 5

Operating Income

	1997	1998
Revenues	18868	18813
Less COGS	6105	5562
Less Selling, G&A expenses	7852	8284
equals Operating Earnings	5001	4967

The operating income is very similar in both years. The revenues were almost identical, and the drop in cost of goods sold in 1998 was offset by an increase in S,G &A expenses.

Problem 6

If advertising is used mainly to build up Coca-Cola's brand name, then these expenses should be capitalized, rather than included in operating expenses. To find the current capitalized value of past advertising expenses, we would add up the unamortized portions from past years. If we assume that these expenditures are to be amortized straight-line over a nine-year life, then the entire unamortized portion of advertising expenditures ten years ago would be amortized in this period. One-tenth of the advertising expenditures eight years ago would be amortized this period, with one-tenth remaining unamortized, and so on.

Let us assume that it is the end of 2000, and we wish to compute the capitalized value of Advertising for 2000

Year expenditure incurred	Amount of Advertising expenditures to be included in Capitalized Advertising Asset for	Amount Amortized this year

	2000	
1992	1/10	1/10
1993	2/10	1/10
1994	3/10	1/10
1995	4/10	1/10
1996	5/10	1/10
1997	6/10	1/10
1998	7/10	1/10
1999	8/10	1/10
2000	9/10	1/10

Problem 7

The effective tax rate in 1997 was 1926/(5001-258+1312) = 31.81%, while the same quantity for 1998 was 1665/(4967-277+508) = 32.03%, which is almost the same. The difference may reflect differences between the tax and reporting books.

Problem 8

The pre-tax operating margin for 1997 was 5001/18868 or 26.51%, while the number for 1998 was 4967/18813 or 26.40%

The after-tax operating margin was (5001-1926)/18868 = 16.30% for 1997, and (4967-1665)/18813 or 17.55% for 1998, using actual taxes paid.

If we use the marginal tax rate, then the net margin is 26.51(1-0.3181) = 18.08% for 1997, and 26.4(1-0.3203) = 17.94% for 1998.

The margins look very similar in both years. There are no strong conclusions you can draw about profitability.

Problem 9

a. The return on equity is defined as Net Income/Book Value of Equity. Using beginning of 1998 value of equity, this was 3533/7274 = 48.57%

b. The pre-tax return on capital equals EBIT/Total Capital = 4967/(7274+3875) = 44.55%

c. The after-tax return on capital equals 44.55(1-0.3203) = 30.28%

Problem 10

a. The book value of equity at the end of 1999 would be, in millions

Book Value of equity, end of 1998	1500
Less Share repurchase	400
Add Net Income for 1999	150
Less Dividends Paid	50
Book Value, end of 1999	1200

b. The return on equity, using beginning book value equals 150/1500 = 10%

c. The return on equity, using average book value of equity = 150x2/(1500 + 1200) = 11.11%

CHAPTER 4

THE BASICS OF RISK

Problem 1

Year	Price	Annual Return
1989	1.2	
1990	2.09	0.741667
1991	4.64	1.220096
1992	5.34	0.150862
1993	5.05	-0.05431
1994	7.64	0.512871
1995	10.97	0.435864
1996	20.66	0.883318
1997	32.31	0.563892
1998	69.34	1.146085
	average	0.622261

a. The average annual return is 62.23%

b. The standard deviation is 42.49%

The variance is 0.1805

c. No. The firm is changing its business mix, is under increasing assault for monopolistic practices and is accumulating cash. I would expect all of these factors to change its risk profile.

Problem 2

Year	Price	Dividends	Return
1989	36.1	3	
1990	33.6	3	1.39%
1991	37.8	3	21.43%
1992	30.9	2.3	-12.17%

1993	26.8	1.6	-8.09%
1994	24.8	1.6	-1.49%
1995	31.6	1.6	33.87%
1996	28.5	1.6	-4.75%
1997	24.25	1.6	-9.30%
1998	35.6	1.6	53.40%
	average		8.25%
	std		22.84%
	variance		0.0521

a. The average annual return is 8.25%
b. The standard deviation is 22.84%, and the variance is 0.0521
c. I would not expect the same variance and standard deviation of returns because utilities have become much more deregulated today and face a lot of competition.

Problem 3

Year	*Scientific Atlanta*	*AT&T*
1989	80.95	58.26
1990	-47.37	-33.79
1991	31	29.88
1992	132.44	30.35
1993	32.02	2.94
1994	25.37	-4.29
1995	-28.57	28.86
1996	0	-6.36
1997	11.67	48.64
1998	36.19	23.55
average	27.37	17.804
s.d.	51.36	27.89
covariance	774.48	
correlation	0.54	

a. The average return over the ten years is 27.37% for Scientific Atlanta and 17.8% for AT&T. The standard deviations are 51.36% and 27.89% respectively.

b. The covariance is 774.48, while the correlation coefficient 0.54.

c. The variance of a portfolio composed equally of the two investments equals $(0.5)^2(51.36)^2+(0.5)^2(27.89)^2+2(51.36)(27.89)(0.5)(0.5)(0.54) = 1240.68$; the standard deviation is 35.22%

Problem 4

a. You'd pick the stock market portfolio, since it dominates gold on both average return and standard deviation.

b. The higher possible returns on gold are balanced by the lower possible returns at other times. Note that the average return on gold is much less than that on the stock market.

c. The expected return on this portfolio would be (8+20)/2 = 14%. The variance would equal $(0.5)^2(25)^2 + (0.5)^2(22)^2 - 2(0.5)(0.5)(25)(22)(0.4) = 167.25$; the standard deviation equals 12.93%

d. If the supply of gold is negatively correlated with the level of the market, and the price of gold is inversely related to the supply of gold, we have a positive correlation between the return on the market and the return on gold. This would make gold less desirable, since it does not help as much in reducing portfolio variance. The optimal amount to invest in gold would drop.

Problem 5

a. The average return on the portfolio equals (0.6)25 + (0.4)12 = 19.8%

The variance of returns equals $(0.6)^2(36)^2 +(0.4)^2(22^2) + 2(0.4)(0.6)(36)(22)(0.28) =$ 650.44; the standard deviation of returns = 25.5%

b. The minimum variance portfolio is given by

$w_{CC} = [22^2-(22)(36)(0.28)]/[22^2+36^2-2(22)(36)(0.28)] = 262.24/1336.48 = 0.1962$; the weight in Texas Utilities is 1-0.1962 = 0.8038.

Problem 6

Times Mirror σ	25%
Unilever σ	40%
correlation	Portfolio Variance s.d.

-1	56.25	7.50%
-0.8	156.25	12.50%
-0.6	256.25	16.01%
-0.4	356.25	18.87%
-0.2	456.25	21.36%
0	556.25	23.58%
0.2	656.25	25.62%
0.4	756.25	27.50%
0.6	856.25	29.26%
0.8	956.25	30.92%
1	1056.25	32.50%

Problem 7

The portfolio variance equals

$(1/3)^2(23)^2+(1/3)^2(27)^2+(1/3)^2(50)^2 +2(1/3)(1/3)(23)(27)(-0.15)$

$+2(1/3)(1/3)(27)(50)(-0.25)+ 2(1/3)(1/3)(23)(50)(0.2) = 360.97$

The standard deviation = 19%

Problem 8

The variance of a portfolio consisting of N securities can be estimated as (1/N)(average variance) + (1-1/N)(average covariance) = 10 + (50-10)/N.

Number of securities in portfolio (N)	Estimated portfolio variance
5	18
10	14
20	12
50	10.8
100	10.4

We must solve 10 + 40/N = 1.1(10) = 11, or N = 40

Problem 9

The expected return on the new portfolio = 0.2(5) + (0.8)12 = 10.6%

The standard deviation of returns on the new portfolio = 0.8(25) = 20%

Problem 10

a. Invest everything in the riskless asset.
b. Solve 0.15 = w(0.3) to get w =0.5; invest 50% in each asset.
c. Invest everything in the market portfolio
d. Solve 0.45 w(0.3) to get w =1.5; the investor should borrow 50% of his own outlay at the riskfree rate and invest the borrowing as well as his own outlay in the market portfolio.
e. Solve w(15) + (1-w)5 = 12 to get w = 0.7; invest 70% in the market portfolio and the rest in the riskfree asset.

Problem 11

a. The covariance of returns between Scientific Atlanta and the market portfolio = -13.07
b. The variance of returns is 2637.56 for Scientific Atlanta and 209.88 for the market portfolio
c. The beta of Scientific Atlanta equals -13.07/209.88 = -0.0623

Problem 12

a. Solve 1.5 = Covariance(R_{UA}, R_{mkt})/22^2. Hence the covariance equals 726. The correlation between United Airlines and the market can be computed as 726/(22x66) = 0.5
b. The share of market risk in United Airlines risk is $(0.5)^2$ or 25%.

Problem 13

a. Bethlehem Steel is most exposed to the fourth factor. One can try to identify the factors by regressing the estimated factors on various macroeconomic variables. The APT, itself, does not identify the factors.
b. If the riskfree rate is 5%, the expected return on Bethlehem Steel would be 5 + 1.2(2.5) + 0.6(1.5) + 1.5(1) + 2.2(0.8) + 0.5(1.2) = 12.76%

c. Using the CAPM, the expected return would be 5 + 1.1(5) = 10.5%
d. The expected returns could be different if there are other risks that the market deems relevant that are not adequately captured in the market portfolio.

Problem 14

The expected return on Emerson Electric would be 6 + 0.5(1.8) + 1.4(0.6) + 1.2(1.5) + 1.8(4.2) = 17.1%

Problem 15

a. The expected annual return on Lucent Technologies would be 1.77 - 0.11(ln 1800) +0.35(ln(735/1800), which works out to 0.63% per month. On an annual basis, this would work out to 7.58% without compounding and 7.85% with compounding ($(1.0063^{12}-1)$)
b. Under the CAPM, the expected return is 6% + 1.55(5.5) = 14.525% per annum.

The two approaches differ because they use different measures of risk. The first one uses an empirical proxy, while the second one uses a measure derived from theory.

CHAPTER 5

OPTION PRICING THEORY AND MODELS

Problem 1

A. The values of the option parameters are as follows:

S = $83

K = $85

t = 0.25

r = 3.80%

Variance = 0.09

Value of call = $4.42

B. To replicate this call, you would have to:

Buy 0.4919 Shares of Stock (this is N(d1) from the model)

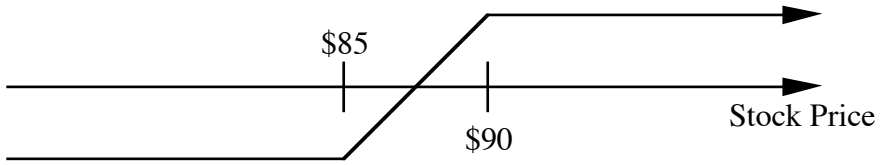
and

Borrow $K e^{-rt} N(d2) = 85 \exp^{-(0.038)(0.25)} (0.4324) = \$36.40$

C. At an implied variance of 0.075, the call has a value of approximately $4.00 (the market price).

Implied Standard Deviation = $\sqrt{0.075} = 0.2739$

D.



E.

Value of Three-month Put = $C - S + Ke^{-rt} = \$4.42 - \$83 + 85 \exp^{-(0.038)(0.25)} = \$5.62$

Problem 2

A. S = $28.75

K = $30

t = 0.25

$r = 3.60\%$

$\sigma^2 = 0.04$

PV of Expected Dividends = $\$0.28/(1.036)^{2/12} = \$0.28$

Value of Call = $0.64

B. The payment of a dividend reduces the expected stock price, and hence reduces the value of calls and increases the value of puts.

Problem 3

A. First value the three-month call, as above:

Value of Call = $0.64

Then, value a call to the first (and only) dividend payment,

$S = \$28.75$

$K = \$30$

$t = 2/12$

$r = 3.60\%$

$\sigma^2 = 0.04$

$y = 0$ (since it assumes exercise before the dividend payment)

Value of Call = $0.51

Since the value of the three-month call is higher, there is no anticipated exercise.

B. If the dividend payment is large enough, it may pay to exercise the call just before the ex-dividend day (before the stock price drops) rather than wait until expiration. This early exercise is more likely for call options:

(a) the larger the dividend on the stock, and

(b) the closer the option is to expiration.

Problem 4

A. You would need to borrow $Ke^{-rt} N(d2) = 90 \exp^{(-0.04)(0.25)} (0.4500) = \$40.10$

B. You would need to buy 0.575 shares of stock.

Problem 5

A. S= $4.00

K = $4.25

r = 5%

t = 1

Variance = 0.36

Value of Warrant = $0.93

B. Adjusted Stock Price = (Stock Price * Number of Shares Outstanding) + (Warrant price * Number of Warrants Outstanding)/(Number of Shares+Number of Warrants)

= ($4.00 * 11,000,000 + $0.93 * 550,000)/(11,550,000) = $3.85

(To avoid the circular reasoning problem, the price from the no-dilution case is used.)

Adjusted Exercise Price = $4.25

r = 5%

t = 1

Variance = 0.36

Value of Warrant = $0.80

(If you are using a spreadsheet with iterations turned on, and are feeding the option prices back to calculate the adjusted stock price, the value of the warrants is still $0.80.)

C. Dilution increases the number of shares outstanding. For any given value of equity, each share is worth less.

Problem 6

A. S = 250

K = 275

t = 5

r = 5%

$\sigma^2 = (0.15)^2$

y = 0.03

Value of call = $29.09

B. Value of put with same parameters = $28.09

C.

(1) The variance will be unchanged for the life of the option. This is likely to be violated because stock price variances do change substantially over time.

(2) There will be no early exercise. This is reasonable and is unlikely to be violated.

(3) Any deviations from the option value will be arbitraged away.

While there are plenty of arbitrageurs eager to exploit deviations from true value, arbitraging an index is clearly more difficult to do than arbitraging an individual stock.

Problem 7

New Security = AT & T stock - Call (K=60) + Put (K=45)

= \$50 - \$7.11 + \$3.55 = \$46.44

The call with a strike price of \$60 is sold, eliminating upside potential above \$60.

The put with a strike price of \$45 is bought, providing downside protection.

CHAPTER 6

MARKET EFFICIENCY – DEFINITION, TESTS AND EVIDENCE

Problem 1

(a) Resources are allocated among firms efficiently (i.e. put to best use)

(f) No group of investors will do better than the market consistently after adjusting for risk and transactions costs.

Problem 2

No. The stock price should reflect this seasonal pattern in sales. If seasonal sales were better or worse than expected, you would expect to see an effect on stock prices.

Problem 3

To test any market inefficiency, a model needs to be specified for expected returns. One cannot therefore test market efficiency alone without jointly testing an asset pricing model

Problem 4

No. Demand and Supply are determined by real variables (including the intrinsic value).

Problem 5

You should have looked at the merger announcement date (in the WSJ) and not at the effective date. Furthermore you should have started looking at days before the announcement date. Finally, by focusing on only the twenty largest mergers, you may be inducing sampling bias into your conclusions.

Problem 6

(d) market prices contain errors, but the errors are random and therefore cannot be exploited by investors.

Problem 7

a. Decrease Efficiency

Reasoning: Increases transactions cost and allows inefficiencies to continue.

b. Decrease Efficiency

Reasoning: Removes an avenue that those with bad news could have used.

c. Increase Efficiency

Reasoning: Allows investors to trade on news more easily

d. Increase Efficiency

Reasoning: Allows more investors to come in and exploit inefficiencies.

Problem 8

(a) There is some insider trading going on,, or at least information leaking out.

(b) Suggests that the announcement contains good news, and that some of the news at least is a positive surprise to markets.

(c) Suggests that markets over reacted to the initial news and there is a price correction.

Problem 9

Small firms make a substantial premium over expected returns after adjusting for risk. Most of this premium is earned in the first fifteen days of the year. This may be because (a) we are measuring risk incorrectly (b) Transactions costs are higher (c) Information is much more scanty. If your transaction costs are low enough, you could construct a portfolio of smaller stocks.

Problem 10

This suggests that markets do not react instantaneously to information events and that price adjustments to new information do not happen immediately. I would expect to find this to be much more of a problem with smaller, information-poor firms. I would exploit this anomaly by buying these stocks right after a positive surprise and selling after a negative surprise and holding for a very short time period. (The transactions costs and uncertainty might be much higher)

Problem 11

(a) Investors sell stocks on which they have made losses towards the end of the year (driving the price down) and buy them back after the turn of the year (causing prices go up)

(b) More information may come out in January than any other month of the year. Investors may be more optimistic and have more cash in January.

Problem 12

9% (1-.4) + 5% (1-x) = 12% (1-.4) + 1% (1-x)

Solve for x, x = 55%

Problem 13

a. False. Low PE stocks are not riskier.

b. False. The small stock effect is not created by outliers.

c. False. Stock prices are affected but the average investor cannot take advantage of the price effect.

Problem 14

Expected Return on AD Value Fund = 6% + 0.8 (16%-6%) = 14%

Expected Return on AD Growth Fund = 6% + 1.2 (16%-6%) = 18%

AD Value outperformed the market by 2%

AD Growth underperformed by the market by 2%

b. (0.95) (1.02)^n = 1.00

Solve for n,

n = 2.59 years

CHAPTER 7

RISKLESS RATES AND RISK PREMIUMS

Problem 1

I would use the U.S. treasury bond rate. There is country risk but it is best shown as part of the risk premium.

Problem 2

Because it exposes you to reinvestment risk – the rate will be different in 6 months. A more appropriate rate would be a 5-year treasury (preferable a zero coupon).

Problem 3

Rupiah riskless rate = Government bond rate – Default spread = 17% - 5% = 12%

Problem 4

$70 = 45\ (1+ r_{India})^{10}/(1.05)^{10}$

Solving for r, you get = 9.74%

Problem 5

You could use the 3% rate on inflation-index treasury bonds as your riskless rate, if you assume that capital flows freely across countries. If this is the case, the real riskless rate has to be the same across countries. However, the assumption about free capital flows may not be appropriate in some countries. An alternative approach would be to set the real riskless rate = expected real growth rate in the long term in Chile.

Problem 6

Annual standard deviation (assuming no serial correlation) = $30\%/\sqrt{50} = 4.25\%$

Problem 7

You are assuming that

a. The risk preferences of investors have not changed systematically over time.
b. The average risk investment over time has remained constant

c. There is no selection bias associated with the period of history that you are looking at.

If investors have become less risk averse, the average risk investment has less risk or if there is a "survivor market" bias, the historical risk premium will be too high an estimate of the future expected risk premium.

Problem 8

a. Country risk premium as default spread = 7.6% - 5.1% = 2.5%
b. Country risk premium with relative market volatility = 2.5% (25%/15%) = 4.17%

Problem 9

a. Total risk premium using equity std deviation = 5.5% (48/20) = 13.2%
   Country risk premium = 13.2% - 5.5% = 7.7%
b. Country risk premium = 3% (48/24) = 6%

Problem 10

Expected dividends next year = 5% of 1400 = 70

Value = 1400 = 70/ (r - .06)

Solving for r,

Required return on stocks = (70 + .06*1400)/1400 = 11%

Riskless rate = 5.5%

Implied equity risk premium = 11% - 5.5% = 5.5%

Problem 11

	Last year	*1*	*2*	*3*	*4*	*5*	*Term Year*
Dividends	750.00	862.50	991.88	1140.66	1311.75	1508.52	1583.94

Estimating the present value of the cash flows in the first five years, and the terminal value as

Terminal value = 1583.94/(r - .06)

The discount rate of 12.85% yields a present value of 15000 (which is the current level of the index)

Implied equity risk premium = 12.85% - 6% = 6.85%

Problem 12

This statement is not true. If earnings go up more than the index goes up, if there is a substantial increase in expected growth rates or a big drop in the riskless rate, you can see risk premiums go down as the index goes up.

