Regnskabsanalyse og Aktievurdering

Prissætning af overskud

Kapitel 6

Hvad vil du lære fra kapitlet?

❑ Hvad "overnormal overskudsvækst" er

❑ Hvorledes budgettering af overnormal overskudsvækst giver den indre P/E ratio

❑ Hvad der forstås ved en "normal P/E ratio"

❑ Forskellen mellen ex-dividend overskudsvækst og cum-dividend overskudsvækst

❑ Forskellen mellem en Case 1 og 2 værdiansættelse

Hvad vil du lære fra kapitlet? - fortsat

❑ Fordele og ulemper ved AEG-modellen, og hvorledes værdiansættelsen er i sammenligning med RI-modellen

❑ Hvorledes udbytte, aktietilbagekøb og kapitalindskud berører overnormal overskudsvækst

❑ At overnormal overskudsvækst er lig med ændringen i residualoverskud

❑ Hvorledes AEG-modellen beskytter mod at betale for meget for overskud, der er fabrikeret

❑ Hvorledes AEG-modellen kan anvendes til reverse engineering

Begreberne bag P/E ratio

❏ Prisen i tælleren er baseret på forventede fremtidige overskud

❏ Overskud i nævneren er nuværende (eller forward) overskud

❏ P/E er derfor baseret på forventede vækst i overskud

❏ Sammenlign med price-to-book:

✓ P/B er baseret på forventede overskud relativt til nuværende bogført værdi

✓ ROCE er vækst i bogført værdi

✓ P/B er baseret på forventede vækst i bogført værdi

Pas på ikke at betale for overskud, der er fabrikeret

❑ Investeringer skaber vækst, men ikke nødvendigvis værdi

❑ Vækst i overskud kan fabrikeres

❑ Vi behøver en metode, der beskytter mod at betale for meget for overskudsvækst

P/B Valuation for Nike, Inc. (Ch. 5)

		Forecast Year				
	2006	2007	2008	2009	2010	2011
EPS		2.96	3.80	3.07	3.93	4.28
DPS		0.71	0.88	0.98	1.06	1.20
BPS	14.00	16.25	19.17	21.26	24.13	27.21
ROCE		21.1%	23.4%	16.0%	18.5%	17.7%
RE (9% charge)		1.700	2.338	1.345	2.017	2.108
Discount rate (1.09^t)		1.090	1.188	1.295	1.412	1.539
Present value of RE		1.560	1.968	1.039	1.429	1.370
Total present value of RE to 2011	7.37					
Continuing value (CV)						48.95
Present value of CV	31.81					
Value per share	53.18					

The continuing value:

$$CV = \frac{2.108 \times 1.045}{1.09 - 1.045} = 48.95$$

$$\text{Present value of continuing value} = \frac{48.95}{1.539} = 31.81$$

Note: Allow for rounding errors.

From P/B Valuation to P/E Valuation

The residual earnings pro forma for Nike, Inc:

		Forecast Year					
	2006	2007	2008	2009	2010	2011	2012
EPS		2.96	3.80	3.07	3.93	4.28	4.65
DPS		0.71	0.88	0.98	1.06	1.20	1.12
BPS	14.00	16.25	19.17	21.26	24.13	27.21	30.74
Residual earnings (9% charge)		1.700	2.338	1.345	2.017	2.108	2.203
Change in residual earnings			0.638	−0.993	0.672	0.091	0.095

$$V_0^E = \frac{1}{\rho_E - 1}\left[\text{EPS}_1 + \frac{\Delta \text{RE}_2}{\rho_E} + \frac{\Delta \text{RE}_3}{\rho_E^2} + \frac{\Delta \text{RE}_4}{\rho_E^3} + \frac{\Delta \text{RE}_5}{\rho_E^4} + \frac{\Delta \text{RE}_6}{\rho_E^4(\rho_E - g)} \right]$$

$$V_{2006}^E = \frac{1}{0.09}\left[2.96 + \frac{0.638}{1.09} + \frac{-0.993}{1.09^2} + \frac{0.672}{1.09^3} + \frac{0.091}{1.09^4} + \frac{0.095}{1.09^4(1.09 - 1.045)} \right]$$

$$= \$53.18$$

Ændring i RE og AEG

- Samme værdi:

