CHAPTER SIX

Accrual Accounting and Valuation: Pricing Earnings

Concept Questions

C6.1. Analysts typically forecast eps and eps growth without consideration for how earnings are affected by payout. That is, they forecast ex-dividend growth, not cum-dividend growth. Investors value ex-dividend earnings growth, but they also value additional earnings to be earned from the reinvestment of dividends.

C6.2. The historical 8.5% growth rate that is often quoted is the ex-dividend growth rate. It ignores the fact that earnings were also earned by investors from reinvesting dividends (in the S&P 500 stocks, for example) that were typically 40% of earnings. The cum-dividend rate is about 12%. See Box 6.x.

C6.3. This formula capitalizes earnings at the ex-dividend earnings growth rate, g. This ignores growth that comes from reinvesting dividends. Further, if earnings are expected to grow at a rate equal to the required return, r, then the growth should not be valued , and forward earnings should be capitalized at the rate, r, not r – g. Only growth in excess on the required rate should be recognized.

The formula also has mathematical problems. If g = r, then the denominator is zero and the value is infinite. If g is greater than r (which is necessary for growth to have value), the denominator is negative.

C6.4. The trailing P/E is normal: 1.12/0.12 = 9.33. The forward P/E is also normal: 1/0.12 = 8.33.

C6.5. The difference is that, for the trailing P/E, one more years of earnings are involved (the current year). The trailing P/E can be interpreted as paying for the value of forward earnings (at the multiple for forward earnings) plus a dollar for every dollar of current earnings.

C6.6. Cum-dividend earnings growth incorporates earnings that are earned from the reinvestment of dividends, and investors value those earnings. Ex-dividend growth rates are affected by dividends: dividends reduce assets which then earn lower earnings. As cum-dividend growth rates reflect the earnings from dividends, they are not affected by dividends. Cum-dividend growth rates are effectively the rates that firms would have if they did not pay dividends.

C6.7. Correct. See Box 6.x.

C6.8. Incorrect. As the normal (forward) P/E ratio is the inverse of the required return and the required return for a bond is (usually) lower than that for a stock, the normal P/E ratio for a bond is greater than that for a stock. However, a bond cannot deliver growth, so the P/E ratio for a growth stock might well be greater than that for a bond.

C6.9. Yes, she could. One expects the earnings yield on a stock to be greater than the bond yield because a stock is riskier and thus has a higher required return.

C6.10. A PEG ratio is the ratio of the P/E to one-year-ahead expected earnings growth (in percentage terms). As the P/E anticipates earnings growth, the PEG ratio should be 1.0 if the market is anticipating growth appropriately. However, more than one year of growth is involved in assessing P/E ratios, so the measure should only be used as a first-pass check on the P/E ratio.

C6.11. Intrinsic P/E ratios are determined by the cost of capital and earnings growth expectations. So P/E ratios might have been low in the 1970s because the market did not see much earnings growth in the future for the typical firm, and saw considerable growth in the 1960s and 1990s. Or the cost of capital increased in the 1970s (and fell in the 1960s and 1990s). The interest rate is one component of the cost of capital, and interest rates were higher in the 1970s (particularly the late 1970s) than in the 1960s and 1990s.

The traded P/E ratios may also reflect market inefficiency: the market might have priced earnings too low in the 1970s and too high in the 1960s and 1990s. That turned out to be the case (after the fact) in the 1960s and 1970s (as P/E ratios and prices fell after the 1960s but increased after the 1970s).

C6.12. Earnings-to-price ratios -- the inverse of price/earnings ratios -- are driven by three things:

(1) The required equity return
(2) Expected growth
(3) Market inefficiency in pricing the required return and expected growth.

The argument assumes that factors (2) and (3) do not explain the change in the earnings-to-price ratio. Were growth expectations higher in the 1990s than in the 1970s? Were S&P 500 stocks overpriced?

C6.13. Comparing the 10% growth rate in earnings with a 4% rate for GNP, compares a cum-dividend growth rate (after reinvesting dividends) with an "ex-dividend" growth rate: the GNP is the income for the economy (as measured) but much of the annual income is consumed ("withdrawn" as a "dividend") rather than reinvested in production.

C6.14. The trailing P/E, based on current earnings, is affected by transitory earnings. The forward P/E based on next years' forecasted earnings is less likely to be so affected, and so is a better base for growth. (But the analyst does have to forecast next year's earnings).

C6.15. Yes; eps growth can be increased with investment, but the investment may earn only the required return, and thus not add value. A firm can also increase its expected earnings growth through accounting methods, but not add value.

Exercises

E6.1. Valuation From Forecasting Abnormal Earnings Growth

This exercise complements Exercise 5.1 in Chapter 5, using the same forecasts. The question asks you to convert a pro forma to a valuation using abnormal earnings growth methods. First complete the pro forma by forecasting cum-dividend earnings and normal earnings. Then calculate abnormal earnings growth and value the firm.

	2004E	2005E	2006E	2007E	2008E
Earnings	388.0	570.0	599.0	629.0	660.45
Dividends	115.0	160.0	349.0	367.0	385.40
Reinvested dividends		11.5	16.0	34.9	36.70
Cum-div earnings		581.5	615.0	663.9	697.15
Normal earnings		426.8	627.0	658.9	691.90
Abnormal earn growth		154.7	-12.0	5.0	5.25
Growth rates:					
Earnings growth		46.91%	5.09%	5.00%	5.00%
Cum-div earn growth (AEG)		49.87%	7.89%	10.83%	10.83%
Growth in AEG					5.0%
Discount rate		1.100	1.210		
PV of AEG		140.64	-9.92		

Note that the AEG for 2005 and 2006 are discounted back to the end of 2004.

a. Forecasted abnormal earnings growth (AEG) is given in the pro forma above. AEG is the difference between cum-dividend earnings and normal earnings. So, for 2005,

AEG = 581.5 – 426.8 = 154.7.