CHAPTER 8

ESTIMATING RISK PARAMETERS AND COSTS OF FINANCING

Problem 1

We use the CAPM:

The Expected Return on the stock = 0.058 + 0.95(0.0876) = 0.1412 = 14.12%.

Since the investor is a short-term investor, we use the T-bill rate, and the arithmetic mean. Since the focus is short-term, we don't need to take compounding into account.

For a long-term investor, we would use the T-bond rate, and the geometric mean:

The expected return 0.064 + 0.95(0.055) = 0.1163 or 11.63%.

The cost of equity for the company is more appropriately the long-term required rate of return, since most projects for the company would be long-term.

(I am using the 8,76% arithmetic average premium for stocks over T.Bills and the 5.5% geometric average premium for stocks over T.Bonds that were prevailing at the time this problem was written. Obviously, both numbers will change as the premiums get updated.)

Problem 2

The levered beta of the company is given by formula: $\beta_{\mathrm{L}} = \beta_u(1+(1-t)(D/E))$.

Solving, we get $\beta_{\text{unlevered}}$ = 0.95/(1+(1-0.36)(1.7/1.5)) = 0.55

The proportion of the risk of the firm's equity that can be attributed to business risk is 0.55/0.95 = 58%, while the remainder is due to financial leverage risk.

Problem 3

a. The cost of equity equals 0.064 + 1.70(0.055) = 15.75%

b. If long term bond rates rise to 7.5%, the cost of equity will rise by a like amount to 16.85%.

c. Since Biogen had no debt, all of its risk is due to business risk.

Problem 4

The Malaysian government bond is not riskfree but in the absence of information about default risk in Malaysia, I will use that as my risk free rate in the local currency. If you assumed a default spread, you are on perfectly safe ground).

a. The expected return on the stock, assuming that the marginal investor is a Malaysian with primarily domestic holdings is 0.115 + 1.15(0.12) = 25.30%, using the risk premium based on country risk provided by ratings agencies.

b. For an international investor, who has the ability to diversify globally, some of the risk might be diversifiable, and hence the true beta might be lower. To take care of this possible overstatement, it would be appropriate to compute a beta relative to a more global index, such as the Morgan Stanley Capital Index.

Problem 5

a. Using the CAPM, we compute the expected return as 0.03 + 1.2(0.0876) = 13.51%. We use a T-bill rate, because the focus is on the short-term expected return (the next year). For the same reason, we use the market premium over bills.

b. The cum-dividend price, one year from now, would be $50 (1.1351) = 56.75. The ex-dividend price, assuming that the stock price goes down by the amount of the dividend is 56.75 – 2.50 = $54.25.

c. Over the last year, the expected return would have been 15.51%, based on the prevailing T-bill rate then of 5%.

d. The actual returns were (-4+2)/54 = -3.70%

e. The unlevered beta based on the current capital structure would be 1.2/(1+(1-0.4)(50/100)) = 0.92. There is no debt in the new capital structure. Hence the new beta would be 0.92.

Problem 6

It's current levered beta is 1.2. Using the formula for leveraging a beta $\beta_L = \beta_u(1+(1-t)(D/E))$, we find the unlevered beta = 1.2/(1+(1-0.4)(50/100)) = 0.92. If the D/E ratio is increased to 8, we have the new levered beta equal to 0.92(1+(1-0.4)8) = 5.35.

Problem 7

a. The combined beta for Novell after the acquisition equals

$$\left(\frac{2}{1+2}\right)1.5+\left(\frac{1}{1+2}\right)1.3=1.43$$

b. If Novell borrowed the $1m., we would lever this beta to get 1.43(1+(1-0.4)(1/2)) = 1.86

Problem 8

a. Firm Value = $ 8 billion + $ 1 billion = $ 9 billion

We will assume that the debt is allocated to the divisions in proportion to the market value of equity of the divisions. The unlevered for Hewlett Packard as a company can be computed as $\left(\frac{2.25}{9}\right)1.1+\left(\frac{2.25}{9}\right)1.5+\left(\frac{1.125}{9}\right)2.0+\left(\frac{3.375}{9}\right)1.0=1.275$. Using the debt to equity ratio of 1/8, we can estimate HP's levered beta to be

Levered Beta = 1.275 (1 + (1-.36) (1/8)) = 1.377

Since the divisional structure and leverage of Hewlett Packard has probably changed over the years, the beta obtained by regressing past returns of HP against a market index will not be the same as 1.377.

b. If the T. bond rate is 7.5%, the cost of equity for the divisions can be computed as follows:

Business Group	Beta and Cost of Equity
Mainframes	Levered Beta = 1.1 (1+(1-.36) (1/8)) = 1.19 0.075+1.19(0.055) = 14.03%
Personal Groups	Levered Beta = 1.5(1+(1-.36) (1/8)) = 1.62 0.075+1.5(0.055) = 16.41%
Software	Levered Beta = 2.0(1+(1-.36) (1/8)) = 2.16 0.075+2.16(0.055) = 19.38%
Printers	Levered Beta = 1.0 (1+(1-.36) (1/8)) = 1.08 0.075+1.0(0.055) = 13.44%

To value the printer division, we would use a cost of equity of 13.44%.

c. We will assume that the mainframe division is sold for its estimated value of $2.25 billion. The value of the remaining divisions is now $ 6.75 billion.

After the divestiture, we'd have the unlevered beta equal to $\left(\frac{2.25}{6.75}\right)1.5 + \left(\frac{1.125}{6.75}\right)2.0 + \left(\frac{3.375}{6.75}\right)1.0 = 1.333$. If the proceeds are used to buy back stock, the market value of equity will drop to $5.75 billion. Using the information that HP had debt outstanding equal to $1.0 billion, the levered beta equals 1.333(1+(1-0.36)(1/5.75))=1.48

Problem 9

a. The degree of operating leverage is computed as %Δ Operating Income/% Δ Revenue.

Firm	Degree of Operating Leverage	Beta
PharmaCorp	25/27 = 0.92	1.0
SynerCorp	32/25 = 1.28	1.15
BioMed	36/23 = 1.56	1.3
Safemed	40/21 = 1.90	1.4

b. There is a clear relationship between the degree of operating leverage and the beta. The greater the degree of operating leverage, the more responsive income (and presumably stock returns) will be to changes in revenue which are correlated with changes in market movements.

Problem 10

It is possible that the service is adjusting the beta estimate towards the mean of 1.0

Problem 11

The volatility in commodity prices will be reflected in the beta only to the extent that commodity price movements are correlated with market movements. Commodity prices probably do not move closely with the rest of the market.

Problem 12

a. Here are the results of the regression of AD Corp. returns on the NYSE returns:

	Coefficients	Standard Error
Intercept	-0.14706	6.59342
X Variable	0.735294	0.670845

$R^2 = 0.285948$

The beta value of 0.735. The alpha is computed as –0.147.

b. Using the annualized 6-month T. bill rate as the riskfree rate, we get an expected return of 0.06 + 0.735(0.0876) = 12.44%.

c. Comparing the alpha of -0.147 to $(1-\beta)R_f = (1-0.735)0.06 = .0159$, we see that AD did worse than expected relative to the market.

dIf you were undiversified, you would be much more interested in the total standard deviation in the stock, since you cannot eliminate the firm specific risk. 72% (1-0.28) of this risk is diversifiable.

e. $0.735 = (0.2)(2x0.735) + (0.8)\beta_{rem}$, where β_{rem} is the beta of the remaining firm. Solving, we find $\beta_{rem} = 0.55$.

Problem 13

a. The required rate of return is 0.06 + 0.46(0.055) = 8.53%

b. $(1-R^2) = 95\%$ of this firm's risk is diversifiable.

c. The current unlevered beta = 0.46/(1+(1-0.36)(20/40)) = 0.35. The total firm is worth 60 m. The average beta of the divisions that will be kept must equal $0.35 = (1/3)0.20 + (2/3)\beta_{rem}$. Solving, $\beta_{rem} = 0.425$. The new unlevered beta equals

$$\left(\frac{40}{40+50}\right)0.425 + \left(\frac{50}{40+50}\right)0.80 = 0.63$$

The new levered beta = 0.63(1+(1-0.36)(50 /90))=0.85.

Problem 14

a. (β^2)(Var. of mkt)/Var. of stock = R^2; hence the $\beta = 1.41$

b. Intercept – $(1-\beta)R_f = 0.0039$; the monthly riskfree rate is computed as $(1.0484)^{1/12} - 1 =$ 0.0039465 or 0.39465%.

Intercept = 0.0039 – (1-1.141)(.0039465) = .45%

c. The two firms need not have the same beta, if the extents to which their relative stock price movements covary with the market are different. If AMR has a higher beta, then it will also have correspondingly a lower amount of diversifiable firm-specific risk.

Problem 15

a. The expected return over the next year = 0.048 + (1.65)(0.0876) = 19.25%.

b. In this case, we would use a geometric average estimate of the risk premium and a long-term T. bond rate to get 0.064 + (1.65)(0.055) = 15.48%

c. The extent of the monthly overperformance = $(1.511)^{1/12} - 1 = 3.5\%$.

Hence, Intercept – $(1-\beta)R_f = 0.035$, using a value of 0.0328 for the intercept, $R_f = 4.14\%$, after annualizing.

d. It's current unlevered beta = 1.65/(1+(1-0.4)(.03)) = 1.62. Taking into account the new leverage ratio of [2000+.03(265)(30)]/(265)(30) = 0.2816, the new levered beta becomes 1.62(1+(1-0.4)(.2816)) = 1.89.

Problem 16

a. The riskfree rate on a monthly basis equals 0.4868%. Hence the extent of overperformance equals –0.0005 – (1-1.2)(0.00487) = 0.05% approximately.

b. After the sale of the division and the share repurchase, MAD had $40m. in debt and $120 in equity. Hence, before these events, it would have had $160m. in equity and $20m. in debt. Assuming, for convenience, that the beta before the restructuring is still 1.2, we can compute its unlevered beta as 1.2/(1+(1-0.4)(20/160)) = 1.116. The unlevered beta of the leftover firm other than the magazine division, β_{rem}, must satisfy

$\left(\frac{20}{180}\right)0.6 + \left(\frac{160}{180}\right)\beta_{rem} = 1.116$; hence $\beta_{rem} = 1.1805$.

The new levered beta equals 1.1805(1+(1-0.4)(40/120)) = 1.4166.

Problem 17

a. The unlevered beta equals 1.61/(1+(1-0.4)(10/10))=1.01

b. If the debt ratio goes from 1 to .9 and then to 0.8, the levered beta would become 1.01(1+(1-0.4)(0.9)) = 1.5554 and 1.4948 respectively.

Problem 18

a. Unlevered Beta of the firm including cash can be computed by:

1.05/(1+(1-.36)(13000/355*50)) = 0.715

This beta is depressed by the fact that the firm has a substantial amount of cash on its balance sheet.

Unlevered beta of non-cash assets = Unlevered Beta / (1- Cash/ Firm Value)

= 0.715/(1- 8000/(13000 + 355*50)) = 0.966

b. If some of the cash is paid out, the unlevered beta of the firm will decrease:

Value of Firm after cash dividend = 13000 + 355*50 – 5000 = 25750

New unlevered beta = 0.966 (22750/25750) + 0 (3000/25750) = 0.85

c. The debt ratio would be rise to 13000/(355x50-5000). The levered beta is 0.85(1+(1-0.36)(13000/(355x50-5000))) = 1.41

Problem 19

Firm	Beta	debt	equity	d/e	unlevered beta
Black and Decker	1.4	2500	3000	0.833333	0.933333
Fedders	1.2	5	200	0.025	1.182266
Maytag	1.2	540	2250	0.24	1.048951
National Presto	0.7	8	300	0.026667	0.688976
Whirlpool	1.5	2900	4000	0.725	1.045296

The average unlevered beta = 0.9798. Using the private firm's leverage ratio of 25%, we can compute a levered beta of 0.9798(1+(1-0.4)(0.25))= 1.1268. (If, instead of estimating the unlevered beta for each of the comparable firms, you had used the average beta and debt to equity ratio for the sector to compute an unlevered beta, you would have estimated an unlevered beta of 0.9820)

b. Given the range of unlevered betas for these publicly traded firms, it might be that there are differences amongst these firms and between these firms and the private firm that are not averaged out in the numbers. For example, the degree of operating leverage

might be different. In addition, the private firm owner may not be diverisified, in which case it may be inappropriate to use betas in the first place.

Problem 20

a. The unlevered beta for the comparable firms would be 0.95/(1+(1-0.36)(0.35))= 0.7761. The levered beta for the division would be 0.7761(1+(1-0.36)(0.25))=0.90

b. If RJR Nabisco had a much higher fixed cost structure than comparable firms, then the division would probably have a higher unlevered beta as well.

Problem 21

The unlevered beta for the current business in 1995 would be 0.9/(1+(1-0.36)(1.0))= 0.5488. The unlevered beta of comparable media business firms is 1.2/(1+(1-0.36)(0.50)) = 0.9091. Hence the unlevered beta of the new business (including the media division) in 1999 can be estimated as 0.3(0.9091) + 0.7(0.5488) = 0.6569. Leveraging it up, we get the levered beta estimate of 1.077.

Southwestern's debt-to-capital ratio = _; if it decided to finance its media operations with a debt equity ratio of 50%, then the media division's debt-to-capital ratio would be 1/3. Hence, Southwestern's over-all debt-to-capital ratio would be 0.3(1/3) + 0.7(1/2) = 0.45; hence it's debt to equity ratio would be 9/11. Hence the levered beta would be 0.6569(1+(1-0.36)(9/11)) = 1.00

Problem 22

a., b. Not necessarily. A growing firm would expect its beta to decline, since it is becoming a larger portion of the market portfolio. Presumably, in some ways, it is also getting diversified.

The rate of decline would decrease eventually, and in any case, the beta shouldn't drop below 1.0, unless the firm sees other changes.

Problem 23

a. The levered beta using comparable firm data would be 1.15(1+(1-0.4)(0.2)) = 1.288.

b. Using the regression, a range estimate with a likelihood of 95% that the true beta lies within it, is –0.25 to 1.75.

c. Using the comparable firm beta,

Cost of Equity = 6.5% + 1.29 (5.5%) = 13.60%

Cost of Capital = 13.60% (10/12) + 7.5% (1-.4) (2/12) = 11.34%

Problem 24

a. With a default spread of 1% over the treasury bond rate, we have a pre-tax cost of debt of 7%. Hence the estimated value of the debt would be $\frac{600}{.07}\left[1-\frac{1}{1.07^n}\right]+\frac{10000}{1.07^n}$, where n is the average maturity of the debt. This works out to $9.523 billion, using an average maturity of 6 years

b. The pre-tax cost of debt would be 7%, given that BBB bonds earn 1% over the treasury bond rate. The after-tax cost of debt would be

After tax cost of debt = 7% (1-.35) = 4.55%

c. Using the estimated market value of debt, the debt-to-capital ratio is 9.523/(25+9.523) = 0.2759; the debt/equity ratio is 0.38. The levered beta estimate, using the average unlevered beta of firms in the industry is 0.8[1+(1-0.35)0.38] = 0.998; hence the cost of equity is 6+0.998(5.5) = 11.49. Hence, the cost of capital = (0.2759)(7)(1-0.35) + (1-0.2759)(11.49) = 9.576%

CHAPTER 9

MEASURING EARNINGS

Problem 1

Year	Operating Lease Expense	Present Value at 7%
1	90	84.11215
2	90	78.60949
3	85	69.38532
4	80	61.03162
5	80	57.03889
6-10	75	219.2538
	Sum of present values	569.4313

The debt value of operating leases is $569.4313 million. Including this amount in debt, the book value debt to equity ratio becomes 569/1000 or 0.5694

Problem 2

If EBIT (with operating leases expensed) equals $200 million, and we wish to capitalize operating leases and compute adjusted operating income, we need to make an assumption regarding the depreciation on the asset created by the operating lease capitalization. A convenient assumption is that the interest expense equals the difference between the actual operating lease payment and the depreciation on the asset. Hence the total amount to be expensed in the computation of net income is the actual lease payment.
However, in order to compute operating income alone, we need to add back the imputed interest payment, which would be 7% of the value of the capitalized operating leases as of one year ago. This would have been (569.4313+ 85)/1.07 = 611.62. Seven percent of this equals $42.81. Adjusted operating income is, therefore, $242.81.

Problem 3

If the book value of capital is $1 billion, and the reported debt to capital ratio is 10%, the book value of debt equals $100 million. If the present value of lease commitments is $750 million, the revised debt to capital ratio is (100+750)/(1000+750) = 48.57%.
The after-tax return on capital is 0.25x1000/1750 = 14.29%

Problem 4

Year	*R&D Expenses*	*Current Year Amortization*	*Unamortized amount*	*Percentage of Original Expense Unamortized*
-5	50	10	0	0
-4	60	12	12	20
-3	70	14	28	40
-2	80	16	48	60
-1	90	18	72	80
Current year	100		100	100
Sum		70	260	

I am assuming that the current year's R&D expense will not be amortized this year.

a. The value of the research asset equals $260 million.

b. The amount of R&D amortization this year is $70 millions.

c. The adjustment to operating income is to reduce it by 100-70 or $30 m.

Problem 5

Capital Invested is $1500 million. The value of the research asset is $1000 million. Hence the adjusted value of capital invested is $2500 million. EBIT(1-t) originally calculated was $1500 million; adjusted EBIT(1-t) equals approximately 1500 +250 –150 = 1600; hence Stellar Computer's adjusted return on capital is 1600/2500 = 64%.

CHAPTER 10

FROM EARNINGS TO CASH FLOWS

Problem 1

a. Effective tax rate = 0.25! 12.5/50

After-tax operating income = 37.5

	1	2	3	Terminal year
EBIT (1-t)	$41.25	$45.38	$49.91	$52.41
Reinvestment	$16.50	$18.15	$19.97	$20.96
FCFF	$24.75	$27.23	$29.95	$31.44
Terminal value			$524.08	
Present Value	$22.30	$22.10	$405.10	
Firm Value	$449.49			

b. Marginal tax rate rate = 0.35

After-tax operating income = 32.5

	1	2	3	Terminal year
EBIT (1-t)	$35.75	$39.33	$43.26	$45.42
Reinvestment	$16.50	$18.15	$19.97	$20.96
FCFF	$19.25	$21.18	$23.29	$24.46
Terminal value			$407.62	
Present Value	$17.34	$17.19	$315.08	
Firm Value	$349.61			

b. Marginal tax rate rate = 0.25

After-tax operating income = 37.5

	1	2	3	Terminal year
EBIT (1-t)	$41.25	$45.38	$49.91	$45.42 !
Tax rate changed in year 4				
Reinvestment	$16.50	$18.15	$19.97	$20.96

FCFF	$24.75	$27.23	$29.95	$24.46
Terminal value			$407.62	
Present Value	$22.30	$22.10	$319.94	
Firm Value	$364.34			

Problem 2

R & D adjustment

Year	R&D expense		Amortization	Remaining R&D
Current	$50.00		$50.00	
-1	$40.00	$13.33	$26.67	
-2	$30.00	$10.00	$10.00	
-3	$20.00	$6.67	$0.00	
Value of research asset			$86.67	
Amortization =		$30.00		

Adjusted Operating Income = 80 (1-.4) + 50 - 30 = $68.00

Free Cashflow to Firm

Adjusted Operating Income =	$68.00	
+ Depreciation & Amortization =	$50.00	! Includes amortization of R&D
- Cap Ex =	$160.00	! Includes R&D and acquistions
Free Cash flow to Firm =	-$42.00	

Problem 3

PV of Operating Lease Commitments =$310.49 ! PV of $ 50 million at cost of debt for 8 years

Adjusted EBIT = $78.63 ! = 60 + .06*310.49

EBIT (1-t) = $ 78.63 (1-.4) =	$47.18
+ Depreciation	50
- Capital Expenditures	110! Includes two acquisitions
- Change in Non-cash Working capital	-20
FCFF	$7.18

Non-cash working capital change = (180-80)-(200-120) = -20

I used the short cut for the adjusting operating leases. You could have added the entire operating lease expense back and subtracted out depreciation on the leased asset.