  V = Bogført værdi + PV af RE

  = Kapitaliseret forward earnings + PV af ændringer i RE

- Samme mål:

  Ændring i RE = Abnormal Earnings Growth (AEG)

  Abnormal Earnings Growth (AEG) er vækst i overskud ud over afkastkravet

The Prototype Savings Account

	2000	2001	2002	2003	2004	2005
Earnings withdrawn each year (full payout)						
Earnings		5	5	5	5	5
Dividends		5	5	5	5	5
Book value	100	100	100	100	100	100
Residual earnings		0	0	0	0	0
Earnings growth rate		0	0	0	0	0
Cum-dividend earnings		5	5.25	5.51	5.79	6.08
Cum-dividend earnings growth rate			5%	5%	5%	5%
No withdrawals (zero payout)						
Earnings		5	5.25	5.51	5.79	6.08
Dividends		0	0	0	0	0
Book value	100	105	110.25	115.76	121.55	127.63
Residual earnings		0	0	0	0	0
Earnings growth rate			5%	5%	5%	5%
Cum-dividend earnings		5	5.25	5.51	5.79	6.08
Cum-dividend earnings growth rate			5%	5%	5%	5%

$$\text{Value of savings account} = \frac{\text{forward earnings}}{\text{required return}} = \frac{\$5}{0.05} = \$100 \qquad \text{Forward P/E} = \frac{1}{\text{required return}} = \frac{1}{0.05} = 20$$

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Trailing og Forward P/E

$$\text{Forward P/E} = \frac{\text{Price}_0}{\text{Earnings}_1}$$

$$\text{Trailing P/E} = \frac{\text{Price}_0 + \text{Dividend}_0}{\text{Earnings}_0}$$

[Dividende reducerer nuværende pris,
 men ikke nuværende overskud]

$$\text{Normal Forward P/E} = \frac{1}{\text{Afkastkrav}}$$

$$\text{Normal Trailing P/E} = \frac{1 + \text{afkastkrav}}{\text{Afkastkrav}}$$

Normal Forward P/E = Normal Trailing P/E -1

Cum-Dividend Earnings

For the *zero-payout* account:

	2001	2002	2003	2004	2005
Cum-dividend earnings	5.00	5.25	5.51	5.79	6.08

For the *full-payout* account:

	2001	2002	2003	2004	2005
Earnings in the account	5.00	5.00	5.00	5.00	5.00
Dividend reinvested @ 5%		0.25	0.51	0.79	1.08
Cum-dividend earnings	5.00	5.25	5.51	5.79	6.08

$$\text{Cum-dividend earnings (2002)} =$$

$$\text{Earnings (2002)} + \left[0.05 \times \text{Dividend (2001)} \right]$$

De to konti har forskellig (ex-dividend) overskudsvækst,men den samme cum-dividend overskudsvækst

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Normaloverskud

❑ *Normaloverskud er overskud, der* vokser med afkastkravet:

Normaloverskud = ρ_E Earnings$_{t-1}$

❑ Fra opsparingskontoen fås:

Normaloverskud (2002) = 1,05 x Overskud(2001)

$$= 1,05 \text{ x } 5,00 = 5,25$$

Normaloverskud (2003) = 1,05 x Overskud(2002)

$$= 1,05 \text{ x } 5,25 = 5,5125$$

Overnormal overskudsvækst (AEG)

❑ Overnormal overskudsvækst er vækst udover normal overskudsvækst

AEG = Cum-dividend earnings – normal overskud

❑ Fra opsparingskontoen fås:

AEG (2002) = 5,25 – 5,25 = 0

AEG (2003) = 5,5125 – 5,5125 = 0

Hvad har vi lært af eksemplet med opsparingskontoen?