Cum-dividend earnings is earnings plus prior year’s dividend reinvested at the required rate of return. So, for 2005,

Cum-dividend earnings = 570.0 + (115 × 10%) = 581.

Normal earnings is prior year's earnings growing at the required rate. So, for 2005,

$$\text{Normal earnings} = 388 \times 1.10 = 426.8$$

Abnormal earnings growth can also be calculated as

$$\text{AEG} = (\text{cum-div growth rate} - \text{required rate}) \times \text{prior year's earnings}$$

So, for 2005,

$$\text{AEG} = (0.4987 - 0.10) \times 388 = 154.7$$

b. The growth rates are given in the pro forma.

c. The growth rate of AEG after 2006 is 5%. Assuming this rate will continue into the future, the valuation runs as follows:

Forward earnings, 2004	388.00
Total present value of AEG for 2005-2006 (140.64 – 9.92 = 130.73)	130.72
Continuing value (CV), 2006 $= \dfrac{5}{1.10 - 1.05} = 100.00$	
Present value of CV $= \dfrac{100.0}{1.210}$	82.64
	601.36
Capitalization rate	0.10
Value of the equity $= \dfrac{601.36}{0.10}$	6,013.6
Value per share on 1,380 million shares	4.36

This is a Case 2 valuation. If you worked exercise E5.1 using residual earnings methods, compare you value calculation with the one here.

d. The forward P/E = 6,013.6/388 =15.5. The normal P/E is 1/0.10 = 10.

E6.2. Abnormal Earnings Growth and Value

This exercise complements Exercise 5.2 in Chapter 5, using the same forecasts.

Develop the pro forma to forecast abnormal earnings growth (AEG) as follows:

	2000	2001	2002	2003	2004
Eps	3.90	3.70	3.31	3.59	3.90
Dps	1.00	1.00	1.00	1.00	1.00
Reinvested dividends (12%)		0.12	0.12	0.12	0.12
Cum-dividend earnings		3.82	3.43	3.71	4.02
Normal earnings (12%)		4.368	4.144	3.707	4.021
Abnormal earnings growth		-0.548	-0.714	0.003	-0.001

(a) See bottom line of pro forma for answer.

(b) As AEG is forecasted to be zero after 2002, the valuation is based on forecasted AEG up to 2002:

$$V_{1999}^{E} = \frac{1}{0.12}\left[3.90 + \frac{-0.548}{1.12} + \frac{-0.714}{1.2544}\right]$$

$$= \$23.68$$

Note that this is the same value as obtained using residual earnings methods in Exercise 5.2.

(c) The expected trailing P/E for 2004 must be normal if abnormal earnings growth is

expected to continue to be zero after 2004.

(d) The expected trailing P/E is normal: 1.12/0.12 = 9.33:

$$\frac{V_{2004} + d_{2004}}{Eps_{2004}} = 9.33$$

So, V + d = \$3.90 x 9.33

= \$36.387

As the dividend is expected to be \$1.00, the 2004 value (ex-dividend) is \$35.387.

E6.3. Calculating Cum-dividend Earnings Growth: Nike

The pro forma is as follows:

	2003	**2004**
Eps	2.77	3.13
Dps	0.55	
Reinvestment of 2003 dividend at 10%		0.055
Cum-dividend eps		3.185
Cum-dividend eps growth rate (3.185/2.77 –1)		14.98%
Ex-dividend eps growth rate (3.13/2.77 - 1)		13.0%

E6.4. Calculating Cum-dividend Earnings: General Motors

Year	***Eps***	***Dps***	***Earnings on prior year's reinvested dividends***	***Cum-dividend eps***
1994	5.22	0.80		
1995	7.28	1.10	0.08	7.36
1996	6.06	1.60	0.11	6.17
1997	8.70	2.00	0.16	8.86
1998	4.26	2.00	0.20	4.46

E6.5. Dividend Displacement and Value

(a) Firm B will have higher earnings in 2002 because it will pay no dividend in 2002. Firm A's 2002 earnings will be displaced by its 2001 dividend.

Dividend in 2001 for Firm A = 0.6 × 16.60 = 9.96

Reduced 2002 earnings for Firm A = 9.96 × 11% = 1.10

Therefore, B's earnings (without the displacement) = 17.80 + 1.10

= 18.90

(Assumes retained earnings are invested at the cost of capital.)

(b) Anticipated future dividends don’t affect current price (unless payment reduces investment in value-generating projects). Firm A’s shareholders expect to earn the earnings of Firm B’s shareholders by reinvesting the dividend at the cost of capital. So cum-dividend earnings are the same for both firms.

E6.6. Using Analysts’ Forecasts to Calculate PEG Ratios and Evaluate Stock Prices: General Motors

The pro forma is as follows:

	2003	**2004**
Eps	4.62	6.77
Dps	2.00	
Reinvestment of 2003 dividend (at 12%)		0.24
Cum-dividend eps		7.01

(a) Cum-dividend expected eps for 2004 = $7.01

Cum-dividend growth rate for 2004 = 7.01/4.62 – 1.0 = 51.73%

(b) Cum-dividend for 2004	7.01
Normal earnings for 2004 = 4.62 x 1.12 =	5.1744
AEG, 2004	1.8356

Alternative calculation:

AEG = (Cum-div growth rate, 2004 – required return) x eps, 2003

= (0.5173 – 0.12) x 4.62

= 1.8355 (allow for rounding error)

(c) Forward P/E = 39/4.62 = 8.44

PEG = Forward P/E for 2003/Growth rate for 2004

= 8.44/51.73

= 0.16

The simplistic interpretation of the ratio says that, if the ratio is less than 1.0, the stock is a BUY: the P/E is underpricing subsequent earnings growth. However, as the ratio prices only one year of growth, it can be misleading. That is certainly the case here: GM cannot maintain a 51.73% growth rate. A growth rate of 8.44% would yield a PEG of 1.0.