Problem 4

a. Net working capital =	40928	! 91524 - 50596
b. Non-cash working capital =	57241	! Net out cash and short term debt
c. As percent of revenues =	36.94%	

Problem 5

	1	2	3	4	5	
Revenues	$170,446	$187,491	$206,240	$226,864	$249,550	
Working capital as % of revenue		36.94%	36.94%	36.94%	36.94%	36
Change in working capital	$5,724	$6,297	$6,926	$7,619	$8,381	

	1	2	3	4	5	
Revenues	$170,446	$187,491	$206,240	$226,864	$249,550	
Working capital as % of revenue		4.30%	4.30%	4.30%	4.30%	4.
Change in working capital	$666	$733	$806	$887	$976	

(I have assumed immediate convergence. If you assume gradual convergence, your ratio will change each year)

Problem 6

a. Next year's FCFF

Revenues	1100
Working capital change	-5! Assuming that working capital is -5% of revenue
EBIT (1-t)	80
- Change in working capital	-5
FCFF	85

b. If we were forecasting cashflows for the next 10 years, we would use an industry average working capital percent or look at the firm's own history since it is unlikely (though not impossible) that working capital will continue to be a source rather than a use of cash.

CHAPTER 11

ESTIMATING GROWTH

Problem 1

Year	Year: No	EPS	ln(EPS)	Growth Rate
1989	1	$ 1.28	0.25	
1990	2	$ 1.42	0.35	10.94%
1991	3	$ 1.58	0.46	11.27%
1992	4	$ 1.78	0.58	12.66%
1993	5	$ 1.98	0.68	11.24%
1994	6	$ 2.30	0.83	16.16%

a. Arithmetic Average =12.45%

Geometric Average = (2.30/1.28)^(.2) -1 = 12.44%

b. EPS(t) = 1.025 + 0.199 (t)

Growth rate = 0.199/Average EPS =11.55%

c. ln(EPS(t)) = 0.12 + 0.1156 (t) ! Growth rate is 11.56%

Problem 2

a. Expected growth rate in earnings per share = 20% * (1-.37) = 12.6%
b. Expected growth rate in earnings per share if ROE changes = .25 (1-.37) + (.25-.20)/.20 = 40.75%

Problem 3

Return on equity = 150/1000 = 15%

Equity reinvestment rate = {(Net cap ex + Change in working capital) – Net Debt issued]/ Net Income = ((160 – 100 + 40) – 40)/ 150 = 40%

Expected growth rate = 15% * .40 = 6%

Problem 4

a. Return on capital = 100/800 = 12.5%

Reinvestment rate = (25 + 15)/ 100 = 40%

Expected growth rate = 12.5% * .4 = 5%

b. Expected growth rate = 15%*.4 + (15% - 12.5%)/12.5% = 26%

Problem 5

Year	*Current*	*1*	*2*	*3*	*4*	*5*
Revenues	$100.00	$200.00	$350.00	$525.00	$682.50	$887.25
Margin	-10.00%	-6.40%	-2.80%	0.80%	4.40%	8.00%
EBIT	-$10.00	-$12.80	-$9.80	$4.20	$30.03	$70.98

I am assuming a linear improvement in operating margins over time.

Problem 6

Revenues in most recent year = $ 25 million

Revenues in 10 years = $ 2 billion $(1.06)^{10}(.08)$ = $286.54 million

Expected growth rate = $(286.54/25)^{1/10}-1$ = 27.62%

CHAPTER 12

CLOSURE IN VALUATION: ESTIMATING TERMINAL VALUE

Problem 1

a. Operating income in year 5 = 100 million $(1.1)^5$ = $ 161.05 million

   Terminal value (year 5) = 161.05 * 8 = $1288.41 million

b. Value/ EBIT = (1- t) (1 – g/ ROC)/ (Cost of capital – g)

   8 = (1.4) (1-.05/ROC)/ (.10 - .05)

   Solving for ROC,

   ROC = .15 or 15%

Problem 2

Expected EBIT in year 6 = 80 $(1.20)^5$ (1.05) = $209.02 million

Expected EBIT (1-t) in year 6 = $209.02 (1 - .40) = $125.41 million

Reinvestment rate in year 6 = g/ ROC = 5/14 = 35.71%

Terminal value = $125.41 (1-.3571)/ (.10-.05) = $1612.43 million

Problem 3

a. Expected stable growth rate = ROC* Reinvestment rate

= 15% .30 = 4.5%

Expected high growth rate = .80 *.15 = 12%

EBIT (1-t) in year 5 = (.15*100) $(1.12)^4$ (1.045) = $24.66 million

Terminal value = 24.66 (1-.30)/(.09-.045) = $383.60 million

c. If return on capital drops to 9%, you can re-estimate value by either changing the reinvestment rate (keeping growth at 4.5%) or changing the growth rate (keeping the reinvestment rate at 30%).

If growth rate is kept fixed,

Reinvestment rate = 4.5/9 = 50%

Terminal value = 24.66 (1-.50)/(.09- .045) = $274 million

If reinvestment rate is kept fixed,

Expected growth rate = 9% (.30) = 2.7%

EBIT (1-t) in year 5 = (.15*100) $(1.12)^4$ (1.027) = $24.24 million

Terminal value = 24.24 (1-.30)/(.09-.027) = $269.33 million

Problem 4

a. Terminal value = 500 $(1.03)^{10}$ = $671.96 million

c. After-tax operating income in year 10 = 50 $(1.08)^{10}$ = $107.95 million

Terminal Value/ After-tax operating income = 671.96/107.95 = 6.22

d. Value = EBIT (1-t) (1+g)/ (r –g)

Value/ EBIT (1-t) = (1+g)/ (r – g)

6.22 = 1.03/ (r - .03)

Solving for r, cost of capital = 13.55%

Problem 5

a. After-tax operating income in year 6 = 20 $(1.1)^5$ (1.04) = $ 33.50 million

Net Cap ex in year 6 = (15-5) $(1.1)^5$ (1.04) = $16.75 million

Free cashflow to the firm in year 6 = $16.75 million

Terminal value of firm in year 5 = 16.75/(.12 - .04) = $209.375 million

c. Reinvestment rate = 10/20 = 50% (in perpetuity)

Return on capital in perpetuity = g/ Reinvestment rate = .04/.5 = 8%

d. Terminal value if net cap ex is zero = 33.50/ (.12-.04) = $ 418.75 million

e. Return on capital in perpetuity has to be infinite to allow growth rate to be positive while reinvestment rate is zero.

Problem 6

a. Expected after-tax operating income in year 4 = 40 $(1.07)^3$(1.03) = $50.96

Return on capital = 40/ 400 = 10%

Reinvestment rate in year 4 = g/ ROC = 3%/10% = 30%

Value at end of year 3 = 50.96 (1 - .30)/ (.10 - .03) = $ 509.60 million

b. If no growth after year 4

Value at end of year 3 = 50.96 (1- 0)/ (.10 – 0) = $ 509.60 million

c. If expected growth rate is –5%

Reinvestment rate = g/ ROC = -5/10 = -50%

Value at end of year 3 = 50.96 (1- (-.5))/ (.10 – (-.05)) = $ 509.60 million

There is a partial liquidation of the firm each year which adds to the cashflows.

Since the cost of capital = return on capital, the terminal value is not a function of the expected growth rate.

Problem 7

a. Expected after-tax operating income in year 4 = 40 $(1.07)^3(1.03)$ = \$50.96

Return on capital = 40/ 400 = 10%

Reinvestment rate in year 4 = g/ ROC = 3%/10% = 30%

Value at end of year 3 = 50.96 (1 - .30)/ (.08 - .03) = \$ 713.44 million

b. If no growth after year 4

Value at end of year 3 = 50.96 (1- 0)/ (.08 – 0) = \$ 637.0 million

c. If expected growth rate is –5%

Reinvestment rate = g/ ROC = -5/10 = -50%

Value at end of year 3 = 50.96 (1- (-.5))/ (.08 – (-.05)) = \$ 588 million

Since the cost of capital < return on capital, higher stable growth rates increase terminal value.

CHAPTER 13

DIVIDEND DISCOUNT MODELS

Problem 1

A. False. The dividend discount model can still be used to value the dividends that the company will pay after the high growth eases.

B. False. It depends upon the assumptions made about expected future growth and risk.

C. False. This will be true only if the stock market falls more than merited by changes in the fundamentals (such as growth and cash flows).

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

A. Cost of Equity = 6.25% + 0.90 * 5.5% = 11.20%

Value Per Share = $3.56 * 1.055/(.1120 - .055) = $65.89

B. $3.56 (1 + g)/(.1120 - g) = $80

Solving for g,

g = (80 * .112 - 3.56)/(80 + 3.56) = 6.46%

Problem 3

A. Retention Ratio = 1 - Payout Ratio = 1 - 0.42/1.50 = 72%

Return on Capital

= (Net Income + Int Exp (1-t))/(BV of Debt + BV of Equity)

= (30 + 0.8 * (1 - 0.385))/(7.6 + 160) = 18.19%

Debt/Equity Ratio = 7.6/160 = .0475

Interest Rate on Debt = 0.8/7.6 = 10.53%

Expected Growth Rate

= 0.72 [.1819 + .0475 (.1819 - .1053 * (1 - 0.385))] = 13.5%

Alternatively, and much more simply,

Return on Equity = 30/160 = .1875

Expected Growth Rate = 0.72 * .1875 = 13.5%

B. Expected payout ratio after 1998:

= 1 - g/[ROC + D/E (ROC - i (1-t))]

= 1 - .06/(.125+.25(.125 - .07(1-.385))

= 0.5876

C. Beta in 1993 = 0.85
Unlevered Beta = 0.85/(1 + (1 - 0.385) * 0.05) = 0.8246
Beta After 1998 = 0.8246 * (1 + (1 - 0.385) * 0.25) = 0.95

D. Cost of Equity in 1999 = 7% + 0.95 * 5.5% = 12.23%
Expected Dividend in 1999
= ($1.50 * 1.135^5 * 1.06) * 0.5876 = $1.76
Expected Price at End of 1998 = $1.76/(.1223 - .06) = $28.25

E.

Year	*EPS*	*DPS*	
1994	$1.70	$0.48	
1995	$1.93	$0.54	
1996	$2.19	$0.61	
1997	$2.49	$0.70	
1998	$2.83	$0.79	$28.25
Cost of Equity = 7% + 0.85 * 5.5% =			11.68%
PV of Dividends and Terminal Price (@ 11.68%) =			$18.47

F. Total Value per Share = $18.47
Value Per Share Using 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 4

A. Cost of Equity = 6.25% + 0.85 * 5.5% = 10.93%
Value of Stable Growth = $0.48 * 1.07/(.1093 - .07) = $13.07

B. Value of Extraordinary Growth
= $0.48 * (6/2) * (.25 - .07)/(.1093 - .07) = $6.60

C. The payout ratio is assumed to remain unchanged as the growth rate changes. The payout ratio in this case is assumed to remain at 60% (0.48/0.80).

Problem 5

A.

Period	*EPS*	*DPS*
1	$4.58	$0.79
2	$5.32	$0.92
3	$6.17	$1.07
4	$7.15	$1.21
5	$8.30	$1.43
6	$9.46	$2.35
7	$10.59	$3.56
8	$11.65	$4.94
9	$12.58	$6.44
10	$13.34	$8.00

B. Expected Price at End of 2003

= ($13.34 * 1.06 * 0.60)/(.1175 - .06) = $147.54

(Cost of Equity = 6.25% = 5.5% = 11.75%)

C.

PV of Dividends - High Growth =	$3.67
PV of Dividends - Transition =	$9.10
PV of Terminal Price =	$44.59
Value Per Share =	$57.36

Problem 6

a. Dividends = $ 20 million

Value of equity = 20 (1.05)/(.12-.05) = $ 300 million

b. Average annual stock buyback = 180/4 = $ 45 million

Modified dividends = $ 65 million

Value of equity = 65 (1.05)/(.12-.05) = $ 975 million

FREE CASH FLOW TO EQUITY DISCOUNT MODELS

Problem 1

A. True. Dividends are generally smoothed out. Free cash flows to equity reflect the variability of the underlying earnings as well as the variability in capital expenditures.

B. False. Firms can have negative free cash flows to equity. Dividends cannot be less than zero.

C. False. Firms with high capital expenditures, relative to depreciation, may have lower FCFE than net income.

D. False. The free cash flow to equity can be negative for companies, which either have negative net income and/or high capital expenditures, relative to depreciation. This implies that new stock has to be issued.

Problem 2

A. Value Per Share = $1.70 * 1.07/(.1203 - .07) = $36.20
(Cost of Equity = 6.25% + 1.05 * 5.50% = 12.03%)

B.

Current Earnings per share =	$3.20
- (1 - Desired Debt Fraction)(Capital Spending - Depreciation) = 83.61%* =$0.84	$1.00
- (1 - Desired Debt Fraction) * Δ Working Capital = 83.61% * $0.00 =	$0.00
Free Cash Flow to Equity =	$2.36

Cost of Equity = 6.25% + 1.05 * 5.5% = 12.03%

Value Per Share = $2.36 * 1.07/(.1203 - .07) = $50.20

This is based upon the assumption that the current ratio of capital expenditures to depreciation is maintained in perpetuity.

C. The FCFE is greater than the dividends paid. The higher value from the model reflects the additional value from the cash accumulated in the firm. The FCFE value is more likely to reflect the true value.

Problem 3

A.

Year	*EPS*	*Cap Exp*	*Depr*	*Δ 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	

The net capital expenditures (Cap Ex - Depreciation) and working capital change is offset partially by debt (20%). The balance comes from equity. For instance, in year 1:

FCFE = $2.71 - ($2.60 - $1.30) * (1 - 0.20) - $0.05 * (1 - 0.20) = $1.64)

Cost of Equity = 6.5% + 1 * 5.5% = 12%

Terminal Value Per Share = $5.08/(.12 - .06) = $84.74

Present Value Per Share = $1.64/1.12 + 1.89/1.12^2 + 2.19/1.12^3 + 2.54/1.12^4 + (2.93 + 84.74)/1.12^5 = $55.89

B.

Year	*EPS*	*Cap Exp*	*Depr*	*Δ 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	$52.09
6	$5.12	$4.90	$2.45	$0.04	$3.13	

Terminal Value Per Share = $3.13/(.12 - .06) = $52.09

Present Value Per Share = 1.64/1.12 + 1.89/1.12^2 + 2.19/1.12^3 + 2.54/1.12^4 + (2.93+52.09)/1.12^5 = $37.36

C.

Year	*EPS*	*Cap Exp*	*Depr*	*Δ 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	

Terminal Value Per Share = $2.75/(.12 - .06) = $45.85

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

The beta will probably be lower because of lower leverage.

Problem 4

A.

Year	*EPS*	*Cap Ex*	*Deprec*	*Δ WC*	*FCFE*	*Term. 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	$52.69
6	$4.16	$0.88	$0.59	$0.20	$3.71	

The net capital expenditures (Cap Ex - Depreciation) and working capital change is funded partially by debt (10%). 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) = $52.69

C. Present Value Per Share = $1.57/1.136 + 1.82/1.136^2 + 2.11/1.136^3 + 2.45/1.136^4 + (2.83 + 52.69)/1.136^5$ = $35.05

Problem 5

A.

Year	*1*	*2*	*3*	*4*	*5*
Earnings	$0.66	$0.77	$0.90	$1.05	$1.23
(CapEx-Deprec'n) * (1-∂)	$0.05	$0.06	$0.07	$0.08	$0.10
Δ Working Capital * (1-∂)	$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-∂)	$0.11	$0.13	$0.14	$0.15	$0.16
Δ Working Capital * (1-∂)	$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	1.10
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
End-of-Life Index					1

Stable Growth Phase

Growth Rate: Stable Phase = 5.00%

FCFE in Terminal Year =$1.95 (1.05)

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

B.

Year	*1*	*2*	*3*	*4*	*5*
Earnings	$0.66	$0.77	$0.90	$1.05	$1.23
(CapEx-Deprec'n)* (1-∂)	$0.05	$0.06	$0.07	$0.08	$0.10
Δ Working Capital * (1-∂)	$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-∂)	$0.11	$0.13	$0.14	$0.15	$0.16
Δ Working Capital *(1-∂)	$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	1.10
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
End-of-Life Index					1

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

C.

Year	1	2	3	4	5
Earnings	$0.66	$0.77	$0.90	$1.05	$1.23
(CapEx-Deprec'n) * (1-∂)	$0.05	$0.06	$0.07	$0.08	$0.10
Δ Working Capital * (1-∂)	$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-∂)	$0.11	$0.13	$0.14	$0.15	$0.16

Δ Working Capital * (1-∂)	$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 6

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. The reality, however, is that most analysts will not make this adjustment, and the dividend discount model value will be lower than the FCFE model value.

B. The dividend discount model will overstate the true value per share, 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 7

a. Equity Reinvestment rate

= (Cap Ex – Deprec'n + Chg in WC- Net Debt Issued)/ Net Income

= (50 –20 + 20 - 10)/ 80 = 50%

Return on Equity = Net Income/ Book value of equity = 80/ 400 = 20%

Expected growth rate = ROE * Equity Reinv. Rate = 20% * .5 = 10%

b.

Equity reinvestment rate after year 5 = g/ ROE = 4/12 = 33.33%

Year	Net Income	Equity Reinvestment	FCFE	Terminal value	PV
1	$88.00	$44.00	$44.00		$40.00
2	$96.80	$48.40	$48.40		$40.00
3	$106.48	$53.24	$53.24		$40.00
4	$117.13	$58.56	$58.56		$40.00
5	$128.84	$64.42	$64.42	$1,488.83	$964.44
6	$133.99	$44.66	$89.33		
					$1,124.44

Value of Equity today = $1,124.44 million

Problem 8

a. Non-cash return on equity

= (Net Income – Interest income from cash (1-t))/ (BV of equity – Cash)

= (100 – 10)/ (1000 – 200) = 90 / 800 = 11.25%

b. Equity reinvestment rate = g / ROE = 3% / 11.25% = 26.67%

Value of non-cash equity = 90 (1.03) (1- .2667)/ (.09 - .03) = $ 1,133 million

Value of equity = $1,133 million + $ 200 million = $1,333 million

(I valued cash separately and added it to the value of the non-cash equity.

CHAPTER 15

FIRM VALUATION: COST OF CAPITAL AND APV APPROACHES

Question 1

A. False. It can be equal to the FCFE if the firm has no debt.

B. True.

C. False. It is pre-debt, but after-tax.

D. False. It is after-tax, but pre-debt.

E. False. The free cash flow to firm can be estimated directly from the earnings before interest and taxes.

Question 2

A. FCFF in 1993 = Net Income + Depreciation - Capital Expenditures - Δ Working Capital + Interest Expenses (1 - tax rate)

= $770 + $960 - $1200 - 0 + $320 (1 - 0.36) = $734.80 million

B. EBIT = Net Income/(1 - tax rate) + Interest Expenses

= 770/0.64 + 320 = $1523.125 million

Return on Capital = EBIT (1-t)/ (BV of Debt + BV of Equity)

= 974.80/9000 = 10.83%

Reinvestment Rate = (1200-960)/974.80 = 24.68%

Expected Growth Rate in FCFF = Reinvestment Rate * ROC

= 0.2468 * 10.83% = 2.67%

Cost of Equity = 7% + 1.05 * 5.5% = 12.775%

Cost of Capital = 8% (1 - 0.36) (4000/(4000 + 12000)) + 12.775% (12000/(4000 + 12000)) = 10.86%

Value of the Firm = 734.80/(.1086 - .0267) = $8,972 millions

C. Value of Equity = Value of Firm - Market Value of Debt

= $ 8,972 - $4,000 = $ 4,972 millions

Value Per Share = $ 4,972/200 = $ 24.86

Question 3

A.