1. Et aktiv er værd det kapitaliserede forward overskud, såfremt den forventede overnormale overskudsvækst er nul.

2. Et aktiv har en normal P/E ratio, såfremt den forventede overnormale overskudsvækst er nul

3. Overskud kommer fra to kilder:

✓ Overskud fra aktivet

✓ Overskud fra reinvesterede dividender

4. Dividender berører ikke cum-dividend earnings

5. Dividender berører ikke værdien

En model for Forward P/E

❑ Værdi af opsparingskonto = Kapitaliseret forward overskud + Ingen ekstra værdi

Ekstra værdi tillægges, såfremt (cum-dividend) overskud forventes at vokse med en vækst større en afkastkravet

❑ Modellen: Kapitaliseret forward overskud + ekstra værdi for AEG

$$V_0^E = \frac{Earn_1}{\rho_E - 1} + \frac{1}{\rho_E - 1}\left[\frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

$$= \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

Den indre P/E $\left(\dfrac{V_0^E}{Earn_1}\right)$ fås ved at dividere igennem med $Earn_1$

Alternativ beregning af AEG

$$AEG_t = \left[G_t - \rho_E \right] x \; earnings_{t-1}$$

hvor $G_t = $ Cum-dividend overskudsvækst (plus 1)

Anvendelse af modellen

❑ Forecast næste års overskud (forward earnings)

❑ Tillæg nutidsværdien (ultimo år 1) af forventede overnormal overskudsvækst for år 2 og fremefter

❑ Kapitaliser summen af forward earnings og værdien af overnormal overskudsvækst

Applying the Model

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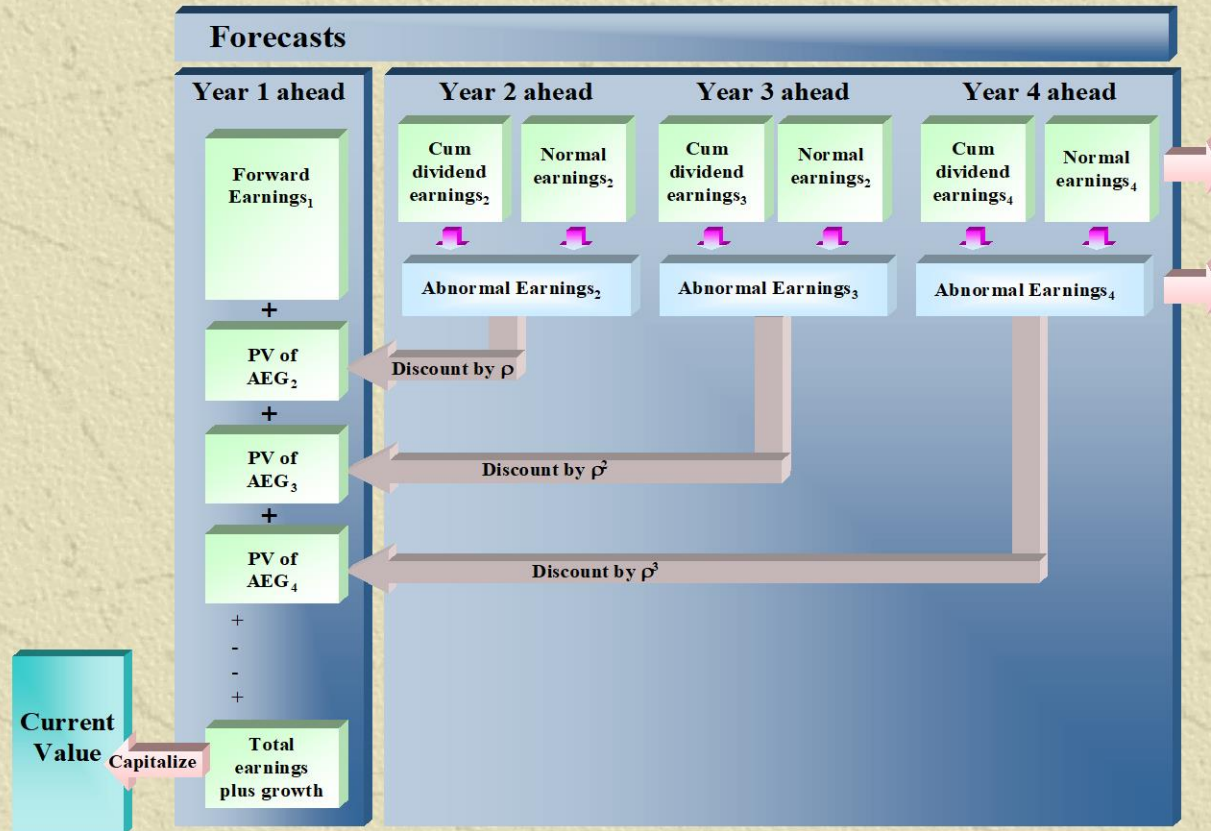
Applying the Model: An Example