(d) If the market saw GM's earnings growing at 12% (the required return) after 2003,

it would give GM a normal P/E of 1/0.12 = 8.33, approximately the 8.44 P/E it actually gave the firm. So the market forecasts no growth over the required rate (that is, no abnormal growth) in the long run. So it must see the large forecasted AEG in 2004 declining after 2004.

E6.7. Forward P/E Ratios and Implied Earnings Growth: Hewlett-Packard

a. At a price of $12 and forward (one-year-ahead) earnings of $1.19 per share, the forward P/E is 12/1.19 = 10.08.

b. If the cost of capital (required return) is 10%, the normal forward P/E is 1/0.10 = 10. This normal P/E is appropriate if one forecasts cum-dividend earnings growth of 10%. So, at a P/E of about 10, the market is forecasting cum-dividend eps growth of 10% per year after the forward year, 2003.

c. As cum-dividend earnings are expected to grow at a rate equal to the cost of capital, no abnormal earnings growth is forecasted.

d. Forecasted cum-dividend eps for 2004, at 10% growth rate: $1.19 x 1.10 = $1.309

Earnings of 2003 dividend during 2004: $0.32 x 0.10

0.032

Ex-dividend eps, 2004

1.277

Ex-dividend growth rate = 1.277/1.19 = 1.073 (a 7.3% rate)

E6.8   Using Earnings Growth Forecasts to Challenge a Stock Price: Toro Company

a. With a required return of 10%, the value from capitalizing forward earnings is

Value_{2002} = \$5.30/0.10 = \$53

With a view to part d of the question, forward earnings explain most of the current market price of \$55. If one can forecast growth after the forward year, one would be willing to pay more that \$53.

b. First forecast the ex-dividend earnings based of analysts' growth rate of 12%. Then add the earnings from reinvesting dividends at 10%.

	2003	2004	2005	2006	2007	2008
Eps growing at 12%	5.30	5.936	6.648	7.446	8.340	9.340
Dividends	0.53	0.594	0.665	0.745	0.834	0.934
Dividends reinvested at 10%		0.053	0.059	0.067	0.075	0.083
Cum-dividend earnings		5.989	6.707	7.513	8.415	9.423

c. Abnormal earnings growth (AEG) is cum-dividend earnings minus normal growth earnings. Normal earnings is earnings growing at the required return of 10%:

Cum-dividend earnings	5.989	6.707	7.513	8.415	9.423
Normal earnings	5.830	6.530	7.313	8.191	9.174
Abnormal earnings growth (AEG)	0.159	0.177	0.200	0.224	0.249

d. With abnormal earnings growth forecasted after the forward year, the stock should be worth more than capitalized forward earnings of $53, the approximate market price. (One would have to examine the integrity of the analysts' forecasts, however.)

The growth rate forecast for AEG for 2005-2008 is 12% (allow for rounding error in calculating this growth rate from the AEG numbers above). This cannot be sustained if the required return is 10%, but there is plenty of short-term growth to justify a price above $55. (Of course, one can call the analysts' forecasts into question.)

E6.9. Abnormal Earnings Growth and Accounting Methods

The revised pro forma is as follows:

	2004E	2005E	2006E	2007E	2008E
Earnings	502.0	570.0	599.0	629.0	660.45
Dividends	115.0	160.0	349.0	367.0	385.40
Reinvested dividends		11.5	16.0	34.9	36.70
Cum-div earnings		581.5	615.0	663.9	697.15
Normal earnings		552.2	627.0	658.9	691.90
Abnormal earn growth		29.3	-12.0	5.0	5.25

Growth rates:				
Earnings growth	13.55%	5.09%	5.00%	5.0%
Cum-div earn growth (AEG)	15.84%	7.89%	10.83%	10.83%
Growth in AEG				5.0%
Discount rate	1.100	1.210		
PV of AEG	26.64	-9.92		

(a) Forecasted earnings for 2004 increase by $114 million, to $502 million, because of the lower cost of good sold. (This assumes that the write-down has no effect on forecasted revenues on which forecasts for other years are based: it is often the case the an inventory write-down means that the firm will have more trouble selling its inventory.)

(b) The valuation based on the revised pro forma is:

Forward earnings, 2004	502.00
Total present value of AEG for 2005-2006 (26.64 – 9.92 = 16.72)	16.72
Continuing value (CV), 2006 $= \dfrac{5}{1.10-1.05} = 100.00$	
Present value of CV $= \dfrac{100.0}{1.210}$	82.64
	601.36
Capitalization rate	0.10
Value of the equity $= \dfrac{601.36}{0.10}$	6,013.6
Value per share on 1,380 million shares	4.36

The valuation is the same at that is Exercise 6.1.

(c) As the additional earnings of $114 million in 2004 will incur a tax of $39.9 million, they will be lower by that amount, that is $462.1 million. However, the lower earnings provide a lower base for calculating AEG for 2005, so AEG in 2005 is higher than that in the pro forma in (a). The net effect is to leave the valuation unchanged. (This assumes forecasts for other years are already after tax.)