Yr	*EBITDA*	*Deprec'n*	*EBIT*	*EBIT (1-t)*	*Cap Exp.*	*∂ WC*	*FCFF*	*Term 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	$14,941

	'93-97	*After 1998*
Cost of Equity =	13.05%	11.89%
AT Cost of Debt =	4.80%	4.50%
Cost of Capital =	9.37%	9.45%

Terminal Value

= {EBIT (1-t)(1+g) - (Rev_{1998} - Rev_{1997}) * WC as % of Rev}/(WACC-g)

= (841 * 1.04) - (13500 * 1.095^5 * 1.04 - 13500 * 1.095^5)

* 0.07 /(.0945-.04) = $14,941

Value of the Firm

= 440/1.0937 + 482/1.0937^2 + 528/1.0937^3 + 578/1.0937^4 + (633 + 14941)/1.0937^5 = $11,566

B. Value of Equity in the Firm = ($11566 - Market Value of Debt) = 11566 - 3200 = 8366

Value Per Share = $8366/62 = $134.94

Question 4

A. Beta for the Health Division = 1.15

Cost of Equity = 7% + 1.15 * 5.5% = 13.33%

Cost of Capital = 13.33% * 0.80 + (7.5% * 0.6) * 0.2 = 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	$5,014

Now After 5 years

Cost of Equity	13.33%	13.33%
=		
Cost of Debt	4.50%	4.50%
=		
Cost of Capital	11.56%	11.56%
=		

Value of the Division = 283/1.1156 + 302/1.1156^2 + 321/1.1156^3 + 342/1.1156^4 + (364 + 5014)/1.1156^5 = $4,062 millions

C. There might be potential for synergy, with an acquirer with related businesses. The health division at Kodak might also be mismanaged, creating the potential for additional value from better management.

Question 5

Value = FCFF /(WACC-g)

750 = 30/(WACC-.05)

Solving for WACC,

WACC = .09

Given the cost of equity of 12% and the after-tax cost of debt of 6%,

Book Value weight for Equity = 0.50

The correct weights will be as follows:

Market Value Weight of Equity = (3*50)/(3*50+50) = 0.75

Correct Cost of Capital = 12% (.75) + 6% (.25) = 10.5%

Correct Value of Firm = 30/(.105-.05) = $545.45

Question 6

A. Cost of Equity = 7% + 1.25 * 5.5% = 13.88%
Current Debt Ratio = 1340/(1340 + 18.25 * 183.1) = 28.63%
After-tax Cost of Debt = 7.43% (1 - 0.4) = 4.46%
Cost of Capital = 13.88% (0.7137) + 4.46% (0.2863) = 11.18%

B. & C. See table below.

D/(D+E)	*Cost of*	*Beta*	*Cost of*	*AT Cost of*	*Cost of*	*Firm*

	Debt		*Equity*	*Debt*	*Capital*	*Value*
0%	6.23%	1.01	12.54%	3.74%	12.54%	$2,604
10%	6.23%	1.07	12.91%	3.74%	11.99%	$2,763
20%	6.93%	1.16	13.37%	4.16%	11.53%	$2,912
30%	7.43%	1.27	13.97%	4.46%	11.11%	$3,063
40%	8.43%	1.41	14.76%	5.06%	10.88%	$3,153
50%	8.93%	1.61	15.87%	5.36%	10.61%	$3,265
60%	10.93%	1.91	17.53%	6.56%	10.95%	$3,125
70%	11.93%	2.42	20.30%	7.16%	11.10%	$3,067
80%	11.93%	3.43	25.84%	7.16%	10.89%	$3,149
90%	13.43%	6.45	42.47%	8.06%	11.50%	$2,923

Unlevered Beta = 1.25/(1 + 0.6 * (1340/(183.1 * 18.25)) = 1.01

Levered Beta at 10% D/(D+E) = 1.01 * (1 + 0.6 * (10/90)) = 1.07

FCFF to Firm Next Year = (637 - 235) * (1 - 0.4) * 1.03 = $248.43 million

Value of the Firm = 255.67 * 1.03/(WACC-.03)

Problem 7

a. Cost of capital approach

Return on capital = 200 (1 - .4)/ 1200 = 10%

Reinvestment rate = g/ ROC = 4%/10% = 40%

Cost of equity = 5% + 1.2 (5.5%) = 11.6%

Cost of capital = 11.6% (1000/1500) + 6% (1-.4)(500/1500) = 8.93%

Value of firm

= EBIT (1-t) (1- Reinvestment rate) (1+g)/ (Cost of capital – g)

= 200 (1-.4) (1-.4)(1.04)/ (.0893 - .04) = $1,519 million

b. Unlevered beta = 1.20/ (1 + (1-.4)(500/1000)) = 0.9231

Unlevered cost of equity = 5% + 0.9231 (5.5%) = 10.08%

Unlevered firm value = = 200 (1-.4) (1-.4)(1.04)/ (.1008 - .04) = $1,232 million

+ PV of tax benefits from debt = Tax rate * Debt

= 0.40 * 500 = $ 200 million

- Expected bankruptcy costs = Probability of bankruptcy * Unlevered firm value *

Cost of bankruptcy = 0.10 * 1232 * .25 = $30.8 million

APV value of firm = $ 1232 + 200 – 30.8 = $ 1401.2 million

c. The APV approach considers only the tax benefits from existing debt, whereas the cost of capital approach assumes that debt will increase over time (to keep the debt ratio stable as the firm grows) and considers the potential tax benefits from future debt issues.

CHAPTER 16

ESTIMATING EQUITY VALUE PER SHARE

Problem 1

Value of operating assets= 250(1-.4)(1-.3333)(1.05)/(.10-.05) =	$1,049.90
+ Cash =	$500.00
- Debt =	$750.00
Value of equity =	$799.90
Value per share =	$4.00

Problem 2

Value of equity = $ 799.90 million

- Equity Options = $ 250.00 million

Value of equity in common stock = $ 599.90 million

Value per share = 599.90/200 = $ 3.00

Problem 3

Exercise proceeds from the options = 6 * 50 = $ 300 million

Treasury stock value per share = (Value of Equity + Exercise proceeds)/ (Number of shares + Number of options) = (799.9 + 300)/ (200 + 50) = $4.40 per share

A more conservative estimate would be obtained if we considered only in-the-money options for this calculation.

Problem 4

Market value of equity = $ 25,000 million

Market value of debt = $ 5000 million

Market value of firm = $ 30,000

- Cash =$ 3,000

Enterprise value = $ 27,000

Cost of capital = 12.5% (25/30) + 5% (5/30) = 11.25%

Enterprise value = EBIT (1-t) (1- Reinvestment rate) (1+g)/ (r –g)

27000 = EBIT (1-.3) (1 - .06/.15) (1.06)/ (.1125-.06)

Solving for EBIT,

EBIT = $3184 million

Problem 5

You would expect to see $1,200 million, which is the sum of the total operating earnings of the two firms. Consolidation requires that you show 100% of the operating earnings of the subsidiary.

Problem 6

Value of Genome Sciences = 300 (1.06)(1-.40)/(.12 - .06) = $3,180 million

Value of Gene Therapies = .10 (100 * 50) =	$ 500 million
Value of Genome Sciences (with minority holding) =	$ 3,680 million
- Debt =	$ 800 million
Value of Equity =	$ 2,880 million

Value per share = 2880/50 = $57.60

Problem 7

If the fund can never be liquidated,

Estimated value of $ 1 invested in fund at 9%(r = 12%) = .09/.12 = $0.75

The discount should be 25%.

If the fund will be liquidated in 10 years

Estimated value of $ 1 invested at 9% for 10 years (r = 12%) = $0.83

The discount should be 17%.

Problem 8

Analyst's estimate of value of equity = 11*1.4 = $15.40 million

a. Estimated value with treasury stock approach

Value per share = (15.40 + 0.4*5)/1.4 = $12.43 per share

c. With option pricing approach

Value per option (S= 12.5, K=5,t=3,r=5%,Std dev=80%) = $9.32

Value of Equity =	$15.40 million
Value of options = 0.4*9.32 =	$ 3.73 million
Value of equity in common stock =	$ 11.67 million

Value per share = $ 11.67/1 = $ 11.67/share

c. You could re-estimate the value of the options using the estimated value per share of $ 11.67 to arrive at a value of each option of $8.55. This would of course change the value per share to a slightly higher value. You could continue until you converge on a value per share.

CHAPTER 17

FUNDAMENTAL PRINCIPLES OF RELATIVE VALUATION

Problem 1

a & b. The difference is in the denominator and which one will give you the highest value will depend upon whether you are under a growing earnings environment or a declining earnings environment. In boom times, with increasing earnings, you would expect the current PE to give you the highest value. In periods of declining earnings, the forward PE will give you the highest value.

Problem 2

a & b. The numerator looks at overall firm value but the denominator is a measure of equity earnings. Firms with substantial leverage will have high values for this ratio, not because they are overvalued, but because of the inconsistency in measurement.

Problem 3

a & b. Multiples cannot be less than zero but can have very high positive values. This is because most multiples are viewed as non-meaningful if they are negative and are removed from the distribution.

c. As a consequence of the positive skewness, the averages are going to get pulled up by the outliers. An analyst comparing an individual firm's multiple to the average will conclude (wrongly) that many of them are undervalued.

Problem 4

There are two consequences. One is, as referenced in problem 4, the averages will be pulled up by the skewed distribution. The other is that you lose a fair number of firms in your sample, creating a potential bias in the sample.

CHAPTER 18

EARNINGS MULTIPLES

Problem 1

A. Payout Ratio = 1.06/$2.40 = 44.17 %

Expected Growth Rate = 6%

Cost of Equity = 7% + 1.05 * 5.5% = 12.775%

P/E Ratio = 0.4417 * 1.06/(.12775 - .06) = 6.91

B. The stock is trading at ten times earnings.

P/E Ratio = 10 = 0.4417 (1+g)/(.12775-g)

Solving for g in this equation,

g = (1.2775 - 0.4417)/10.4417 = 8.00%

Problem 2

A. Dividend Payout Ratio = Dividend Yield/(1/P/E)

= 0.025/(1/16.9) = 0.4225

Expected Growth Rate

= (1+Real Growth Rate) (1+ Expected Inflation) - 1

= 1.035 * 1.025 -1 = 6.09%

Cost of Equity = 6.95% + 5.5% = 12.45%

Expected P/E Ratio = Payout * (1 + g)/(r - g)

= 0.4225 * 1.0609/(.1245 - .0609) = 7.05

B. P/E Ratio = 16.9 = 0.4225 (1+g)/(.1245 - g)

Solving for g,

g = (16.9 * .1245 - 0.4225)/(16.9 + 0.4225) = 9.71%

In fact, this cannot be a stable growth rate.. It has to be valued using a high growth model.

C. Yes. It has to be real growth. If the growth arises because of higher inflation, interest rates will also rise, erasing much of the benefits of higher growth.

Problem 3

A.

	First 5 Years	*After Year 5*
Dividend Payout Ratio =	55.49%	60.00%
Return On Equity =	20.00%	15.00%
Expected Growth Rate =	8.90%	6.00%
Cost Of Equity =	13.05%	13.05%

$$PE = \frac{0.5549 * (1.0890) * \left(1 - \frac{(1.0890)^5}{(1.1305)^5}\right)}{(.1305 - .0890)} + \frac{0.6 * (1.089)^5 * (1.06)}{(.1305 - .06)\ (1.1305)^5}$$

$$= 9.97$$

B. P/E Ratio Based Upon Stable Growth (6%; 60% dividend payout)
= 0.6 * 1.06/(.1305 - .06) = 9.02
Difference Due to High Growth = 9.97 - 9.02 = 0.95

Problem 4

$$\text{A. } PE = \frac{0.10 * (1.15) * \left(1 - \frac{(1.15)^5}{(1.1388)^5}\right)}{(.1388 - .15)} + \frac{0.5 * (1.15)^5 * (1.06)}{(.1305 - .06)\ (1.1388)^5}$$

$$= 8.41$$

B. Growth Rate from 1983 to 1993 = $(0.78/0.08)^{(1/10)} - 1 = 25.57\%$

$$PE = \frac{0.10 * (1.2557) * \left(1 - \frac{(1.2557)^5}{(1.1388)^5}\right)}{(.1388 - .2557)} + \frac{0.5 * (1.2557)^5 * (1.06)}{(.1305 - .06)\ (1.1388)^5}$$

$$= 12.94$$

$$\text{C. } PE = \frac{0.10 * (1.10) * \left(1 - \frac{(1.10)^5}{(1.1388)^5}\right)}{(.1388 - .10)} + \frac{0.5 * (1.10)^5 * (1.06)}{(.1305 - .06)\ (1.1388)^5} = 6.77$$

Problem 5

A. Dividend Payout Ratio = 0.0274/(1/21.2) = 0.581
Cost of Equity = 6% + 5.5% = 11.5%

Solving for the Implied Growth Rate
g = (21.2 * .115 - 0.581)/(21.2 + .581) = 8.53%
1+g = (1+ Expected Inflation Rate) (1+ Real Growth Rate)

Solving for Expected Inflation

1.0853 = (1+Expected Inflation rate) (1.025)

Expected Inflation Rate = 1.0853/1.025 - 1 = 5.88%

(This assumes that the earnings are in stable growth. The analysis becomes much more complicated if you have a period of high growth)

B. The P/E ratio would go down. For instance, in the formulation above,

Dividend Payout Ratio = 0.581

Cost of Equity = 12.5%

Expected Growth Rate =8.53%

The new P/E ratio would be

P/E = 0.581 (1.0853)/(.125 - .0853) = 15.88

C. Not necessarily. If the increase in expected real growth is greater than the increase in interest rates, P/E ratios may go up as interest rates go up.

Problem 6

A. Average P/E Ratio for the Industry = 13.2

Median P/E Ratio for the Industry = 12.25

If the firms in this group are homogeneous, the average P/E ratio provides an estimate of how much the market values earnings in this sector, given the expected growth potential and the risk in the sector.

The average P/E ratio can be skewed by extreme values (usually high, since P/E cannot be less than zero). The median corrects for this by looking at the median firm in the sector.

B. This statement is likely to be true only if

(1) Thiokol has the same growth prospects and risk profile of the typical firm in the industry. It also generates cash flows for disbursement as dividends which are similar to the typical firm in the industry.

(2) Thiokol has higher growth potential and/or lower risk than the typical firm in the industry.

C. The regression of P/E ratios on fundamentals yields the following:

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

R^2= 0.4068

The following table provides predicted P/E ratios for the firms in the group:

	Actual P/E	*Predicted P/E*	*Difference*
Boeing	17.30	12.90	4.40
General Dynamics	15.50	17.90	-2.40
GM- Hughes	16.50	13.68	2.82
Grumman	11.40	12.07	-0.67
Lockheed Corp.	10.20	12.31	-2.11
Logicon	12.40	13.17	-0.77
Loral Corporation	13.30	13.21	0.09
Martin Marietta	11.00	11.34	-0.34
McDonnell Doug.	22.60	17.15	5.45
Northrop	9.50	14.82	-5.32
Raytheon	12.10	10.85	1.25
Rockwell	13.90	14.85	-0.95
Thiokol	8.70	11.44	-2.74
United Industrial	10.40	9.11	1.29

Again, negative numbers indicate that the stock is undervalued.

The problem with a regression like this one is that it has relatively few observations and is likely to be thrown off by a few extreme observations.

Problem 7

A. Expected Growth Rate = 25%

Unlevered Beta = 1.15/(1 + 0.6 * 0.25) = 1.00

FCFE = Net Income + Depreciation - Capital Spending = 10 + 5 - 12 = 3

Estimated Dividend Payout Ratio = 3/10 = 30%

P/E = 18.69 + 0.0695 * 25 - 0.5082 (1.00) - 0.4262 * 0.30 = 19.79

B.

1. The cross-sectional relationship between P/E ratio and the fundamentals may change over time.
2. The market might be overvaluing all stocks.
3. Some of the fundamentals, such as growth rate or beta, might be estimated with error.
4. We are assuming that private companies are valued like publicly traded stocks. (In other words, we are not allowing for diversification and illiquidity discounts)

CHAPTER 19

BOOK VALUE MULTIPLES

Problem 1

A. False. If the ROE< Required rate of return, this can be justified.

B. False, since the drop can be temporary. If the drop is permanent, this will be generally true, since there will be a two-layered impact. The growth will go down, pushing down Price/Book value ratios. The ROE will also go down pushing P/BV ratios down even further.

C. True, but only if we hold risk constant. It is false if we consider very risky stocks.

D. True. If other things (like risk) are not equal, this can be false.

E. False. The growth rate will be lower for these firms. The net effect may be a lower price/book value ratio.

Problem 2

A. Dividend Payout Ratio = \$2/\$4 = 50%

Return on Equity = \$4/\$40 = 10%

Cost of Equity = 7% +0.85 * 5.5% = 11.68%

Expected Growth Rate = 6%

Price/Book Value Ratio = (.1) (.5)(1.06)/(.1168 - .06) = 0.93

A simpler solution might be the following:

Price/Book Value Ratio = (.10 - .06)/(.1168 - .06) = 0.70

(This solution is internally more consistent since it takes into account the relationship between ROE and g, i.e., g=b(ROE))

B. If the P/BV ratio is 1.5, using the first approach,

1.5 = ROE (.5) (1.06)/(.1168 - .06),

Solving for ROE = 16.08%

Using the second approach,

1.5 = (ROE - .06)/(.1168 - .06)

Solving for ROE = 14.52%

Problem 3

A. Average Price/Book Value Ratio = 2.28

Average ROE = 12.44%

Average Beta = 1.10

B. Cost of Equity (based upon average beta) = 7% + 1.1 * 5.5%
= 13.05%

If P/BV = (ROE - g)/(r - g),
and ROE < r, (as in this case)
then P/BV <1.

Therefore, one may conclude that stocks in the industry are, on average, overvalued relative to book value (assuming that the industry overall is in stable growth, although individual firms might still have extraordinary growth).

Problem 4

A.

Price/Book Value of Equity

$$= \left[0.21 * \frac{0.10 * (1.30) * \left(1 - \frac{(1.30)^5}{(1.1633)^5}\right)}{(.1633 - .30)} + 0.21 * \frac{0.60 * (1.30)^5 * (1.06)}{(.133 - .06)\,(1.1633)^5} \right]$$

= 3.34

This takes the return on equity and the growth rate as a given. A more consistent result would be to estimate growth based upont he return on equity and retention ratio. If we did this, the expected growth rate in the high growth period would be:

Expected growth rate= ROE * Retention ratio = 21% * .9 = 18.9%

In stable growth, this firm should be able to payout out a lot more than 60%, with a growth rate of 6% and a a ROE of 21%:

Stable payout ratio = 1 – g/ROE = 1 – 6/21 = 71.43%

Price/Book Value of Equity

$$= \left[0.21 * \frac{0.10 \ * \ (1.189) \ * \left(1 - \frac{(1.189)^5}{(1.1633)^5}\right)}{(.1633 \ - \ .189)} + 0.21 * \frac{0.7143 \ * \ (1.189)^5 * (1.06)}{(.133 - .06)\ (1.1633)^5} \right]$$

$= 2.54$

B. Using the first approach:

Growth Rate	*Price/Book Value Ratio*
10%	1.47
15%	1.83
20%	2.25
25%	2.75
30%	3.34
40%	4.81
50%	6.76

C. Between 11 and 12 years (this can be solved through trial and error).

Problem 5

A.