Forecast for a firm with expected earnings growth of 3 percent per year (in dollars). Required return is 10% per year.

	2000	2001	2002	2003	2004	2005
Earnings	12.00	12.36	12.73	13.11	13.51	13.91
Dividends	9.09	9.36	9.64	9.93	10.23	10.53
Book value	100.00	103.00	106.09	109.27	112.55	115.93
RE (0.10)		2.36	2.43	2.50	2.58	2.66
RE growth rate			3%	3%	3%	3%
Earnings on reinvested dividends			0.936	0.964	0.993	1.023
Cum-dividend earnings			13.667	14.077	14.499	14.934
Normal earnings			13.596	14.004	14.424	14.857
Abnormal earnings growth			0.071	0.073	0.075	0.077
Earnings growth rate			3%	3%	3%	3%
Cum-dividend earnings growth rate			10.6%	10.6%	10.6%	10.6%
Abnormal earnings growth rate				3%	3%	3%

Residual earnings valuation:

$$V_{2000}^E = 100 + \frac{2.36}{1.10 - 1.03} = 133.71$$

AEG valuation:

$$V_{2000}^E = \frac{1}{0.10}\left[12.36 + \frac{0.071}{1.10 - 1.03}\right] = 133.74$$

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A Case 1 Valuation: General Electric

Required return is 10%

In this case, abnormal earnings growth is expected to be zero after 2004

			Forecast Year			
	1999	2000	2001	2002	2003	2004
Dps		0.57	0.66	0.73	0.77	0.82
Eps		1.29	1.38	1.42	1.50	1.60
Dps reinvested at 10%			0.057	0.066	0.073	0.077
Cum-dividend earnings (eps + dps reinvested)			1.437	1.486	1.573	1.677
Normal earnings ($1.10 \times eps_{t-1}$)			1.419	1.518	1.562	1.650
Abnormal earnings growth (AEG)			0.018	-0.032	0.011	0.027
Discount rate (1.10^t)			1.100	1.210	1.331	1.464
PV of AEG			0.016	-0.026	0.008	0.028
Total PV of AEG		0.017				
Total earnings to be capitalized		1.307				
Capitalization rate		0.10				

Value per share $\left(\dfrac{1.307}{0.10} \right)$ 13.07

$$V_{1999}^{E} = \frac{1}{0.10}\left[1.29 + 0.017\right] = 13.07$$

Same as residual earnings valuation

A Case 2 Valuation: Nike, Inc.

Required return is 9%

In this case, abnormal earnings growth is expected to grow at a 4.5 percent rate after 2012

				Forecast Year			
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
DPS		0.71	0.88	0.98	1.06	1.20	1.30
EPS		2.96	3.80	3.07	3.93	4.28	4.65
DPS reinvested (0.09 × DPS$_{t-1}$)			0.064	0.079	0.088	0.095	0.110
Cum-dividend earnings			3.864	3.149	4.018	4.375	4.760
Normal earnings (1.09 × EPS$_{t-1}$)			3.226	4.142	3.346	4.284	4.665
Abnormal earnings growth (AEG)			0.638	−0.993	0.672	0.091	0.095
Discount rate (1.09^t)			1.090	1.188	1.295	1.412	
Present value of AEG at end 2007			0.585	−0.836	0.519	0.064	
Total PV of AEG to 2011		0.332					
Continuing value (CV)						2.111	
Present value of CV		1.495					
Total earnings to be capitalized		4.787					
Capitalization rate		0.09					