E6.10. Normal Trailing and Forward P/E Ratios: Whirlpool Corporation

(a) If Whirlpool's shares are to trade at a normal forward P/E, the pro forma should show zero expected abnormal earnings after the forward year, 1995. The following calculations show that 1996 and 1997 abnormal earnings growth, based on the analyst's forecasts, is indeed approximately zero:

	1996	**1997**
Eps forecast	5.08	5.44
Dps for 1995 reinvested at 10%	0.128	
Dps for 1996 reinvested at 10%		0.134
Cum-dividend eps	5.208	5.574
Normal earnings	5.225	5.588
Abnormal earnings growth	-0.017	-0.014

(b) If Whirlpool is to trade at a normal trailing P/E, the pro forma must forecast zero abnormal earnings growth for 1995 (the forward year) as well as for 1996 and 1997. This is indeed the case:

Eps forecast for 1995	4.75
Dps for 1994 ($1.22) reinvested at 10%	0.122
Cum-dividend eps for 1995	4.872
Normal earnings (4.43 x 1.10)	4.873
Abnormal earnings growth	-0.001

At a market price of $47, Whirlpool actually did trade at (close to) a normal P/E:

$$\text{Trailing P/E} = \frac{47 + 1.22}{4.43} = 10.88$$

The normal P/E for a required return of 10% is 11.

E6.11. Is a Normal Forward P/E Ratio Appropriate? Maytag Corporation

a. Normal forward P/E for a 10% cost of capital = 1/0.10 = 10.0.

Actual traded forward P/E = \$28.80/\$2.94 = 9.80.

The firm was trading below a normal P/E, so the market was forecasting negative abnormal earnings growth after 2003.

b. A five-year pro forma with a 3.1% eps growth rate after 2004 and forecasted dps that maintains the payout ratio in 2003:

	2003	2004	2005	2006	2007
Eps	2.94	3.03	3.12	3.22	3.32
Dps	0.72	0.74	0.76	0.79	0.81
Dps reinvested at 10%		0.072	0.074	0.076	0.079
Cum-dividend earnings		3.102	3.194	3.296	3.399
Normal earnings at 10%		3.324	3.333	3.432	3.542
Abnormal earnings growth		-0.222	-0.139	-0.136	-0.143

An AEG valuation based on just these five years of forecasts is:

$$V^{E}_{2002} = \frac{1}{0.10}\left[2.94 + \frac{-0.222}{1.10} + \frac{-0.139}{1.21} + \frac{-0.136}{1.331} + \frac{-0.143}{1.4641}\right]$$

= \$24.23

So, even if abnormal earnings growth were expected to recover to zero after 2007, the current price of \$28.80 is too high.

E6.12. Residual Earnings and Abnormal Earnings Growth

The pro forma for the forecast is as follows:

	2002	2003	2004	2005	2006	2007
Eps		4.32	5.03	5.58	6.20	6.88
Dps		0.60	0.67	0.74	0.83	0.92
Bps	13.85	17.57	21.93	26.77	32.14	38.10
Reinvested dividends at 12%			0.072	0.080	0.089	0.100
Cum-dividend earnings			5.102	5.660	6.289	6.980
Normal earnings			4.838	5.634	6.250	6.944
Abnormal earnings growth			0.264	0.026	0.039	0.036

Residual earnings	2.658	2.922	2.948	2.987	3.023
Change in residual earnings		0.264	0.026	0.039	0.036

The answers to parts a, b and c of the question are in the last three lines of the pro forma.

E6.13. Normal P/E Ratios

The normal trailing P/E ratio is $\frac{1+\text{required equity return}}{\text{required equity return}}$

The normal forward P/E is the trailing P/E – 1.0

The schedule for the trailing P/E is as follows. Subtract 1.0 to get the forward P/E.

8%	13.50
9%	12.11
10%	11.00
11%	10.09
12%	9.33
13%	8.69
14%	8.14
15%	7.67
16%	7.25

E6.14. Calculating an Intrinsic P/E Ratio: Maytag Corporation

The pro forma from the forecast develops as follows:

	1993A	1994A	1995E	1996E	1997E	1998E
Eps		1.40	1.55	1.65	1.76	1.88
Dps		0.50	0.56	0.59	0.63	0.69
Bps	5.50	6.82	7.81	8.87	10.00	11.19
Residual earnings (10%)		0.86	0.87	0.87	0.87	0.88
Abnormal earnings growth				0.00	0.00	0.00

This pro forma uses a growth rate in (ex-dividend) eps of 7% after 1996 (mid-point of the range given by the analyst). The dividend is forecasted to maintain the 1995 payout of 36% of earnings.

In this pro forma, abnormal earnings growth is calculated as the change in residual earnings (as it always must be).

(a) As abnormal earnings growth is forecasted to be zero after the forward year (1995), the P/E must be normal. For the required equity return of 10%, the normal P/E is $\frac{1}{0.10} = 10$. The value of the equity at the end of 1994 is:

Value of equity = \$1.55 x 10

= \$15.50

(b) The P/E is normal for a 10% required equity return.

(c) Expected earnings must grow cum-dividend at the required return of 10%.

Minicases

M6.1. Borders Group: Reverse Engineering with Earnings Forecasts

Introduction

This case asks the student to test a market price with little information: just two years of earnings forecasts. So, with no forecasts for subsequent years, the valuation is going to be incomplete. However, students should be impressed about how far one can get in answering the question.

The case demonstrates the mechanics of using the abnormal earnings growth model and the use of reverse engineering in investing.

Working the Case

The forward P/E is 17/1.28 = 13.3. So the question is one of asking whether a forward P/E of 13.3 is appropriate. That question turns on whether subsequent growth beyond 2002 warrants a forward P/E of 13.3. The normal forward P/E for a cost of capital of 10% is 1/0.10 = 10, so we have so see some abnormal earnings growth to justify a P/E of 13.3. Alternatively stated, we have to see (cum-dividend) earnings growth at a rate greater that the cost of capital of 10%.