	Next 10 yrs	After yr 10
Payout Ratio	37.00%	60.00%
Expected Growth	19.85%	6.00%
Cost of Equity	12.88%	11.50%
ROE	31.50%	15.00%

Expected Growth Rate = (1 - Payout Ratio)*ROE = (1 - .37) (.3150)

= .1985

Payout Ratio After Year 10 = 1 - Growth Rate / ROE

= 1 - 6%/15% = .60

Price / Book Value of Equity

$$= \left[0.315 * \frac{0.37 * (1.1985) * \left(1 - \frac{(1.1985)^{10}}{(1.1288)^{10}}\right)}{(.1288 - .1985)} + 0.15 * \frac{0.60 * (1.1985)^{10} * (1.06)}{(.115 - .06)\ (1.1288)^{10}} \right]$$

$= 4.80$

B.

	Next 10 years	*After year 10*
Payout Ratio	37.00%	60.00%
Expected Growth	12.60%	6.00%
Cost of Equity	12.88%	11.50%
ROE	20.00%	15.00%

Expected Growth Rate = (1 - Payout Ratio)*ROE = (1 - .37) (.20)

= .126

$$\boxed{\text{PBV} = \left[0.20 * \frac{0.37 * (1.126) * \left(1 - \frac{(1.126)^{10}}{(1.1288)^{10}}\right)}{(.1288 - .126)} + 0.15 * \frac{0.60 * (1.126)^{10} * (1.06)}{(.115 - .06)\ (1.1288)^{10}} \right] = 2.42}$$

Problem 6

A. The R squared of the regression measures the goodness of fit of the regression. A high R squared would provide the user with more comfort with the predictions from using the regression.

B. P/BV = 0.88 + 0.82 (0.2857) + 7.79 (.25) - 0.41 (1.05) + 13.81 (.175) = 5.05

This regression uses the information in the entire cross-section, and hence might capture more of the differences across firms in other industries.

Problem 7

Return on capital = 600/ (4000 + 1000) = 12%

Cost of capital = 11% (8000/9000) + 4% (1000/9000) = 10.22%

Value to Book = (ROC –g) / (Cost of capital – g) = (.12-.04) / (.1022 - .04) = 1.29

Problem 8

Value to book = 2 = (ROC - .04) / (.10 - .04)

Return on capital = 16%

Problem 9

$$\text{VBV} = \left[0.15 * \frac{(1 - \frac{.12}{.15}) * (1.12) * \left(1 - \frac{(1.12)^{10}}{(1.10)^{10}}\right)}{(.10 - .12)} + 0.12 * \frac{(1 - \frac{4}{12}) * (1.12)^{10} * (1.04)}{(.09 - .04)\ (1.09)^{10}} \right]$$

$$= 2.51$$

Problem 10

Tobin's Q measures the market value of assets in place as a ratio of the replacement cost of these assets. The market value of equity includes expected growth investments in the future and thus is much higher than the market value of assets in place.

CHAPTER 20

REVENUE MULTIPLES AND SECTOR-SPECIFIC MULTIPLES

Problem 1

A. Dividend Payout Ratio = $1.12/$2.45 = 0.4571

Expected Growth Rate = 6%

Cost of Equity = 7% + 0.9 (5.5%) = 11.95%

Profit Margin = 2.45/122 = 2%

P/S Ratio = .02 * 0.4571 * (1.06)/(.1195 - .06) = 0.16288

Price Based on this Multiple = 0.16288 * 122 = $19.87

B. P/S Ratio Needed for a Price of $34 = $34/122 = 0.2787

Profit Margin Needed for this P/S Ratio

= 0.2787 * (.1195 - .06)/(0.4571 * 1.06)

= 0.0342 or 3.42%

Problem 2

A. These are the two companies with high expected growth rates. These high growth rates may explain the high P/S ratios. In addition, the Bombay company has the highest profit margin of the group.

B.

Correlation between P/S ratio and profit margin =	0.8840
Correlation between P/S ratio and expected growth =	0.7694
Correlation between P/S ratio and beta =	0.2754
Correlation between P/S ratio and payout =	-0.4390

C. One measure that might work is the ratio of Price/Sales (P/S) ratio to profit margin. On this basis, Bradlee's which has a P/S ratio of 0.09 and a profit margin of 1.04%, Caldor and Sears are most likely to be undervalued, whereas the Bombay company with P/S-Margin ratio of 0.56 is most likely to be overvalued.

Company	*Price*	*Sales*	*P/S Ratio*	*Profit Margin*	*Exp. Growth*	*Beta*	*P/S-Margin*
Bombay Co.	$38	$9.70	3.92	7.01%	29.00%	1.45	0.559
Bradlees	15	168.6	0.09	1.04%	12.00%	1.15	0.086
Caldor	32	147.45	0.22	1.83%	12.50%	1.55	0.119

Consol. Store	21	23	0.91	4.13%	26.50%	1.35	0.221
Dayton Hudson	73	272.9	0.27	1.70%	12.50%	1.3	0.157
Federated	22	58.9	0.37	2.38%	10.00%	1.45	0.157
Kmart	23	101.45	0.23	1.72%	11.50%	1.3	0.131
Nordstrom	36	43.85	0.82	3.65%	11.50%	1.45	0.225
Penney	54	81.05	0.67	4.32%	10.50%	1.1	0.154
Sears	57	150	0.38	3.03%	11.00%	1.35	0.125
Tiffany's	32	35.65	0.9	4.21%	10.50%	1.5	0.213
Wal-Mart	30	29.35	1.02	3.58%	18.50%	1.3	0.286
Woolworth	23	74.15	0.31	1.82%	13.00%	1.25	0.17

Alternatively, a regression of P/S ratios against the fundamental variables could have been run and estimated P/S ratios can be obtained.

Problem 3

A.

Profit Margin = 221/8298 = 2.66%

$$PS = 0.0266 * \left[\frac{0.31*(1.135)*\left(1-\frac{(1.135)^5}{(1.13325)^5}\right)}{(.13325 - .135)} + \frac{0.60*(1.135)^5*(1.06)}{(.13325-.06)\ (1.13325)^5} \right]$$

$$= 0.275$$

B. P/S ratio for Stable Growth Firm with Same Margin

= 0.0266 * 0.6 * 1.06/(.13325 - .06) = 0.231

P/S ratio attributable to High Growth = 0.275 - 0.231 = 0.044

Problem 4

A.

$$PS = 0.1784 * \left[\frac{0.45 * (1.11) * \left(1-\frac{(1.11)^5}{(1.125)^5}\right)}{(.125 - .11)} + \frac{0.60 * (1.11)^5 * (1.06)}{(.125-.06)\ (1.125)^5} \right]$$

$$= 2.02$$

B. New Margin = 100/700 = 14.29%

Old Growth Rate

= Old Profit Margin * Sales/Book Value * (1 - Payout ratio)

= .1784 * Sales/Book Value * (1 - 0.45) = 11%

Sales/Book Value = 1.12

New Growth Rate (for high growth period)

= .1429 * 1.12 * (1 - 0.45) = 8.81%

Price / Sales Ratio

$$= 0.1429 * \left[\frac{0.45 * (1.0881) * \left(1 - \frac{(1.0881)^5}{(1.125)^5}\right)}{(.125 - .0881)} + \frac{0.60 * (1.0881)^5 * (1.06)}{(.125-.06)\ (1.125)^5} \right]$$

= 1.47

Problem 5

A.

	Next 10 Years	*After Year 10*
Payout Ratio	33.00%	60.00%
Sales/Book Value	2.50	2.50
Expected Growth Rate	16.75%	6.00%
Cost of Equity	14.15%	12.50%
Profit Margin	10.00%	10.00%

P/S Ratio = 1.59991143

Price per share = $39.00

B.

	Next 10 Years	*After Year 10*
Payout Ratio	33.00%	60.00%
Sales/Book Value	3.00	3.00
Expected Growth Rate	16.08%	6.00%
Cost of Equity	14.15%	12.50%
Profit Margin	8.00%	8.00%

P/S Ratio = 1.21549194

Price Per Share = $35.55

C. The status quo strategy is best, since it leads to a higher price per share.

D. Sales would have to drop 20%. (Sales/book value ratio would have to be 2.40 for the two strategies to be equivalent.)

Problem 6

A. The coefficients on this regression measure both the direction and the magnitude of the relationship between P/S ratios and independent variables. My concerns would be the same as for the peer group regression.

B.

Company	*P/S Ratio*	*Profit Margin*	*Payout*	*Exp. Growth*	*Beta*	*Predicted P/S*
Arbor Drugs	0.42	3.40%	18%	14.00%	1.05	0.39904
Big B Inc.	0.30	1.90%	14%	23.50%	0.70	0.48704
Drug Emporium	0.10	0.60%	0%	27.50%	0.90	0.28121
Fay's Inc.	0.15	1.30%	37%	11.50%	0.90	0.34188
Genovese	0.18	1.70%	26%	10.50%	0.80	0.37292
Longs Drug	0.30	2.00%	46%	6.00%	0.90	0.38680
Perry Drugs	0.12	1.30%	0%	12.50%	1.10	0.14108
Rite Aid	0.33	3.20%	37%	10.50%	0.90	0.48487
Walgreen	0.60	2.70%	31%	13.50%	1.15	0.33992

These predictions use the information in the entire cross-section, and should be more reliable.

C. P/S = 0.42 + 0.33 * 0 + 0.73 * 0.20 - 0.43 * 0.93 + 7.91 * 0.06
= 0.64

The values in this regression are the values of the private firm being valued.

Market Value of Equity = Revenues * Price/Sales Ratio
= 250 * 0.64 = $160 million

Problem 7

a. After-tax operating margin = 1.5/15 = 10%

Return on capital = After-tax Operating Margin * Turnover ratio = 10%*1.5 = 15%

Reinvestment rate = 5%/15% = 33.33%

Value to sales ratio = After-tax Margin * (1- Reinvestment rate) (1+g)/ (Cost of capital – g)

= .10 (1-.3333) (1.05)/(.10-.05) = 1.40

b. Reinvestment rate in first 5 years = g/ ROC = 10/15 = 66.67%

Value/Sales Ratio

$$= 0.10 * \left[\frac{(1 - .6667) * (1.10) * \left(1 - \frac{(1.10)^5}{(1.10)^5}\right)}{(.10 - .10)} + \frac{(1 - .3333) * (1.10)^5 * (1.05)}{(.10 - .05)(1.10)^5} \right]$$

$$= 0.10 * \left[(1 - .6667) * 5 + \frac{(1 - .3333) * (1.10)^5 * (1.05)}{(.10 - .05)(1.10)^5} \right] = 1.57$$

Problem 8

Value to sales ratio for Estee Lauder = 0.45 + 8.5 (.16) = 1.81

Value to sales ratio for GenCosmetics = 0.45 + 8.5 (.05) = 0.875

Value of brand name = (1.81 – 0.875) (500) = $467.5 million

Problem 9

d. Return on capital = Operating Margin * Sales/ Book

=(18/ 100)*(100/90) = 20%

Reinvestment rate = g/ ROC = 5/20 = 25%

Value to Sales ratio = .18 (1-.25)(1.05)/(.10-.05) = 2.835

b. Return on capital for generic firms = 10%

Reinvestment rate = 5/10 = 50%

Value to Sales ratio = .09 (1-.5)(1.05)/(.10-.05) = 0.945

Brand name value = (2.835 – 0.945) (100) = $ 189 million

CHAPTER 21

VALUING FINANCIAL SERVICE FIRMS

Problem 1

a. Return on equity = 4/40 = 10%

Expected growth rate = ROE * Retention ratio = 10%*(1-.6) = 4%

Value per share = 2.40 (1.04)/ (.096 -.04) = $44.57

b. Value = 2.40 (1+g)/ (.096 – g) = 40

Solving for g,

Implied growth rate = 3.40%

Problem 2

a. Return on equity = 2.00/14 = 14.29%

Expected growth rate = ROE * Retention ratio = 14.29% (1-.20/2.00) = 12.86%

b. Value per share

Payout ratio in year 6 = 1 – g/ ROE = 1 – 5/12 = 58.33%

Cost of equity in high growth = 6% + 1.10(4%) = 10.40%

Cost of equity in stable growth = 10%

Year	EPS	DPS	Terminal price	PV
1	$2.26	$0.23		$0.20
2	$2.55	$0.25		$0.21
3	$2.87	$0.29		$0.21
4	$3.24	$0.32		$0.22
5	$3.66	$0.37	$44.86	$27.57
6	$3.84	$2.24		
				$28.42

Terminal value = 2.24/(.10 - .05) = $ 44.86

Value per share (discounted at 10.40%) = $26.39

Problem 3

a. Price to Book ratio = 1.40 = (ROE - .04)/ (.11 - .04)

Solving for ROE, ROE = 13.8%

b. If ROE = Cost of equity, the price to book ratio will become one.

Problem 4

a. I would expect Sun Trust to trade at a lower price to book ratio, because it has a lower return on equity than the average for the sector.

Company Name	*P/BV*	*ROE*
Wachovia Corp.	2.05	18.47%
PNC Financial Serv.	2.54	21.56%
SunTrust Banks	1.91	15.35%
State Street Corp.	6.63	19.52%
Mellon Financial Corp.	4.59	23.95%
Morgan (J.P.) & Co	1.74	19.39%
First Union Corp.	1.52	19.66%
FleetBoston Fin'l	2.25	20.15%
Bank of New York	7.01	25.36%
Chase Manhattan Corp.	2.6	24.60%
Wells Fargo	3.07	17.72%
Bank of America	1.69	19.31%
Bank of Montreal	1.23	18.08%
Average	**2.99**	**20.24%**

b. Regressing price to book ratios against return on equity

PBV = -4.08 + 34.91 ROE

Company Name	*P/BV*	*ROE*	*Predicted PBV*
Wachovia Corp.	2.05	18.47%	2.37
PNC Financial Serv.	2.54	21.56%	3.45
SunTrust Banks	1.91	15.35%	1.28
State Street Corp.	6.63	19.52%	2.74
Mellon Financial Corp.	4.59	23.95%	4.28
Morgan (J.P.) & Co	1.74	19.39%	2.69
First Union Corp.	1.52	19.66%	2.78
FleetBoston Fin'l	2.25	20.15%	2.96
Bank of New York	7.01	25.36%	4.77
Chase Manhattan Corp.	2.6	24.60%	4.51
Wells Fargo	3.07	17.72%	2.11
Bank of America	1.69	19.31%	2.66
Bank of Montreal	1.23	18.08%	2.23

Problem 5

a. Value of the loan portfolio = 75 million (PVA, 6 years, 6.5%) + $1000/1.065^6$= $1.048 million

b. Value of equity = Value of loan – Value of debt = 1048 – 800 = $ 248 million

Problem 6

a. Return on equity = 20%

Cost of equity = 5.2% + 1.2 (4%) = 10%

Excess equity returns this year = (.20 - .10) (100) = $ 10 million

Expected growth rate = ROE * Retention ratio = .20 * .7 = 14%

Year	*Excess equity return*	*PV at 10%*	*BV of Equity at beginning of year*
1	$11.40	$10.36	$114.00
2	$13.00	$10.74	$129.96
3	$14.82	$11.13	$148.15
4	$16.89	$11.54	$168.90
5	$19.25	$11.96	$192.54
6	$21.95	$12.39	$219.50
7	$25.02	$12.84	$250.23
8	$28.53	$13.31	$285.26
9	$32.52	$13.79	$325.19
10	$37.07	$14.29	$370.72

BV of Equity at beginning of year = BV of Equity (1+ growth rate)

c. Value of equity = Book value of equity + PV of excess equity return

= 100 + 122.35 = 222.35 million

c. If the return on equity after year 10 is 15%:

Excess equity return in year 11 = (.15 - .10) (BV of equity end of year 10)

= (.15 - .10) (370.72*1.14) = $21.13 million

Assuming no growth in excess equity returns over time

Terminal value of excess equity return = 21.13/ .10 = $211.30 million

PV of terminal value = 211.30 / 1.10^{10} = $81.46 million

This value will increase if you assume a perpetual growth rate.

CHAPTER 22

VALUING FIRMS WITH NEGATIVE EARNINGS

Problem 1

A.

Year	*EPS*
1984	$0.69
1985	$0.71
1986	$0.90
1987	$1.00
1988	$0.76
1989	$0.68
1990	$0.09
1991	$0.16
1992	($0.07)
1993	($0.15)
Average Earnings Per Share =	$0.48

Normalized Earnings Per Share in 1994 = $0.48 * 1.06 = $0.51

B.

Normalized Earnings Per Share =	$0.51
- (Cap Ex - Deprec'n) * (1 - Debt ratio) =	$0.25
- Δ Working Capital * (1- Debt ratio) =	$0.06
Normalized FCFE Next Year =	$0.19

(Assume that capital expenditures and depreciation will grow 6% in 1994.)

Problem 2

A.

Total Assets in 1993 =	$25,000	(in millions)
Normalized Return on Assets=	12%	
Normalized Return on Assets (pre-tax) =	20%	

Normalized Income statement (based upon 12% ROA)

Earnings Before Interest and Taxes =	5000
Interest Expenses =	1400

Earnings Before Taxes =	3600
Taxes (at 40%) =	1440
Net Income =	2160
- (Cap Ex - Deprec'n) * (1-Debt ratio) =	500
FCFE	1660

Cost of Equity = 7% + 1.1 * 5.5% =	13.05%
Expected Growth Rate =	5%

Earnings before interest and taxes is calculated using the ROA:

ROA = EBIT (1- tax rate) / Total Assets = 12% (given in the problem)

Value of Equity = (1660 * 1.05)/(.1305 - .05) = $21,652

B. Value of Equity = $21,652/$1.1305^2$ = $16,942

Problem 3

A.

Earnings Before Interest and Taxes =	$52.70
- Interest Expense =	$17.00
Earnings Before Taxes =	$35.70
- Taxes (40%)	$14.28
Earnings After Taxes =	$21.42
- (Cap Ex - Deprec'n) * (1-Debt Ratio) =	$3.75
- Δ Working Capital * (1- Debt Ratio) =	$4.76
FCFE =	$12.91

EBIT = Interest Expense * Interest Coverage Rate = $17 * 3.10 = $ 52.70

The change in working capital is based upon revenues growing at 4%.

B. Cost of Equity = 7% + 1.1 * 5.5% = 13.05%

Expected Growth Rate = 4%

Value of Equity = 12.91 * 1.04/(.1305 - .04) = $148.36 million

Problem 4

A.

Year	*Net Income*	*(in millions)*
1987	$0.30	
1988	$11.50	
1989	($2.40)	

1990	$7.20
1991	($4.60)
1992	($1.90)
Average =	$1.68

Net Income =	$1.68
- (Cap Ex - Deprec'n) * (1 - Debt ratio) =	1.30
= FCFE =	$0.38

B. Cost of Equity (until 1996) = 7% +1.2 * 5.5% = 13.6%

Cost of Equity (after 1996) = 7% + 5.5% = 12.5%

Year	*Net Income*	*(Cap. Ex - Deprec'n) * (1 - Debt Ratio)*	*FCFE*	*Terminal Value*
1993	$1.78	$1.37	$0.42	
1994	$1.89	$1.43	$0.45	
1995	$2.00	$1.50	$0.50	
1996	$2.12	$1.58	$0.54	$11.20
Term Year	$2.23	$1.70	$0.63	

Terminal Value = $0.63/(.125 - .05) = $8.40 million

Value of Equity

$= 0.42/1.136 + 0.45/1.136^2 + 0.50/1.136^3 + (0.54 + 8.40)/1.136^4$

= $6.43 million

Value per Share = $ 6.43 million/ 0.5 = $12.86

Problem 5

A.

	Equity	*Debt*
Market Value Weight	61.61%	38.39%
Cost of Component	13.33%	5.10%

Cost of Capital = 13.33% (0.6161) + 5.1% (0.3839) = 10.17%

B.