Value per share $\left(\dfrac{4.787}{0.09}\right)$ 53.18

The continuing value:

$$\text{CV at 2011} = \frac{0.095}{1.09 - 1.045} = 2.111$$

$$\text{Present value of continuing value} = \frac{2.111}{1.412} = 1.495$$

$$V^E_{2006} = \frac{1}{0.09}\left[2.96 + 0.332 + 1.495\right] = 53.18$$

Same as residual earnings valuation

Converting Analysts' Forecasts to a Valuation: Google Inc., 2010

Price, early 2011 = $^{\$}$624

Required return = 11%

Consensus eps forecasts:

2011	$^{\$}$33.83
2012	$^{\$}$39.47

5-year growth rate forecasted = 17.4%

	2010A	2011E	2012E	2013E	2014E	2015E
DPS		0.00	0.00	0.00	0.00	0.00
EPS		33.83	39.47	46.34	54.40	63.87
DPS reinvested (0.11 × DPS$_{t-1}$)			0.00	0.00	0.00	0.00
Cum-dividend earnings			39.47	46.34	54.40	63.87
Normal earnings (1.11 × EPS$_{t-1}$)			37.55	43.81	51.44	60.38
Abnormal earnings growth (AEG)			1.92	2.53	2.96	3.49
Discount rate (1.11^t)			1.11	1.232	1.368	1.518
Present value of AEG			1.730	2.054	2.164	2.300
Total PV of AEG to 2015		8.25				
Continuing value (CV)						51.85
Present value of CV		34.16				
Total earnings to be capitalized		76.24				
Capitalization rate		0.11				

Value per share $\left(\dfrac{76.24}{0.11}\right)$ 693.09

The continuing value:

CV at 2015 = $\dfrac{3.49 \times 1.04}{1.11 - 1.04}$ = 51.85

Present value of continuing value = $\dfrac{51.85}{1.518}$ = 34.16

Converting an Analyst's Forecast to a Valuation: Nike Inc.

	2002	2003E	2004E	2005 E	2006 E	2007 E
Dps		0.55	0.65	0.70	0.83	0.95
Eps	2.83	3.22	3.65	4.13	4.66	
Dividend reinvested at 10%			0.055	0.065	0.070	0.083
Cum-dividend earnings			3.275	3.715	4.200	4.741
Normal earnings			3.113	3.542	4.015	4.543
Abnormal earnings growth (AEG)			0.162	0.173	0.185	0.198
Continuing Value (2003)		5.40				
Total		8.23				
Capitalization rate		0.10				
Value per share	82.30					

$$CV = \frac{0.162}{1.10 - 1.07} = 5.40$$

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AEG er lig med ændringen i RE

$$AEG_t = \left[earn_t + (\rho_E - 1)d_{t-1}\right] - \rho_E earn_{t-1}$$
$$= earn_t - earn_{t-1} - (\rho_E - 1)[earn_{t-1} - d_{t-1}]$$

❑ Fra "strøm –og beholdningsligningen for egenkapital (kap.2)

$$B_{t-1} = B_{t-2} + earn_{t-1} - d_{t-1}, \text{ så } earn_{t-1} - d_{t-1} = B_{t-1} - B_{t-2} \text{ Hvorfor}$$

$$AEG_t = earn_t - earn_{t-1} - (\rho_E - 1)[B_{t-1} - B_{t-2}]$$
$$= [earn_t - (\rho_E - 1)B_{t-1}] - [earn_{t-1} - (\rho_E - 1)B_{t-2}]$$
$$= RE_t - RE_{t-1}$$

Forecasting Changes in Residual Earnings

Calculation of equity value using the abnormal earnings growth model. Abnormal earnings growth is the difference between residual earnings in two subsequent periods.