With only two years of earnings forecasts, we do not know analysts' earnings growth rate into the future. But we can apply reverse engineering techniques and ask what growth rate is required for a price of $17.

First calculate abnormal earnings growth (AEG) for 2003:

	2001	2002	2003
Price	17		
Earnings Forecast		1.28	1.44
Normal Earnings, 2003: 1.28 × 1.10			1.408
Abnormal earnings growth, 2003			0.032

Normal earnings for 2003 is 2002 earnings growing at 10%. Cum-dividend earnings for 2003 is the forecasted earnings (with no reinvestment of dividends) because

Borders pays no dividends. AEG is the difference between earnings and normal earnings. Note that AEG could have been calculated as cum-dividend earnings growth minus normal earnings growth, that is, as (1.44 – 1.28) – 1.28 x 0.10 = 0.032.

Now ask the reverse engineering question: What growth in AEG after 2003 is required to justify a price of $17? Using the abnormal earnings growth P/E model,

$$17 = \frac{1}{0.10}\left[1.28 + \frac{0.032}{1.10 - g}\right]$$

So, g = 1.024 (2.4% growth). The calculation does depend on a cost of capital of 10%, of course, but one can look at implied growth rates under alternative estimates for the cost of capital.

Thinking about growth in AEG is a bit difficult. But AEG growth can be translated into earnings growth. A scenario of 2.4% growth in AEG can be translated into one for growth in eps, as follows.

	2001	2002	2003	2004	2005
Earnings forecasts, 2002-3		**1.28**	**1.44**		
Normal Earnings, 2003			1.408		
AEG, 2003			0.032		
Normal Earnings, 2004: 1.44 × 1.10				1.584	
AEG, 2004: 0.032 × 1.024				0.033	
Earnings Forecast, 2004				**1.617**	
Normal Earnings, 2005: 1.617 × 1.10					1.779
AEG, 2005: 0.033 × 1.024					0.034
Earnings forecast, 2005					**1.813**
(and so on for 2006 and beyond.)					

The numbers in bold here are the earnings forecasts for future years.

	2002	2003	2004	2005
Earnings Forecasts	1.28	1.44	1.62	1.81

The question of whether $17 is a reasonable price is answered by asking whether these eps forecasts are reasonable: can you justify eps growth from 1.28 in 2002 to 1.81 in 2005? Note that the implied growth in (cum-dividend) eps is 12.5% per year, compared with a 10% normal growth for the cost of capital.

The analysis in Parts II and III of the book is designed to forecasts growth rates. The analysis here is one that can be applied in absence of any further analysis.

Taking the Case a Bit Further

You may choose to introduce the alternative form of the AEG model developed in the later chapter on P/E ratios.

If one expects AEG to grow at a constant rate from year 2 ahead onwards, the model is

$$V_E^0 = \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{AEG_2}{\rho_E - g}\right]$$

as stated above. This can be restated as

$$V_E^0 = \frac{Earn_1}{\rho_E - 1} \bullet \frac{g_2 - g}{\rho_E - g}$$

where g is, as before, one plus the long-term growth rate of AEG and g_2 is one plus the growth rate forecasted for cum-dividend eps in year 2 ahead. For Borders, analysts' expected growth rate for eps in year 2 (2003), g_2, is 1.44/1.28 = 1.125 (12.5%). So, for a 2.4% long-term AEG growth rate, the $17 price for Borders can be calculated as:

$$\begin{aligned} V^{E}_{2000} &= \frac{1.28}{0.10} \times \left[\frac{1.125 - 1.024}{1.10 - 1.024}\right] \\ &= \$17 \end{aligned}$$

So the model can be seen as building in a short-term growth rate (g_2) and a long-term growth rate, g. Often short term expected growth rates are high and not indicative of long-term growth. But one wants to value short-term growth as well as long-term growth. Firms with high expected growth in the short term should be valued higher, for the same long-term growth. So, think of this variant of the model as forecasting a short-term growth rate, but recognizing that the short-term growth typically falls off to a long-term level. What might that long-term level be? Well, a starting point is typical growth in GDP (4%), or typical growth for the industry.

M6.2. Dell Computer Corporation: Pricing Earnings Forecasts with Sensitivity Analysis

Introduction

This short case applies reverse engineering and introduces sensitivity analysis.

Intrinsic

value calculations are not precise exercises – we cannot get the true intrinsic value. Valuation models develop approximations. But the models can be utilized to understand our uncertainty a little better. Sensitivity analysis is the tool. Typically we are most uncertain about long-run growth rates and the cost of capital. Sensitivity analysis yields valuations for different estimates of long-run growth and the cost of capital. If the price falls out of the bounds of reasonable estimates for these two inputs, we are more confident that the stock is mispriced.

We develop sensitivity analysis further is later chapters. This case is an introduction.

Working the Case

The only inputs we have here are forecasts for 2002 and 2003. With these forecasts we can, however, apply reverse engineering to the abnormal earnings growth model. The AEG model for two years of forecasts is:

$$V_0^E = \frac{1}{\rho_E - 1}\left[\text{Earn}_1 + \frac{\text{AEG}_2}{\rho_E - g}\right]$$

For Dell, forward earnings, Earn_1 = \$0.63.