Year	*1993*	*1994*	*1995*	*1996*	*Terminal Year*
EBIT (1-t)	$8.25	$9.08	$9.98	$10.98	$11.42
- (Cap Ex - Deprec'n)	$0.00	$0.00	$0.00	$0.00	$0.00

- Δ Working Capital	$0.00	$0.00	$0.00	$0.00	$0.00
= FCFF	$8.25	$9.08	$9.98	$10.98	$11.42
Terminal Value				$185.18	

Terminal Value = $11.42/(.1017 - .04) = $185.18

Present Value = $8.25/1.1017 + $9.08/$1.1017^2$ + $9.98/$1.1017^3$ + ($10.98 + $185.18)/$1.1017^4$ = $155.60 million

C. Value of Equity = Value of Firm - Market Value of Debt = $155.60 - $109 = $46.60 million

Value of Equity Per Share = $46.60/15.9 = $2.93

Problem 6

a. Normalized net income next year = .10 * 1000	=	$ 100 million
Net Cap Ex (1- debt ratio) = 80 (1.05)(1-.25)	=	$ 63 million
Change in working capital = [1575(.095) - 1500(.10)] (1-.25) -=		$ 0 million
FCFE	=	$ 37 million

c. To value the firm, we first have to re-estimate the free cashflows to equity with normalized working capital – the change computed above cannot be sustained in perpetuity since it reflects a change in working capital as a percent of revenues

Normalized net income next year = .10 * 1000	=	$ 100 million
Net Cap Ex (1- debt ratio) = 80 (1.05)(1-.25)	=	$ 63 million
Change in working capital = [1575(.095)-1500(.095)](1-.25) =		$ 5.34 million
FCFE	=	$ 31.66 million

Value of Equity = 31.66/ (.09-.05) = $ 791.50 million

Problem 7

A,

	Current	*1*	*2*	*3*	*4*	*5*	*Terminal year*
Revenues	$5,000.00	$5,500.00	$6,050.00	$6,655.00	$7,320.50	$8,052.55	$8,455.18
EBITDA	$300.00	$484.00	$701.80	$958.32	$1,259.13	$1,610.51	$1,691.04
Depreciation	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$840.00
EBIT	-$500.00	-$316.00	-$98.20	$158.32	$459.13	$810.51	$851.04
- t* EBIT	$0.00	$0.00	$0.00	$0.00	$0.00	$125.50	$340.41
EBIT (1-t)	-$500.00	-$316.00	-$98.20	$158.32	$459.13	$685.01	$510.62

+ Depreciation		$800.00	$800.00	$800.00	$800.00	$800.00	$840.00
- Cap Ex		$600.00	$600.00	$600.00	$600.00	$600.00	$1,095.31
FCFF		-$116.00	$101.80	$358.32	$659.13	$885.01	$255.31
Terminal value						$6,382.77	
PV		-$106.42	$85.68	$276.69	$466.94	$4,723.55	
Value of firm	$5,446.45						
EBITDA Margin	6.00%	8.80%	11.60%	14.40%	17.20%	20.00%	20.00%
NOL	700	1016	1114.2	955.88	496.754	0	

c. If there was a 20% chance of bankruptcy, the value of the firm today can be written as follows:

DCF Value (1- Probability of distress) + Distress sale value (probability of distress)

= 5446.45 (1-.20) + .6*1250 * .20 = $4,507 million

VALUING YOUNG OR START-UP FIRMS

Problem 1

Year	Current	1	2	3	4	5
Revenues	500	1000	1800	2520	3528	4939.2
Operating Margin	-80.00%	-62%	-44%	-26%	-8%	10%
EBIT	-400	-620	-792	-655.2	-282.24	493.92

Problem 2

	10-K	1Q 2001	1Q 2000	Trailing 12 month
Revenues	$1,100	$600	$120	$1,580
Operating loss	-$330	-$180	-$30	-$480

Problem 3

Total Market in 10 years = 25000 * 1.05^{10} = $ 40, 722 million

Revenues in year 10 = total Market * market share = 40722 * .10 = $ 4072 million

Revenues today= $ 25 million

Revenue growth = $(4072/25)^{1/10}$-1 = 66.41%

Problem 4

Year	Current	1	2	3	4	5
Revenues	$1,000.00	$1,200.00	$1,440.00	$1,728.00	$2,073.60	$2,488.32
Operating Margin	-$0.09	-$0.06	-$0.03	$0.00	$0.06	$0.10
EBIT	-$90.00	-$72.00	-$43.20	$0.00	$124.42	$248.83
EBIT *t	$0.00	$0.00	$0.00	$0.00	$0.00	$31.22
EBIT (1-t)	-$90.00	-$72.00	-$43.20	$0.00	$124.42	$217.61
NOL	$180.00	$252.00	$295.20	$295.20	$170.78	$0.00

Problem 5

Year	Current	1	2	3	4	5
Beta	2	1.84	1.68	1.52	1.36	1.2
Cost of equity	13.60%	12.96%	12.32%	11.68%	11.04%	10.40%
Cost of debt	9%	9%	9%	9%	9%	9%
After-tax cost of debt		9.00%	9.00%	9.00%	9.00%	7.87%
Debt ratio	70%	66.00%	62.00%	58.00%	54.00%	50.00%
Cost of capital		10.35%	10.26%	10.13%	9.94%	9.14%

Problem 6

Value of Vitale = DCF Value (1 – Probability of distress) + Distress sale value (Probability of distress) = 700 (1-.4) + 1.5 *100 *4 = $ 510 million

Value per share = 510/30 = $ 17 per share

CHAPTER 24

VALUING PRIVATE FIRMS

Problem 1

a.& b.

Average beta=	1.35666667
Average debt/equity=	0.13653333
Unlevered beta =	1.24764572
Total beta =	2.49529144
Total levered beta=	2.71306233
Cost of equity =	20.92%
Cost of capital =	19.08%

After year 5, I use a total beta of 2.00 (Market beta of 1/ 0.5)

Cost of equity = 6% + 2*5.5% = 17%

Cost of capital = 17% (.88) + 8.75% (1-.36)(.12) = 15.63%

Year	*Current*	*1*	*2*	*3*	*4*	*5*	*Terminal Year*
Revenues	$50.00	$65.00	$84.50	$109.85	$142.81	$185.65	$196.79
EBIT	$9.50	$12.35	$16.06	$20.87	$27.13	$35.27	$37.39
EBIT (1-t)		$7.90	$10.28	$13.36	$17.37	$22.57	$23.93
- Net cap ex	$3.50	$4.55	$5.92	$7.69	$10.00	$13.00	$13.77
- Chg in WC		$1.50	$1.95	$2.54	$3.30	$4.28	$1.11
FCFF		$1.85	$2.41	$3.13	$4.07	$5.30	$9.04
Terminal value						$93.86	
PV		$1.56	$1.70	$1.86	$2.03	$41.40	
Firm Value	$48.54						
- Debt	$5.83						
Value of Equity	$42.72						

a. For an initial public offering, you would use a market beta

Year	Current	1	2	3	4	5	Terminal Yea
Revenues	$50.00	$65.00	$84.50	$109.85	$142.81	$185.65	$196.7
EBIT	$9.50	$12.35	$16.06	$20.87	$27.13	$35.27	$37.3
EBIT (1-t)		$7.90	$10.28	$13.36	$17.37	$22.57	$23.9
- Net cap ex	$3.50	$4.55	$5.92	$7.69	$10.00	$13.00	$13.7
- Chg in WC		$1.50	$1.95	$2.54	$3.30	$4.28	$1.1
FCFF		$1.85	$2.41	$3.13	$4.07	$5.30	$9.0
Terminal value						$188.65	
PV		$1.56	$1.70	$1.86	$2.03	$80.99	
Firm Value	$88.13						

- Debt	$10.58		
Value of Equity	$77.55		
Average beta=		1.35666667	
Average debt/equity=		0.13653333	
Unlevered beta =		1.24764572	
Total beta =		1.24764572	
Total levered beta=		1.35653116	
		High Growth	Stable Growth
Beta		1.36	1.00
Cost of equity =		13.46%	11.50%
Cost of capital =		12.52%	10.79%

Problem 2

a. Using the Silber regression

Silber regression = (100- exp(4.33+0.036*LN(Revenues) - 0.142* LN(Block size*100) +0.174*Earnings Dummy)) /100

Revenues = 200 million

Block Size = 100% = 1

Earnings Dummy = 1 (positive earnings)

Discount = (100-exp(4.33+0.036*LN(200)-0.142 *LN(1*100) +0.174*1))/100

= 43.13%

Value of firm = 250 (1- .4313) = $142 million

b. Adjusting the base discount

Base discount for firm with revenues of $ 10 million = 25%

Adjustment for revenues = ((100-EXP(4.33+0.036*LN(10)-0.142*LN(1*100)+0.174*1))/100-(100-EXP(4.33+0.036*LN(200)-0.142*LN(1*100)+0.174*1))/100) = 5.81%

Adjusted discount = 25% - 5.815 = 19.19%

Value of firm = 250 (1 - .1919) = $ 202 million

Problem 3

a. Value of Business

Assuming that the business will be sold to a diversified buyer, we use the market beta:

Cost of equity = 7% + 1.1*(5.5%) = 13.05%

Cost of capital = 13.05% (.5) + 8% (1-.4) (.5) = 8.925%

To estimate cashflows, we consider only the portion of the operating income that is not due to the current owner:

EBIT	=	60000
EBIT (1-t)	=	36000
- Net Cap ex	=	10000
FCFF	=	26000

Present value of $26,000 growing at 5% a year for 10 years = $203,486

Present value of Salvage value of $ 500,000 in 10 years= $212.664

Value of Business = $ 416,150

b. If the chef offers to stay on,

	1	2	3
EBIT	105000	110250	115762.5
EBIT without chef	63000	66150	69457.5
Additional income	42000	44100	46305
After-tax income	25200	26460	27783
PV	23135	22301	21497

Additional value of cashflows = $ 66,934

Value of Business = 416150 + 66934 =$ 483, 084.

Problem 4

a. Cost of capital

Unlevered beta = 1.20

Estimated market value of equity = $ 10 million * 3 = $ 30 million

Debt/Equity = 10/30

Levered beta = 1.20 (1 + (1-.40)(10/30)) = 1.44

Cost of equity = 6% + 1.44 (5.5%) = 13.94%

Cost of debt = 1/10 (I am assuming that the debt is recent)

Cost of capital = 13.94% (30/40) + 10% (1-.4) (10/40) = 11.94%

When we get to the terminal year, I would lower the beta to 1

Cost of equity = 11.5%

Cost of capital = 11.5% (30/40) + 10% (1-.4) (10/40) = 10.13%

(You could also adjust the cost of debt down)

b. & c. Firm Value & Equity value per share

Reinvestment rate after year 5 = g/ ROC = 5%/15% = 33.33%

Cap ex in year 6 = (3.14 *.3333) + Depreciation in year 5 (1.05)

Year	*Current*	*1*	*2*	*3*	*4*	*5*	*Terminal year*
Revenues	$20.00	$24.00	$28.80	$34.56	$41.47	$49.77	$52.25
EBIT	$2.00	$2.40	$2.88	$3.46	$4.15	$4.98	$5.23
EBIT (1-t)		$1.44	$1.73	$2.07	$2.49	$2.99	$3.14
+ Depreciation	$0.50	$0.60	$0.72	$0.86	$1.04	$1.24	$1.31
- Cap Ex	$1.00	$1.20	$1.44	$1.73	$2.07	$2.49	$2.35
FCFF		$0.84	$1.01	$1.21	$1.45	$1.74	$2.09
Terminal value = 2.09/ (.1013 -.05) =						$40.78	
PV (@11.94%)		$0.75	$0.80	$0.86	$0.92	$24.20	
Value of firm =		$27.54					
- Debt		$10.00					
Value of Equity =		$17.54					
Value per share =		$17.54					

Problem 5

I would make two adjustments. First, I would use the total beta, rather than the market beta:

First 5 years

Total Beta = 1.44/0.6 = 2.40

Cost of equity = 6% + 2.4 (5.5%) = 19.20%

Cost of debt = 10% (1-.4) = 6%

Cost of capital = 19.20% (30/40) + 6% (10/40) = 15.90%

Terminal year

Total Beta = 1/0.6 = 1.67

Cost of equity = 6% + 1.67 (5.5%) = 15.17%

Cost of capital = 15.17% (30/40) + 6% (10/40) = 12.88%

Year Current 1 2 3 4 5 Terminal yea

Revenues	$20.00	$24.00	$28.80	$34.56	$41.47	$49.77	$52.2
EBIT	$2.00	$2.40	$2.88	$3.46	$4.15	$4.98	$5.2
EBIT (1-t)		$1.44	$1.73	$2.07	$2.49	$2.99	$3.1
+ Depreciation	$0.50	$0.60	$0.72	$0.86	$1.04	$1.24	$1.3
- Cap Ex	$1.00	$1.20	$1.44	$1.73	$2.07	$2.49	$2.3
FCFF		$0.84	$1.01	$1.21	$1.45	$1.74	$2.0
Terminal value						$26.54	
PV		$0.72	$0.75	$0.78	$0.80	$13.52	
Value of firm =		$16.58					
- Debt		$10.00					
Value of Equity =		$6.58					

I would apply a liquidity discount:

Illiquidity Discount = 0.14 – 0.015 (ln(Revenues)) = .0951

Value of Equity = 6.58 (1-.0951) = $5.96 million

CHAPTER 25

ACQUISITIONS AND TAKEOVERS

Problem 1

a to d: see below:

	Grumman Independent	*Northrop Independent*	*Combined No synergy*	*Combined With Synergy*
Revenues	$3,281	$4,620	$7,901	$7,901
- COGS	$2,920	$4,043	$6,963	$6,795
- Depreciation	$74	$200	$274	$274
= EBIT	$287	$378	$664	$832
EBIT (1-t)	$187	$245	$432	$541
- £GWC	$16	$22	$38	$38
= FCFF	$171	$223	$394	$503
Cost of Equity	12.50%	12.50%	12.50%	12.50%
Cost of Debt	5.53%	5.53%	5.53%	5.53%
WACC	11.38%	11.98%	11.73%	11.73%
Firm Value	$2,681	$3,199	$5,879	$7,479

e. Synergy Gain = $7,479 - $5,879 = $1,600
Note: Firm Value = $FCFF_1$/(WACC - g)

Problem 2

26-2
a & b.

	Without Added Debt	*With Added Debt*
Revenues	$7,901	$7,901
- COGS	$6,795	$6,795
- Depreciation	$274	$274
= EBIT	$832	$832
EBIT (1-t)	$541	$541
- £GWC	$38	$38
= FCFF	$503	$503
Beta	1.00	1.08
Cost of Equity	12.50%	12.92%
Cost of Debt	5.04%	5.20%
WACC	11.68%	11.37%
Firm Value	$7,540	$7,897

Beta with Added Debt = Unlevered Beta (1 + (1 - t) (Debt/Equity))
= 0.93 (1 + (1 - 0.4) (0.25)) = 1.08
c. The equity investors should gain the additional value of $357 million.

Problem 3

a., b., c., & d.

	Novell	*WordPerfect*	*No synergy*	*w/ Synergy*
Revenues	$1500	$690		$2,232
COGS	$855	$518		$1,406
Depreciation	$53	$29		$83
EBIT	$593	$144		$743
EBIT (1-t)	$385	$93		$483
- Cap Expenditure	$94	$46		$143
+ Depreciation	$53	$29		$83
- £GWorking Capital	$120	$27		$147
= FCFF	$224	$49		$276
Cost of Equity (Initial)	14.98%	13.88%		14.85%
Cost of Equity (Stable)	13.05%	13.05%		13.05%
Value of firm	$12,059	$1,554	$13,613	$14,377

The cost of equity is also the weighted average cost of capital because neither firm has any debt.
The weights are based upon the estimated values.
(The free cash flow to the firm under synergy in year 1 is greater than the sum of the FCFF of the two individual firms because of the higher growth rate in cash flows. All the estimated numbers under synergy are based upon the new expected growth rate which is 24%.)
e. Value of Synergy = 14,377 - 13,613 = $764 million
Maximum Price for Wordperfect = 1,554 + 764 = $2,318 million

Problem 4

If the synergy takes 5 years to materialize,
PV of Synergy = $764 million / $(1.1485)^5$ = $382.33 million
The expected growth rates were assumed too high and for too long.

Problem 5

a. Value of Synergy	**Pre-merger**	**Post-merger**
Value of Aetna	22,800	21,800
Value of US Healthcare	1,550	1,875
Total	24,350	23,675

The total market value of the two firms declined by $ 675 million after the merger was announced. This would suggest that the market does not believe that there is synergy.

b. Managers may be over optimistic about the potential for synergy, while markets might be much too pessimistic. I would tend to believe the markets.

Problem 6

a. Tax Savings Next Year = $2 Billion(0.4) = $800 million
If you can get this saving immediately, this would also be the value of tax savings.
If you have to wait a year to get the tax savings,
PV of Tax Savings = 800/1.12 = $714 million

b. PV of Tax Savings = $200 (PVA, 12%, 4 years) = $607.47 million

Problem 7

a. , b. & c.

	PMT Corporation	***Peer Group***	***Best Managed***
Return On Capital	8.00%	12.00%	18.00%
Dividend Payout Ratio	50.00%	30.00%	20.00%
Debt Equity Ratio	10.00%	50.00%	50.00%
Interest Rate on Debt	7.50%	8.00%	8.00%
Beta	1.06	1.30	1.30
Growth Rate-First 5 Years	4.18%	10.92%	19.68%
Payout Ratio after Year 5	28.14%	61.54%	75.61%
Growth Rate After Year 5	6.00%	6.00%	6.00%
Cost of Equity	12.83%	14.15%	14.15%
Value of Equity Per Share	$12.65	$25.18	$41.94

Growth Rate-First 5 years = (1 - Payout) (ROC + D/E (ROC - i (1-t))
Payout After 5 Years = 1 - g / (ROC + D/E (ROC - i (1-t))

Problem 8

a.

	1	***2***	***3***	***4***	***5***	***Term. Year***
Revenues	$1,100,000	$1,210,000	$1,331,000	$1,464,100	$1,610,510	$1,707,141
- Expenses	$440,000	$484,000	$532,400	$585,640	$644,204	$682,856
- Depreciation	$100,000	$110,000	$121,000	$133,100	$146,410	$155,195
= EBIT	$560,000	$616,000	$677,600	$745,360	$819,896	$869,090
- Interest Exp.	$360,000	$324,000	$288,000	$252,000	$216,000	$180,000
= Taxable Income	$200,000	$292,000	$389,600	$493,360	$603,896	$689,090
- Tax	$80,000	$116,800	$155,840	$197,344	$241,558	$275,636
= Net Income	$120,000	$175,200	$233,760	$296,016	$362,338	$413,454
+ Depreciation	$100,000	$110,000	$121,000	$133,100	$146,410	$155,195
- Capital Expenditure	$120,000	$132,000	$145,200	$159,720	$175,692	$186,234
- £GWC	$20,000	$22,000	$24,200	$26,620	$29,282	$19,326
- Principal Repaid	$300,000	$300,000	$300,000	$300,000	$300,000	$0
= FCFE	($220,000)	($168,800)	($114,640)	($57,224)	$3,774	$363,089
+ Interest (1-t)	$216,000	$194,400	$172,800	$151,200	$129,600	$108,000
+ Princ. Repaid	$300,000	$300,000	$300,000	$300,000	$300,000	$0
= FCFF	$296,000	$325,600	$358,160	$393,976	$433,374	$471,089

b.

	1	*2*	*3*	*4*	*5*	*6*
Equity	$1,000,000	$1,120,000	$1,295,200	$1,528,960	$1,824,976	$2,187,314
Debt	$3,000,000	$2,700,000	$2,400,000	$2,100,000	$1,800,000	$1,500,000
D/E Ratio	3.00	2.41	1.85	1.37	0.99	0.69
Beta	2.58	2.25	1.95	1.68	1.47	1.30
Cost of Equity	24.90%	23.11%	21.41%	19.95%	18.78%	17.86%
Cum. COE	1.25	1.54	1.87	2.24	2.66	3.14
WACC	11.63%	11.87%	12.18%	12.57%	13.03%	13.53%
Cum WACC	1.12	1.25	1.40	1.58	1.78	2.02

Cost of Equity in Year 2 = Cost of Equity in Year 1 - ($Beta_1$ – $Beta_2$)(5.5%)
= 24.90% - (2.58 - 2.25)(5.5%) = 23.11%

c. Terminal Value of Equity = $363,089/(.1786-.06) = $3,060,662
Terminal Value of Firm = Terminal Value of Equity + Outstanding Debt
= 3,060,662 + 1,500,000 = 4,560,662

d. PV to Equity Investors
= -220,000/1.249 -168,800/(1.249)(1.2311) - 114,640/ (1.2490)(1.2311)(1.2141)
- 57,224/(1.2490) (1.2311)(1.2141) (1.1995) + (3774
+ 3,060,662)/(1.2490) (1.2311)(1.2141) (1.1995)(1.1878)
= $779,220 < 1,000,000
Deal does not make sense from the viewpoint of equity investors.
PV to firm = Discount FCFF at WACC = 3,833,357 < 4,000,000
Overall, deal does not make sense.

Problem 9

a. No. The stockholders could do it themselves at far lower costs.

b. Yes. Diversification may provide a benefit to the owner of a private firm, since much of his or her wealth is probably concentrated in the firm.

c. If by doing this acquisition, the publicly traded firm was able to increase its debt capacity substantially and take better projects, it might make sense to do the acquisition.

CHAPTER 26

VALUING REAL ESTATE

Problem 1

The beta estimated by this analyst is probably too low because –

(a) appraised values tend to be smoothed out relative to the market values of real estate

(b) the stock index was used as the market portfolio instead of an index including all assets

Problem 2

While REITs have more reliable market prices than the appraised series, the betas estimated

using REITs will still have the following problems

(a) The process of securitizing real estate (in REITs) may affect their risk characteristics

(b) REITs operate under significant legal restrictions on investment, financing and dividend

policy, all of which may affect the beta.

(c) Finally, the stock index is still the inappropriate market index, if one's objective is to measure the market risk.

Problem 3

Commercial Real Estate in New York: Financial Service Firms

Commercial Real Estate in Houston: Oil Service Firms

Commerical Real Estate in San Jose: Computer Software Firms

Hotel Complex in Orlando: Theme Parks (eg. Disney) and Tourism

Problem 4

The assessed risk is likley to include some real-estate specific risk if the investors are all primarily real estate. If the investors are all institutional investors, the only risk that matters is market risk or risk that cannot be diversified in a portfolio including financial

and real assets.

Problem 5

I would do a traditional discounted cash flow valuation of the property and then apply a liqudity discount which will be higher for more illiquid assets.

Problem 6

	1	2	3	4	5	6
Revenues	$ 3,307,500	$ 3,969,000	$ 4,688,381	$ 4,922,800	$ 5,168,940	$ 5,324,009
- Var. Oper. Exp.	$ 945,000	$ 992,250	$ 1,041,863	$ 1,093,956	$ 1,148,653	$ 1,183,113
- Fixed Exp.	$ 309,000	$ 318,270	$ 327,818	$ 337,653	$ 347,782	$ 358,216
- RE Taxes	$ 300,000	$ 309,000	$ 318,270	$ 327,818	$ 337,653	$ 347,782
Taxable Income	$ 1,753,500	$ 2,349,480	$ 3,000,431	$ 3,163,374	$ 3,334,852	$ 3,434,898
- Taxes	$ 736,470	$ 986,782	$ 1,260,181	$ 1,328,617	$ 1,400,638	$ 1,442,657
Ope. Inc after tax	$ 1,017,030	$ 1,362,698	$ 1,740,250	$ 1,834,757	$ 1,934,214	$ 1,992,241
Terminal Value					$ 48,597,161	
PV at 7.10%	$ 949,612	$ 1,188,023	$ 1,416,607	$ 1,394,533	$ 35,861,124	

Value of Building = $ 40,809,899

Cost of Capital = 12.5% (.3) + 8.25% (1-.42) (.7) = 7.10%

b. Value of Equity in Building = $ 40,809,899 - .7($40,809,899) =$ 12,242,970

(I am assuming that there is no depreciation. If there is depreciation, you would add the present value of tax savings from depreciation to this value)

Problem 7

Property	Sale Price	Size (Sq. Ft)	Gross Rent	Sales/sq foot	Price/Rent
A	$20,000,000	400,000	$5,000,000	50.00	4.00
B	$18,000,000	425,000	$4,750,000	42.35	3.79
C	$22,000,000	450,000	$5,100,000	48.89	4.31
D	$25,000,000	400,000	$5,500,000	62.50	4.55
E	$15,000,000	350,000	$4,000,000	42.86	3.75
F	$12,000,000	300,000	$3,000,000	40.00	4.00
Average				47.77	4.07

a. Value based on Sales/sq foot = 300,000 * 47.77 = $ 14,331,000

b. Value based upon Price/Rent = (300,000 * 1.05 * $ 15 * .7) * 4.07 =$ 13,461,525

c. We are assuming that the comparable buildings are fairly priced and are similar to the building being valued.

CHAPTER 27

VALUING OTHER ASSETS

Problem 1

a. Beta = 0.80 (1 + (1-.4)(30/70)) = 1.0057

Cost of equity = 6% + 1.0057 (4%) = 10.02%

Cost of capital = 10.02% (.7) + 7% (1-.4) (.3) = 8.28%

(I am assuming that the potential buyer is diversified)

Revenue =	5000000
- Operating Expenses =	3700000 (Includes the chef salary)
EBIT =	1300000
EBIT (1-t) =	780,000

Value of café = 780000 (1.05)/ (.0828 - .05) = $25,000,000

b. If the chef leaves,

Revenue =	4250000
- Operating Expenses =	3311500 (0.3* 3700000+0.7*.85*3700000)
EBIT =	938500
EBIT (1-t)=	563100

Value of café = 563,100 (1.05)/(.0828 - .05) = $18,048,077

Problem 2

Adjusted Operating Income =	$100,000	! I subtracted the manager's salary
Adjused after-tax Operating Income =		$65,000
Adjusted ROC =	13.00%	! 65,000/ (200000+300000)
Expected Growth Rate =	3%	
Expected Reinvestment rate =	23.08%	
Total Unlevered Beta =	2.00	! I used total beta because not diversified
Total Levered Beta =	2.33	! 2 (1+ (1-.35)(.25))
Cost of equity =	14.30%	
Cost of debt =	5.20%	
Cost of capital =	12.48%	! I used industry averages, not book value

Value of Bagel shop = $543,249

Problem 3

Value of copyright = 120,000/1.12 + 100,000/1.12^2 + 80,000/1.12^3 = $243,805

Problem 4

Year	*Revenues*	*Employee Expenses*	*Rent*	*Equipment rental*	*Medical Insurance*	*EBIT*	*EBIT (1-t)*	*PV*
Current	$800,000	$200,000	$100,000	$75,000	$75,000	$350,000	$210,000	
1	$832,000	$208,000	$104,000	$78,750	$80,250	$361,000	$216,600	$195,135
2	$865,280	$216,320	$108,160	$82,688	$85,868	$372,245	$223,347	$181,273
3	$899,891	$224,973	$112,486	$86,822	$91,878	$383,732	$230,239	$168,349
4	$935,887	$233,972	$116,986	$91,163	$98,310	$395,457	$237,274	$156,300
5	$973,322	$243,331	$121,665	$95,721	$105,191	$407,414	$244,448	$145,068
6	$1,012,255	$253,064	$126,532	$100,507	$112,555	$419,598	$251,759	$134,600
7	$1,052,745	$263,186	$131,593	$105,533	$120,434	$432,000	$259,200	$124,846
8	$1,094,855	$273,714	$136,857	$110,809	$128,864	$444,611	$266,767	$115,757
9	$1,138,649	$284,662	$142,331	$116,350	$137,884	$457,422	$274,453	$107,291
10	$1,184,195	$296,049	$148,024	$122,167	$147,536	$470,419	$282,251	$99,404
Value of Practice =								$1,328,619

Problem 5

a. It would depend upon the quality of the card For an excellent card, I would be willing to pay about $ 767 (the average of the three prices – 650, 800 and 850). For a good card, I would be willing to pay about $ 483 and for a poor card, only $275.

b. If the seller has been rated poorly, I would not be willing to pay as much. I would discount the card to reflect my concern that the card is not what it is claimed to be.

Problem 6

a. Standard deviation of portfolio entirely composed of stocks = 20%

Variance of mixed portfolio = $.20^2\ (.90)^2 + .15^2\ (.10)^2 + 2(.20)(.15)(.10)(.9)(.1)$

= .0332

Standard deviation of mixed portfolio = 18.21%

b. I would not add art to my portfolio. The expected return is less than the riskfree rate and I would gain a much bigger gain by putting 10% of my money in the riskless asset (with a zero standard deviation and a correlation of zero with the market) than I would by putting it in art. For art to qualify as a good investment, the expected return would have to be greater than 6% or the correlation would have to be negative.

CHAPTER 28

THE OPTION TO DELAY AND VALUATION IMPLICATIONS

Problem 1

S = PV of $25 million a year for 20 years at 16% = $148.22 million

K = Cost of Taking Project = $300 million

t = 10 years

Standard Deviation = 20%

r = 12%

y = Dividend Yield = 1/ Project Life = 10%

Problem 2

a. PV of Inflows = 400,000 * 0.85 * $(1 - 1.04^{25}/1.07^{25})/(.07 - .04)$ -400,000 * 0.40 * $(1 - 1.03^{25}/1.07^{25})/(.07 - .03)$ = $3,309,756

Fixed Costs associated with opening

= -3,000,000

NPV = 3,309,756 -3,000,000 = $309,756

b. S = 3,309,756

K = 3,000,000

t = 25

r = 7%

$\sigma = 0.25$

y = 1/25 = 4%

Value of the Call Option = $828,674

c. The latter considers the option characteristics of owning the mine, i.e., that copper prices may go up, and that the mine-owner will be more likely to develop the mine at higher copper prices.

Problem 3

Current Value of Developed Reserve = 10,000,000 * ($20 - $6) = $140,000,000

Exercise Price = Cost of Developing Reserve = $120,000,000

t = 20 years

r = 7%

s = 20%

y = 4% (Alternatively, you can use 1/20 or 5% as your cost of delay)

Value of Call (Natural Resource Reserve) = $37,360,435

Problem 4

a. NPV of Project = $250 - $200 = $50 million

b. The option has the following characteristics:

S = 250

K = 200

r = 8%

t = 5

Variance = 0.04

Dividend Yield = 12.5/250 = 5%

Value of Call (Project Rights) = $68.68

c. The latter captures the value of delaying the project. The difference between the two values will increase as the variance in the project cash flows increases.

Problem 5

a. S = PV of Cash Inflows on Project = 250

K = Cost of Taking Project = 500

t = 10 years

r = 6%

s = 0.6

y = 10/250 = 4%

Value of Call (Product Patent) = $95 million

b. It is an increasing function of the variance in project cash flows. This analysis suggests that the rights to products in technologically volatile areas are likely to be worth a great deal, even though the products may not be viable now.

CHAPTER 29

THE OPTIONS TO EXPAND AND ABANDON: VALUATION IMPLICATIONS

Problem 1

a. Net present value of the project = $ 30 - $ 40 = - $ 10 million

b. Inputs

S = Present Value of Net Revenues =			$ 30 million
K = Cost of televising the Olympics =			$ 40 million
t = Time until Olympics =			2 years
r = Riskless rate =			5%
Variance in value =			0.09
y = Cost of delay =			0
d1=	-0.2302	N(d1) =	0.4090
d2 =	-0.6545	N(d2) =	0.2564

Value of the Rights = 30 (0.409) - 40 exp (-0.05)(2) (.2564) = 2.99

c. Probability that rights will be profitable = 0.2564 - 0.4090

Problem 2

a.

S = Expected reinvestment needs as percent of firm value = 10%

K = Reinvestment needs that can be met without excess debt capacity = 6%

T = 1 year

Standard deviation in reinvestment needs = 0.30

The option pricing value with these inputs is 4.32%. If we assume that the current excess returns (18% - 12%) continue in perpetuity, the value of flexibility is

Value of flexibility (on an annual basis) = 4.32% * .06/.12 = 2.16%

b.

Based upon part a, would you recommend that Skates use its excess debt capacity?

The value of flexibility exceeds what the firm would save by moving to its optimal (only 1%). The firm should not use its excess debt capacity.

Problem 3

Value of abandonment option

S = PV of cashflows from development = $ 900 million* 0.4 = $ 360 million

K = Abandonment value = $ 300 million

T = 5 years

Riskless rate = 5%

Standard deviation = 40%

Value of abandonment option = $ 63.51 million

The net present value of this project to Disney is -$ 40 million.

Net present value = -400 + 360 = -40 million

The value of the abandonment option is greater than the negative net present value. I would advice Disney to make the investment.

If you were the developer, you would need to make a net present value equal to at least $63.51 million to cover the cost of the abandonment option.

PV of cash flows to developer = (63.51) + .6 (1000) = $ 663.51 million

Problem 4

For the expansion potential to have option value, Quality Wireless has to have exclusive rights to expand.

Net present value of initial investment = - $ 200 million

S = PV of cashflows from expansion (currently) = ?

K = $2500 million

T = 5 years

Standard deviation in firm value = 25%

Riskless rate = 5%

Setting up the option value = $ 200 million and solving for S, we get

S = $ 1511 million

(Sorry. The only way to get there is by trial and error. An approximate answer would have been sufficient)

Problem 5

Net present value of initial investment = -750 + 85 (PV of annuity, 10 years, 12%)

= - $269.73 million

Value of expansion option

S = 150 (PV of annuity, 12%, 15 years) = $1,021.63 million

K = Cost of expansion = $ 2,000 million

Riskless rate = 6.5%

Standard deviation in value = 40%

Life of the option = 10 years

Value of expansion option = $ 477.28 million

CHAPTER 30

VALUING EQUITY IN DISTRESSED FIRMS

Problem 1

a. True. Equity investors cannot lose more than their equity investment.

b. False. They can make equity more valuable, not the firm.

c. True. It transfers wealth to the bondholders.

d. True. This is the equivalent of the life of the option.

e. True. There is a transfer of wealth to bondholders.

Problem 2

a. Reinvestment rate = g/ROC = 5%/12% = 41.67%

Value of the firm = 40(1.05)(1-.5)(1-0.4)/(.10-.05) = $294 million

b.

The value of the equity is computed as a call option on the value of the firm, using the call option pricing formula, $SN(d_1) - Ke^{-rt}N(d_2)$, where $d_1 = \frac{\ln(S/K) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$,

$d_2 = d_1 - \sigma\sqrt{t}$.

S = $294

K = $500

t = 5 years

r = 5%

$\sigma = 0.125$

The equity or call option value can be written as 294 N(-0.8657) -500 $e^{-0.25}$ N(-1.1452).

Since $N(d_1) = 0.1933$; $N(d_2) = 0.1261$, the option value is $7.75 million.

Value of Call (Equity) = $7.75 million

c. Value of Debt = $294 - $7.75 = $286.25 million

Appropriate Interest Rate = $(500/286.25)^{1/5} - 1 = 11.80\%$

Problem 3

Value of firm

Current free cashflow to firm = $ 850* (1-.4) – (550 – 400) = $ 700 million

Year	*EBIT (1-t)*	*Net cap ex*	*FCFF*	*PV*
1	$612.00	$180.00	$432.00	$392.73
2	$734.40	$216.00	$518.40	$428.43
3	$881.28	$259.20	$622.08	$467.38
4	$1,057.54	$311.04	$746.50	$509.87
5	$1,269.04	$373.25	$895.80	$556.22
Terminal	$1,332.50	$444.17	$888.33	

I used a reinvestment rate of 33.33% (5/15) in the terminal year.

Terminal value = 888.33/(.10-.05) = $ 17,766

Value of firm = 392.73 + 428.43 + 467.38 + 509.87 + 556.22 + $17766.60/1.1^5$ =

$13,386.28 million

Value of equity as an option

S = 13386.28

K = 10000.00

T = Weighted duration of debt = 3 years

Riskless rate = 5%

Variance in firm value = $(.35)(.4)^2+(.15)(.6)^2+ 2\ (.35)(.15)(.5)(.4)(.6) = .20 = 0.0403$

Value of equity = $ 4958 million

If the market value of equity = 30 * 210 = $ 6300 million

Trial and error yields an implied standard deviation of 46.53%.

Value of debt = Firm value – Value of equity

= 13386 – 4958 = $8,428 million

Problem 4

Value of firm = EBIT (1-t) (1- Reinvestment rate) (1+g)/(r – g)

= 25 (1-.4) (1 – 4/10) (1.04)/(.09-.04) = $ 187.20 million

Face value of debt = $ 250 + $ 250 = $ 500 million

Average duration of debt = (2+4)/2 = 3 years

Standard deviation in firm value = $0.25^2(.5)^2+0.4^2(.5)^2+ 2*.25*.4*.5*(.5)^2 = 28.39\%$

Riskless rate = 7%

Value of equity as an option = $ 3.30 million

Problem 5

d1 = -0.15 N(d1) =0.4404

d2= -0.90 N(d2) =0.1841

Value of Equity = 400 (.4404) - 800 exp (-.06*6) (.1841) =$ 73.41

Value of Debt = 400 - 73.41 = $ 326.59

Interest rate on debt = (800/326.59)^(1/6) - 1 = 16.08%

Default spread on debt = 16.08% - 6% = 10.08%

CHAPTER 31

VALUE ENHANCEMENT: A DISCOUNTED CASHFLOW VALUATION FRAMEWORK

Problem 1

a. It should have no effect on value, since expected cash flows are unchanged by the announcement.

b. The stock price might be affected. To the extent that investors form expectations based upon what they know about the firm, this action might lower expectations for the future and reduce the perceived value. The fact that value does not change but price may drop reflects the likelihood that this stock was over valued before it announced the restructuring.

Problem 2

a.

(in billions)	Pre-cutting	Post-cutting
Revenues	10	10
Operating Income	0.3	0.4

Change in operating income = 100 million

Change in after-tax operating income = 100 (1-.4) = 60

Present value of savings over time = 60(1.05)/(.10 - .05) = $ 1,260.00

b. Value of firm before cost-cutting = (300(1-.4))(1.05)/(.10-.05) = 3780

Value of firm after cost cutting = (400(1-.4))(1.045)/(.10-.045) = 4560

Change in firm value = $780.00

Problem 3

a. Cost of capital = 12% (.6) + 8% (1-.4) (.4) = 9.12%

Value of firm = (100*(1-.4)-25) (1.04)/(.0912-.04) = $ 710.94

b. With a 0% tax rate, Cost of capital = 12% (.6) + 8%(.4) = 10.40%

Value of firm = (100 –25) (1.04)/(.104-.04) = $ 1,218.75

Problem 4

a.