Reverse engineering with the current market price:

If Dell's equity cost of capital were 10%, then abnormal earnings growth for two years ahead (2003) is calculated as follows:

Cum-dividend earnings (2003) = \$0.74 (Dell pays no dividends)

Normal earnings: 0.63 x 1.10 = 0.693

Abnormal earnings growth = \$0.047

Reverse engineering at the market price of $22:

$$22 = \frac{1}{0.10}\left[0.63 + \frac{0.047}{1.10 - g}\right]$$

So g = 1.07, or a growth rate in AEG of 7% per year in perpetuity.

A forecast of 7% growth in AEG can be translated into forecasts of eps:

	2003	2004	2005	2006
Earnings, 2003	**0.74**			
Normal earnings, 2004		0.814		
AEG, 2004 (0.047 x 1.07)		0.050		
Earnings, 2004		**0.864**		
Normal earnings, 2005			0.951	
AEG, 2005 (0.050 x 1.07)			0.054	
Earnings, 2005			**1.005**	
Normal earnings, 2006				1.105
AEG, 2006 (0.054 x 1.07)				0.058
Earnings, 2006				**1.163**

(and so of for subsequent years)

Numbers in bold are earnings forecasts, equal to prior earnings growing at 10% plus AEG for the period (growing at 7%). Earnings are growing at approximately 16%. A growth rate of 7% in AEG (or a growth rate in earnings of 16%) seems high for a perpetual growth rate.

At this point, you might introduce the restated (but equivalent) form of the formula that will be covered in the book later:

$$V_E^0 = \frac{Earn_1}{\rho_E - 1} \bullet \frac{g_2 - g}{\rho_E - g}$$

The short-term growth rate, g_2 is growth in two-year ahead cum-dividend earnings from

one year ahead. For Dell this is 0.74/0.63 = 1.1746, a 17.5% growth rate. Thus, for a 7% long-term growth rate for AEG of 7%,

$$V_{2001}^{E} = \frac{0.63}{0.10}\left[\frac{1.175-1.07}{1.10-1.07}\right]$$

$$= \$22$$

Sensitivity analysis

Sensitivity analysis calculates values for different estimates of the cost of capital and growth rates. The analyst inputs all conceivable estimates, to get bounds on a valuation, but in his own mind weights those he feels are more reasonable. If a 7% growth rate is high to him and the required return is no less than 10%, he puts $22 at the top end of the range of estimates, so puts the stock into a “maybe sell” category rather than a “strong buy.”

The calculations for the sensitivity analysis are much easier if you use the restated form of the model above, for then you do not have to recalculate the AEG for changes in the cost of capital. Forward earnings of $0.63 for Dell and the two-year ahead growth rate of 17.5% are the same in each calculation.

Here are valuations of Dell for different costs of capital and growth rates:

Cost of Capital	Growth Rate					
	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
9.0%	13.61	15.50	18.90	21.88	26.83	36.75
10.0	11.03	12.21	14.18	15.75	18.11	22.05
11.0	9.11	9.86	11.05	11.93	13.17	15.03

You see that the current price can be supported if the cost of capital is around 9% and the growth rate is 5%; or if the cost of capital is 10% and the growth rate is 7%. If we were to forecast a long-term growth rate of 4%, equal to the typical GDP growth rate, the value is $18.90 per share for a cost of capital of 9%, less for a higher cost of capital. If we use the CAPM to estimate a cost of capital, it would be 10.2% with the risk-free 5-year rate at the time of 4.2% and a 6% market risk premium. So you see how one plays with different scenarios to get a feel for the reasonableness of the valuation.

Looking at this grid, the analyst might conclude that $22 is expensive for this stock. She might prepare a grid for many stocks and decide which stocks to tilt her portfolio towards, or which to avoid (or sell). That is, she would weight stocks in a portfolio according to the information from these grids.

The validity of this analysis depends, of course, of the reliability of analysts' forecasts for the two years ahead. The forecasts here are consensus forecasts over a number of analysts. One could potentially expand the grid for the spread of analysts' forecasts around the consensus.

Of course, one could also do some pro forma financial statement analysis and model the future of the firm, and so produce ones own forecasts and long-term growth rates. This is the topic of Parts Two and Three of the book.

Extensions

Give Dell's current share price to students, along with consensus forecasts for the next two years (from Yahoo Finance Research page for Dell, for example), and ask them to challenge the current price. Also give them the 5-year eps growth rate that analysts are forecasting to see if a reverse engineering like that above yields the growth rate that analysts are forecasting.

M6.3 Should Cendant Corporation Buy Back its Own Shares?

Introduction

This case is designed to show the student how one can get a good rough cut at a valuation from the little information supplied. It also touches on the issue (raised in Chapter 3) of how (and when) share repurchases generate value for shareholders You might work the short exercises, E3.11 and E3.12 in Chapter 3 as an introduction to this case.

The Information in the Case

Bps(2001)	$8.61
Eps(2001)	$0.42
Dps(2001)	$0.00

Forward Eps (2002)	$1.27
Two-year forward eps (2003)	$1.59
Price per share, October, 2002	10.00
Price-to-book	1.16
Trailing P/E (10.00/0.42)	23.8
Forward P/E (2002) (10.00/1.27)	7.9
Forward P/E (2003) (10.00/1.59)	6.3

Question A

The benchmark rule for stock repurchases says that repurchases at fair value do not generate value for shareholders. The following example demonstrates.

Cendant had 1,040 million shares outstanding in October, 2002 with a market capitalization (at $10 per share) of $10.4 billion. Suppose the $10 per share is a fair value (intrinsic value). If Cendant buys back 100 million shares at $10 each, market capitalization falls to $9.4 billion. But as there are now only 940 million shares outstanding, the value per share is still $10. The share repurchase had not added value to holding a share.

In discussing this benchmark case, note the following:

- Students might note that share repurchases increase earnings per share and earnings growth (as commentators argue). They might then imply that higher eps and eps growth warrant higher valuations. Stock repurchases do indeed increase eps and eps growth, but the effect is a leverage effect that does not add value, (although commentators argue otherwise). This is demonstrated in Chapter 13. The reasoning: the required return increases to reflect the increase in leverage, leaving value unchanged even though higher eps is forecasted.

- Stock repurchases might function as a signal (of inside information about higher value), and so will increase the stock price. But this can only be the case if management buys back stock when it is undervalued: the signal is a signal that management thinks the stock is underpriced.
- Stock repurchases may be desirable if the firm does not have investment projects in which to invest. Rather than investing excess cash in T-bills, a zero value-added investment, pass it out to shareholders who may have better investment opportunities. See the Chrysler case in Chapter 5. Note that, in this case, stock repurchases could be a “signal,” but a negative signal: the firm does not have investment opportunities.

Stock repurchases at fair value do not add value, but stock repurchases at less than fair value do. Shareholders can buy the stock cheaply, but so can the firm on their behalf. So, Cendant might buy back its own stock if indeed it feels that, at $10 per share, its stock is underpriced. Question 2 of the case investigates.

An historical note: Stock repurchases at prices greater than fair value destroy shareholder value (by the same argument). During the stock market bubble of the l990s, there were many large stock repurchases, financed by borrowings. Stock prices were high (as any rough calculation of fair value would have indicated), so value was destroyed for shareholders. The legacy for many firms was a high debt load (from the borrowings) that became difficult to service in 2001-03. Share issues (to raise cash to buy down the debt) became problematical because share prices were much lower (and firms should not issue shares when they are underpriced!). Firms resorted to assets sales to get cash, so upsetting their ability to generate value from operations. Share repurchases of overpriced stock indeed destroys value.

Question B

Challenge the current price of \$10 using the valuation frameworks in Chapters 5 and 6.

The following pro forma incorporates the information in the case and also forecasts residual earnings and abnormal earnings growth. A 12% required return for Cendant's equity is used:

	2001A	2002E	2003E
Eps	0.42	1.27	1.59
Dps	0	0	0
Bps	8.61	9.88	11.47
Residual Earnings (RE)		0.2368	0.4044
Abnormal Earnings Growth (AEG)			0.167

The residual earnings calculation for 2002E is:

RE_{2002} = \$1.27 – (0.12 x 8.61) = \$0.2368

The residual earnings calculation for 2003E is:

RE_{2003} = \$1.59 – (0.12 x 9.88) = \$0.4044

The abnormal earnings growth calculation for 2003E is:

Cum-dividend earnings growth (1.59 – 1.27) = 0.320 (there are no dividends)

Normal earnings growth (1.27 x 0.12) = $\underline{0.153}$

AEG_{2003} $\underline{0.167}$

The 12% required return is used judiciously. With the (risk-free) rate on 10-year US Treasuries of 3.61% at the time, a 12% rate ascribes a risk premium of 8.39% to

Cendant's equity, a hefty amount. So we are probably overstating the required return. Accordingly, an estimated price (as below) is biased downwards; we are getting a floor valuation. With a lower required return we would estimate a higher price. This suits our purpose, for we are testing whether the $10 price is too low, so need a number for which we can say that the value is at least that number.

Challenging the price with residual earnings methods

The traded P/B ratio is 1.16. Does the information here indicate that this P/B is too low?

The pro forma shows that growth in RE is expected from 2002 to 2003. Suppose that one expected no growth in RE after 2002, that is, RE is forecasted to be constant from 2002 onwards, rather than growing.. The RE valuation would then be

V_{2001} = Book Value$_{2001}$ + RE$_{2002}$ capitalized as a perpetuity

So,

$$V_{2001} = 8.61 + \frac{0.2368}{0.12} = \$10.58$$

That is, on the assumption of no growth in RE, the stock is worth more than $10. And this is a valuation where we are charging a high required return (of 12%). If we charge 10% as a required return, the value is $12.40. Based on the pro forma that indicates growth, the stock is cheap.

We have to be careful, of course, for we have only a 2-year pro forma. But we have focused our questioning: to argue that $10 is too expensive, we have to forecast a considerable decline in residual earnings after 2003.

Challenging the price with abnormal earning growth methods

With a required return if 12%, the stock is worth a normal forward P/E of 1/0.12 = 8.33 if we expect no abnormal earnings growth (AEG) after the 2002 forward year. The traded forward P/E is 7.9, so the market is implicitly forecasting negative AEG after 2002. But the pro forma indicates positive (and substantial) AEG for 2003. Put another way, capitalizing forward earnings at 12%, the estimated value is $1.27/0.12 = 10.33, more than the actual price of $10 and, in addition, analysts see AEG of 0.167 in 2003 that adds further value.

Further, these calculations use a high required return. If the required return is 10%, the value from forward earnings is $1.27/0.10 = $12.70 and there is extra value from AEG is 2003 of $0.320 – (0.10 x 1.27) = $0.193.

To suggest that the stock is fairly (or overpriced) one would have to forecast considerable negative AEG in years 2004 and beyond.

Question C

The PEG ratio is the ratio of the forward P/E (for 2002 here) to the subsequent one-year forecasted growth rate (for 2003):

$$PEG = \frac{P/E_{2002}}{Growth_{2003}}$$

So, with a 2003 eps growth rate of 1.59/1.27 – 1.0 = 25.2%,

PEG = 7.9/25.2 = 0.31

This is low against the benchmark of 1.0. The PEG suggests that the P/E of 7.9 is undervaluing subsequent growth. But, we have to be careful. The P/E evaluates long-term growth, and the 2003 growth rate may not continue. At the time, analysts were forecasting a five-year growth rate of 14%. With this rate in the denominator, the PEG ratio is still only 0.56.