EBIT (1-t)	$ 262.50
- Net Cap Ex	$ 105.00
- Chg in WC	$ 50.00
FCFF	$ 107.50

Value of firm = 107.5/(.09-.05) = $2687.50

b. With 50% lower WC requirement

EBIT (1-t)	$ 262.50
- Net Cap Ex	$ 105.00
- Chg in WC	$ 25.00
FCFF	$ 132.50

Value of firm = 132.5/(.09-.05) = $3,312.50

Change in value of firm = $625.00. In fact, if the working capital change applied to existing working capital as well, there will be an additional one-time cash inflow of $ 500 million (50% of $ 1 billion).

c. Effect of lower growth

EBIT (1-t)	$ 261.88
- Net Cap Ex	$ 104.75
- Chg in WC	$ 23.75
FCFF	$ 133.38

Value of firm = 133.38/(.09-.0475) = $3,138.24

Change in value = $ 450.74

Problem 5

Return on capital = 50/250 = 20%

Reinvestment rate = 25/50 = 50%

a. Expected Growth rate = 0.5*0.2 = 10.0%

b. Expected Growth rate with higher reinvestment rate = 0.8 *.20 = 16%

c. Expected Growth rate with lower return on capital = 0.8*.15 = 12%

Problem 6

a. Expected Growth = Reinvestment rate x Return on capital = 50% x 10.69% = 5.35%

Cost of capital = Cost of equity = 11.5%

b. Value of firm = $ 2 billion (1 – Reinvestment Rate) (1+g)/(Cost of capital –g) = $16.25 billion

With no growth and reinvestment, Compaq's value is $ 2 billion/.115 = 17.39

Value destroyed by new investments = $ 17.39 - $ 16.25 = $1.14

Problem 7

a. Expected Growth rate = 5.35% (Nothing changes)

b. Cost of capital = 12.5% (0.8) + 4.5% (0.2) = 10.90%

Value of firm = $ 2 (1-.5)/(0.109-.0535) = $18.00

c. Value of firm with no growth or reinvestment = $18.35

Value destroyed by new investments = $0.35

Problem 8

a. Return on Capital = (0.2)(25)/5 = 100%

Reinvestment rate = 50%

Expected growth in Operating income = 50.00%

b. Return on capital with generic margins = 0.075(25)/5 = 37.5%

Expected growth in operating income = 18.75%

Problem 9

Value of firm with no advertising campaign (10 million growing at15% for 3 years, constant forever thereafter) = $147.08

Value of firm with advertising campaign = PV(10 million growing 15% for 10 years, constant forever thereafter) - PV of Cost of advertising campaign = $160.37

To solve for the probability

Increase in value from advertising = Value of firm with advertising - Value of firm without advertising = $ 137.64

Present value of advertising cost = PV of $ 50 million for 3 years = $124.34

Probability of success needed = X (137.64) = 124.34

Probability = 90.34%

Problem 10

Return on capital = After-tax Operating Margin * Sales/Capital = 7.50%

Reinvestment rate = 60%

Expected growth = 4.500%

a. Value of firm = 300 (1-.6) (1.045)/(.10 -.045) = $ 2,280.00

b. New return on capital = 5% *2.5 = 12.50%

Reinvestment rate = 40%

Expected growth = 5.00%

Value of firm = 300 (1-.4)(1.05)/(.09-.05) = $4,725.00

Change in firm value = $2,445.00

CHAPTER 32

VALUE ENHANCEMENT: EVA, CFROI AND OTHER TOOLS

Problem 1

Book value of equity at start of year = 1,250 – 50 = $1200 (after subtracting out retained earnings of $50 million)

Book value of debt at start of year = 350 – 50 = $300

Book value of capital at start of year = $1500

a. Return on capital = 180/1500 = 12%

b. Cost of capital = 12%(2500/(2500 + 350))+ 5% (350/(2500+350)) = 11.14% (Note that the market value of equity was double the book value at the end of 1998.)

c. EVA = (.12 -.1114) (1500) = $12.89

Problem 2

PV of EVA over time = 12.89 (1.05)/(.1114-.05) = $220.43

Capital invested in firm = $1600

a. Value of firm = $1820.43

b. Portion of value from excess returns = $220.43

c. Market value added at this firm = $220.43

d. PV of EVA for next 5 years = 12.89 growing at 5% for next 5 years = $54.52

Value of firm = 1600 + 54.52 = $1654.52

Portion of value from excess returns = $54.52

Market value added at this firm = $54.52

Problem 3

Year	Operating lease commitment	PV of commitment
1	55	$ 51.89
2	60	$ 53.40
3	60	$ 50.38
4	55	$ 43.57
5	50	$ 37.36
yr 6-15	40	$ 220.00

		$ 456.59

Capital invested before operating leases (in millions) = $ 1,000.00

Capital invested after operating leases = $ 1,456.59

Operating income before operating lease adjustment = $150

Operating income after operating lease adjustment = $177.40

Return on capital before lease adjustment = 9%

Return on capital after lease adjustment = 7.31%

Cost of capital before lease adjustment = 11%

Cost of capital after = 11%(2/2.457)+6%(1-.4)(.457/2.457) = 9.62%

EVA before lease adjustment = (.09-.11) (1000) = -$20.00

EVA after lease adjustment = (.0731-.0962) (1457) = -$33.74

Problem 4

Return on capital = 1/5 = 20%

Cost of capital = .12(.75) + .045(.25) = 10.125%

a. EVA = (.20 - .1025) (1000) = $ 97.50

b. Return on capital for the industry = 22.22%

EVA based on industry numbers = (.2222-.10) (1000) = $122.22

c. Sevilla underperformed the industry

Problem 5

a. EVA this year = 20 million - 60*.15 = $11.00

PV of EVA over next 5 years = $55.00 (note that the growth and discount rates offset each other.

Capital invested = $60.00

Value of firm = $115.00

b. EVA this year = 20 million - 40*0.15 = $14

PV of EVA over next 5 years = $70.00

Capital invested = $40.00

Value of firm = $110.00

Problem 6

Gross Investment before inflation adjustment = $150

Gross Investment after inflation adjustment = $150 $(1.02)^5$ = $ 165.61

After-tax Operating Income each year = $ 20.00

Salvage Value = $50.00

Life of assets = 10 + 5 = 15

Solve for IRR, with PV=165.61, PMT=15, FV=50 and n=15

Year	Flow
0	$ (165.61)
1	$ 20.00
2	$ 20.00
3	$ 20.00
4	$ 20.00
5	$ 20.00
6	$ 20.00
7	$ 20.00
8	$ 20.00
9	$ 20.00
10	$ 20.00
11	$ 20.00
12	$ 20.00
13	$ 20.00
14	$ 20.00
15	$ 70.00

CFROI = 9.85%

b. With economic depreciation method

Economic Depreciation = (165.61-50)*0.0784/[(1.0784^{15})-1] = $4.31

Adjusted CFROI = (20-4.31)/165.61= 9.47%

c. Real cost of capital = (1.10/1.02)-1 = 7.84%

The firm's CFROI exceeds its real cost of capital. It is taking good projects.

Solution to chapter 33

Problem 1

Scenario	Value/share
Worst	$5.00
Most likely	$18.00
Best Case	$30.00

If the most likely scenario value is already risk adjusted, I would still buy the stock. There is a chance that I will lose money but rejecting the investment, with a risk adjusted value> price would represent double counting.

Problem 2

After-tax cash flows last year =	40	
Expected growth rate =	2%	
Cost of capital =	12%	
Value of operating assets =	408	! 40 (1.02)/ (.12-.02)
+Cash	0	
- Debt	50	
Value of equity	358	
Number of shares	25	
Value per share	14.32	
After-tax cash flow if contract lc	20	
Value of operating assets =	204	
+Cash	0	
- Debt	50	
Value of equity	154	
Number of shares	25	
Value per share	6.16	
Expected value per share =	12.688	! 14.32 (.80) + 6.16 (.20) = 12.688
Price per share =	10	
Stock is still under valued. Buy it.		

Problem 3

Net Income	100				
Book value of equity	1000				
Dividends	70				
Assumed stable growth rate =	3%	! You can assume any stable growth rate or cost of equity			
Assumed cost of equity =	10%	! Be consistent across the scenarios			
	Probability	ROE	Growth rate	Payout ratio	Value of equity
Status Quo	40%	10.00%	3%	70.0%	$441.43
Regulatory easing	25%	12%	3%	75.0%	$367.86
Regulatory tightenung	35%	9%	3%	66.7%	$490.48
Expected value of equity (today	$440.20	! 40% (441`.43) + 25% (367.86) + 35% (490.48)			

Problem 4

Expected EBIT (1-t) next year	50	
	Subsidy	No subsidy
Oil prices > $100	$833.33	$555.56
	18%	12%
Oil price $60 - $100	$700.00	$500.00
	30%	20%
Oil price <$ 60	$625.00	$468.75
	12%	8%
Expeced value across scenarios =		$639.17

Problem 5

After-tax operating income =	120
Return on capital =	20%
Expected growth rate =	4%
Reinvestment rate =	20.0%
Cost of capital =	12%
Value of firm =	1200
Book value =	600
Probability of nationalization =	30%
Value of firm today =	$1,020.00

Problem 6

Today
-$7.52

Success
80%
$15.60

Failure
20%
-$100.00

Success
60%
$244.18

Failure
40%
-$327.27

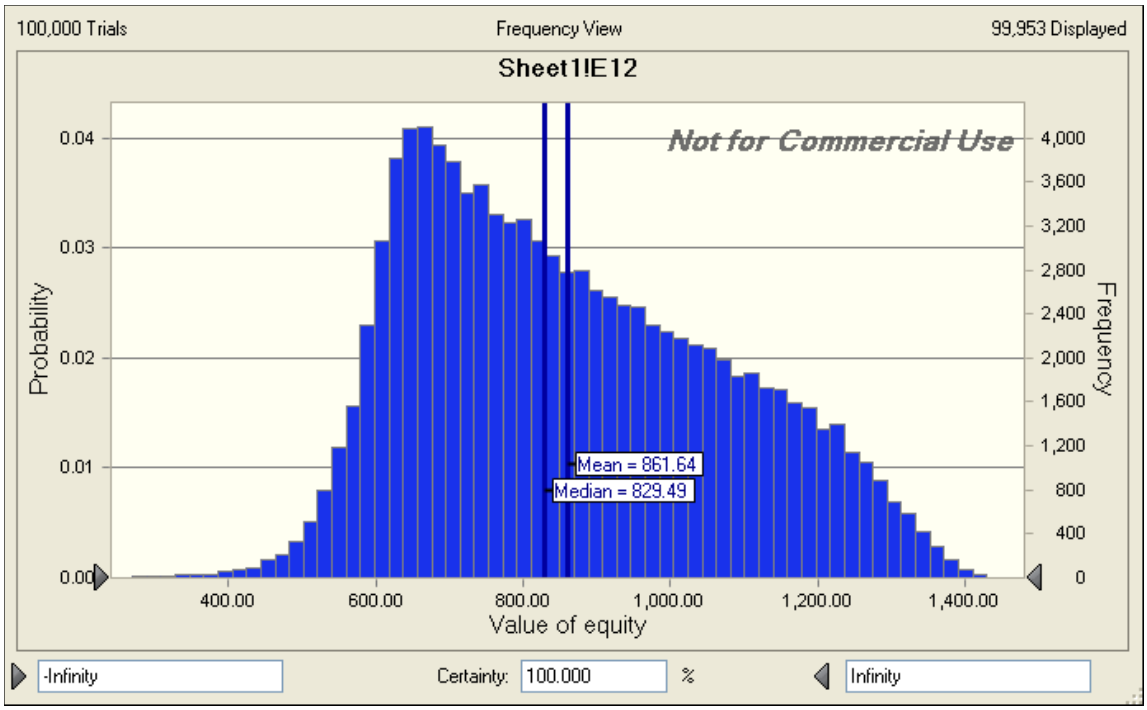
Problem 7

Value of business once operational =	$300.00
PV of operational value =	$213.53
Likelihood of survival =	60%
Survival adjusted value =	$128.12
VC equity brought in =	$50.00
Proportion of value you would demand =	39.03%
Target rate of return =	32.79% ! (300/128)^(1/3)-1

Problem 8

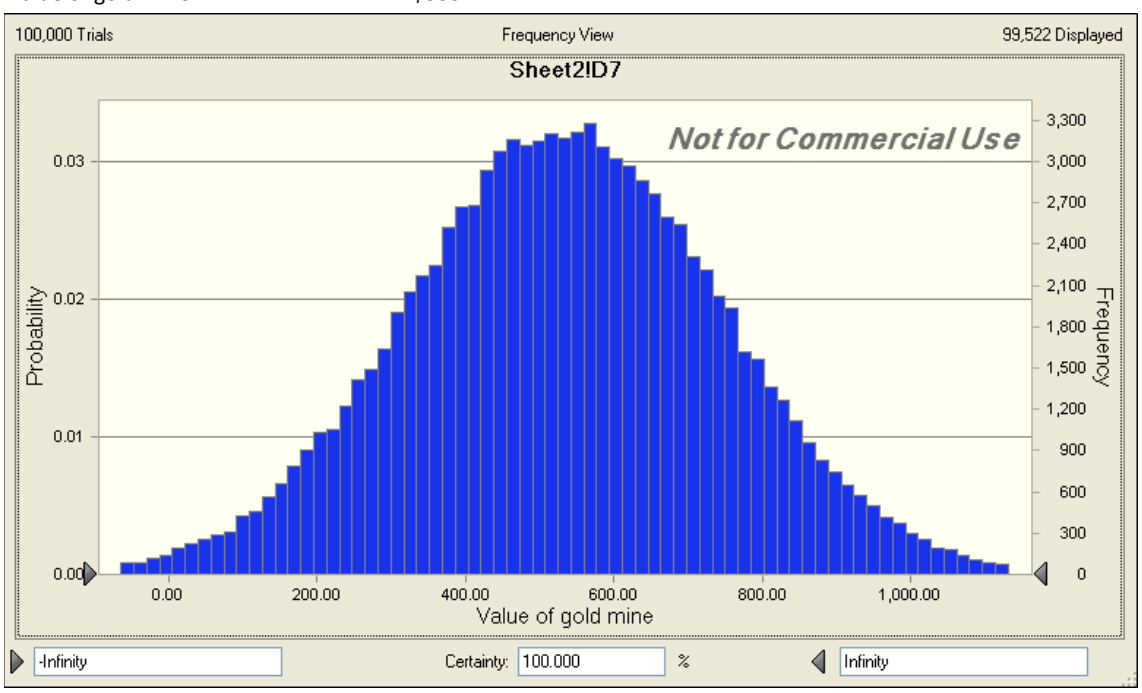
Expected EBIT (1-t) next year =	100
Expected growth rate =	3%
Return on capital =	15%
Cost of capital =	10%

Value of operating assets =	$1,142.86
+ Cash	$200.00
- Debt	$500.00
Value of equity =	$842.86



Problem 9

Production per year (in millions)	0.1
Price/oz =	1500
Fixed Cost per year =	100
Annual cash flow =	50
Number of years =	25
Cost of capital =	8%
Value of gold mine =	$533.74



Solution to chapter 33

Problem 10

Company	Price	Expected value	Standard deviation	% chance that t	Lowest value	Highest value
A	$8.00	$10.00	$1.00	80%	$7.00	$13.00
B	$12.00	$13.50	$0.50	75%	$10.00	$16.00
C	$15.00	$20.00	$5	50%	$4.00	$50.00
D	$9.00	$10.00	$0.20	85%	$8.50	$13.00
E	$50.00	$80.00	$10	80%	$40.00	$150.00
F	$22.00	$25.00	$1	88%	$18.00	$28.00
G	$3.00	$5.00	$0.50	70%	$2.50	$6.00
H	$150.00	$200.00	$30	60%	$40.00	$500.00
I	$35.00	$70.00	$20	65%	$0.00	$200.00
J	$80.00	$100.00	$5	90%	$70.00	$115.00

a. On Expected value basis

Company	Price	Expected value	% Under/Over valued
I	$35.00	$70.00	-50.00%
G	$3.00	$5.00	-40.00%
E	$50.00	$80.00	-37.50%
C	$15.00	$20.00	-25.00%
H	$150.00	$200.00	-25.00%
A	$8.00	$10.00	-20.00%
J	$80.00	$100.00	-20.00%
F	$22.00	$25.00	-12.00%
B	$12.00	$13.50	-11.11%
D	$9.00	$10.00	-10.00%

b. With uncertainty incorporated

Company	Price	Expected value	Standard deviation	T statistics
D	$9.00	$10.00	$0.20	-5.00
G	$3.00	$5.00	$0.50	-4.00
J	$80.00	$100.00	$5	-4.00
B	$12.00	$13.50	$0.50	-3.00
E	$50.00	$80.00	$10	-3.00
F	$22.00	$25.00	$1	-3.00
A	$8.00	$10.00	$1.00	-2.00
I	$35.00	$70.00	$20	-1.75
H	$150.00	$200.00	$30	-1.67
C	$15.00	$20.00	$5	-1.00

T = (Price - Exp value)/ Std deviation

c. With downside worries

Company	Price	Expected value	Lowest value	Worst case % dro	% Under valued
D	$9.00	$10.00	$8.50	-5.6%	-10%
A	$8.00	$10.00	$7.00	-12.5%	-20%
J	$80.00	$100.00	$70.00	-12.5%	-20%
B	$12.00	$13.50	$10.00	-16.7%	-11%
G	$3.00	$5.00	$2.50	-16.7%	-40%
F	$22.00	$25.00	$18.00	-18.2%	-12%
E	$50.00	$80.00	$40.00	-20.0%	-38%
C	$15.00	$20.00	$4.00	-73.3%	-25%
H	$150.00	$200.00	$40.00	-73.3%	-25%
I	$35.00	$70.00	$0.00	-100.0%	-50%

Go with stocks with the least percentage drops in worst case

d. If my compensation was a fixed amount plus a percentage of the excess return that I make for my clients.

CHAPTER 34

VALUING FUTURES AND FORWARD CONTRACTS

Problem 1

The implied interest rate can be calculated by dividing the futures price by the spot price.

Implied interest rate= (Futures price/ Spot price) - 1

Months to expiration	Trading at	Futures/Spot	Annualized
1	$404.62	0.3397%	4.1539%
2	$406.11	0.7092%	4.3316%
3	$407.70	1.1035%	4.4877%
6	$412.51	2.2963%	4.6454%
12	$422.62	4.8035%	4.8035%

Problem 2

a. Theory Price= Spot price + Spot price (Int rate- Div. Yield)

= 258.90 + 258.90 (1.06^(164/365)-1.03^(164/365)) = 262.306356

The actual price is lower than the theory price. The contract is underpriced.

To set up the arbitrage: (1) Buy futures contract (2) Sell short stocks in index (3) Invest in T.Bills

b. Sell futures contracts on the index. # of contracts=

(380000/258.90)*0.8/500=2.34839706

Problem 3

# of contracts that have to be sold= (100 mil/258.9)*1.25/500= 965.623793

3b. Expected Return on the mutual fund= 6+ 1.25(8)=16%

3c. Expected return if you hedge away all market risk= 6% (Riskfree rate)

Problem 4

Theory price= Spot price (1+r) +kt = 481.40(1.06)+ 481.40(.02)= 519.912

Actual price= 515.60. The contract is underpriced.

To set up arbitrage:(1) Buy futures contract (2) Sell short on gold (3) Invest in T.Bills
To unwind: (1) Collect on T.Bills (2) Pay 515.60. Receive gold (3) Return gold; Collect storage cost;
Net profit= 519.91-515.60= 4.31

Problem 5

a.	Month	Theory Basis	Actual Basis	
	March	1.26668689	0.43	Underpriced
	June	3.03339624	1.93	Underpriced

b. To set up arbitrage:(1) Buy futures contract (2) Sell short on stocks (3)Invest in T.Bills
At expiration: (1)Collect on T.Bills (2) Pay $247.75; Receive stocks. (3) Deliver stocks; Pay dividends;

Problem 6

a. F* = Spot (1+r)^t + kt = 19000 (1.10) + 200 = 21,100
b. Since the actual futures contract price is $20,400, I would
1. Buy the futures contract for $20,400
2. Sell short wheat at $ 19,000
3. Invest the cash at 10%
At expiration:
1. Collect on my cash investment = $ 20,900
2. Take delivery on the futures contract paying $ 20,400
3. Return the wheat to the owner; collect saved storage costs of $ 200
Arbitrage Profit = (20,900+200) - 20,400 = $ 700
c. 19,000 (1+r) = 20,400
Solve for r,
r = 20,400/19000 =7.37%