Using Analysts Forecasts

Using both the RE and AEG approaches, we establish a case for underpricing by the market (and a case for a stock repurchase). However, we have based our analysis on sell-side analysts' consensus forecasts and our analysis is only as good as those forecasts. If we doubt those forecasts, we have a doubtful analysis. We might then substitute our own forecasts (developed after further analysis in the book).

One must always be concerned about the quality of sell-side analysts' forecasts. After all, they come for free and what comes for free must be questioned. During the bubble, there was strong suspicion of bias in these forecasts, brought on by over enthusiasm (at best) and deliberate misleading of retail investors (at worse) in the pursuit of investment banking clients.

One could add further information to an analysis like the one here by bringing in the 3- or 5-year eps growth rates that analysts forecast. In 2002, analysts were forecasting a 5-year eps growth rate of 14% for Cendant. As the firm pays no dividends, this is the cum-dividend growth rate. Even with a required return of 12%, this rate is excess of the required rate, so further AEG is forecasted for 2004 onwards (further reinforcing the impression that the shares are underpriced at $10). But, these “long-term” growth rates are often not very reliable, so should be treated with care.

M6.4. Evaluation of an Equity Research Report on Kmart Corporation

Evaluate an equity research report in three steps:

1. Ask what the analyst is relying on to make the recommendation. What is his "model"? Is it a good basis for assessing the worth of a stock?
2. Ask whether the recommendation follows from the analysis — particularly from the forecasts that have been made.
3. Ask whether the analysis is logically consistent. Are "good analysis" principles violated?

An analysts' task is to develop forecasts (of payoffs) and then to make inferences about the valuation from the forecasts. Some analysts are good at forecasting, but not at converting the forecast to a valuation and a recommendation. Yet others are good at gathering information about a firm, but not at converting the information to a forecast. And others feel very strongly about a recommendation, but don't support the recommendation with detailed information gathering or forecasting.

Always ask: What is the model in the analyst's mind in getting a valuation? A poor research report will not give you a clear answer to this question.

The Kmart report is a case in point.

1. What is the analyst relying on to make the recommendation?

The forecast of the P/E ratio is central to the recommendation. But there is no apparent model behind the P/E. The analyst refers to the average P/E he sees for other discount retailers. But is this average multiple justified? He has just introduced the method of comparables (and we have seen the dangers of this in Chapter 3). He does not indicate at all how one arrives at the correct P/E, or even if he understands what a P/E is. And, we see below, his estimate of the P/E is inconsistent with his other forecasts.

2. Does the recommendation follow from the analysis?

The current price is $17 per share. Based on the analyst's forecast of eps of $1.41 in 2001, a forecasted P/E of 20 in 2001 gives a forecasted 2001 price of $28.20.

So, the stock return that he is forecasting over two years (on the current price of $17) is:

$$\text{Anticipated stock return} = \frac{28.20 - 17.0}{17.0}$$

$$= 65.9\% \text{ return}$$

The required return over two years (at 12% p.a.) is 25.4%, so this forecast does indeed imply a BUY. But is the analysis sound?

3. Is the analysis logically consistent?

(a) The analyst forecasts a P/E of 20 for 2001, yielding a forecasted price of $28.20, but forecasts a P/B ratio of 1.38, yielding a forecasted price (on a forecasted bps of $15.43) of $21.30. The two prices differ. The $21.30 price implies anticipated return of

$$\text{Anticipated return} = \frac{21.30 - 17.0}{17.0} = 25.3\%,$$

which is the required two-year return. A HOLD is implied.

(b) The bps forecasts are incorrect given the eps forecasts. It must be that bps (2000) = bps (1999) + eps (2000) – dps (2000). As there are no dividends (and the shares outstanding numbers indicate there are no anticipated stock issues or repurchases),

bps (2000) = 12.12 + 1.23 = 13.35

and

bps (2001) = 13.35 + 1.41 = 14.76

If the forecasted P/B ratio in 2001 is applied to this correct number, price in 2001 is $20.37. This price implies a SELL.

(c) The analyst forecasts earnings to grow at 6% per year after 2001. (We will see later in the book that) when earnings are forecasted to grow at less than the required return, the earnings yield is greater than the required return and the P/E is less than the inverse of the required return. The intuition is that, if the firm is to grow earnings at less than the required return on price, the price will be lower per dollar of earnings than if it were to grow at the required return. So, as the required return is 12%, the E/P should be greater than 12% and the P/E should be less than 9.33. So the analyst's P/E forecast of 20 is inconsistent with his earnings forecast.

(d) The recommendation is inconsistent with the forecast of free cash flow growing at 6%:

$$V^E_{1999} = \frac{\text{Free cash flow for 2000}}{\text{required return - growth in FCF}} - \text{Debt}$$

$$= \frac{632 \times 1.06}{12\% - 6\%} - 2{,}706$$

= $8,459 or $17.14 per share (on 493.4 million shares)

With the current price at $17, this calculation implies a HOLD.

A cost of capital of 12% is assumed here for simplicity. A cost of capital for operations should be calculated (see Chapter 13).

(e) An analysis of forecasted earnings yields implies a SELL:

$$\text{Two-year yield} = \frac{1.23 + 1.41}{17.00} = 15.53\%$$

(Note: there are no dividends to reinvest.) This is less than the required two-year return of 25.4%. So, SELL. Adding additional years of earnings (growing at 6%) will not change this conclusion. The conclusion will change if the anticipated change in premium is incorporated using the price in 2001 from the forecasted P/E of 20. But not by using the forecasted P/B (applied to the bps) in 2001.