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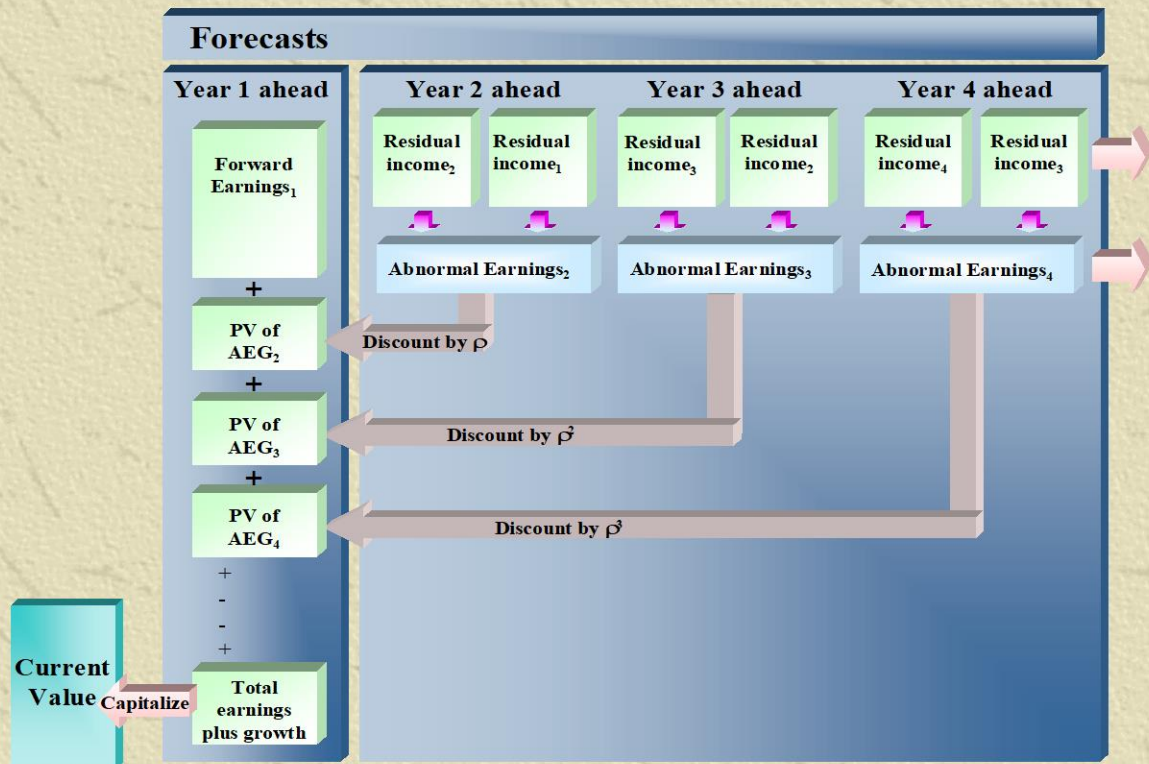
Protection From Earnings Created by Accounting: A Restructuring Charge

	2000	2001	2002	2003	2004	2005
Earnings	4.00	20.36	12.73	13.11	13.51	13.91
Dividends	9.09	9.36	9.64	9.93	10.23	10.54
Book value	92.00	103.00	106.09	109.27	112.55	115.93
Earnings on reinvested dividends				0.936	0.964	0.993	1.023
Cum-dividend earnings				13.667	14.077	14.499	14.934
Normal earnings				22.396	14.004	14.424	14.857
Abnormal earnings growth				(8.729)	0.073	0.075	0.077
Abnormal earnings growth rate					3%	3%	3%

$$V^E_{2000} = \frac{1}{0.10}\left[20.36 - \frac{8.729}{1.10} + \frac{0.073}{1.10 - 1.03}\bigg/1.10\right] = 133.74$$

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Abnormal Earnings Growth Analysis: Advantages and Disadvantages

Advantages

- **Easy to understand:** Investors think in terms of future earnings; investors buy earnings. Focuses directly on the most common multiple used, the P/E ratio.
- **Uses accrual accounting:** Embeds the properties of accrual accounting by which revenues are matched with expenses to measure value added from selling products.
- **Versatility:** Can be used under a variety of accounting principles (Chapter 16).
- **Aligned with what people forecast:** Analysts forecast earnings and earnings growth.

Disadvantages

- **Accounting complexity:** Requires an understanding of how accrual accounting works.
- **Concept complexity:** Requires an appreciation of the concept of cum-dividend earnings; that is, value is based on earnings to be earned within the firm and from earnings from the reinvestment of dividends.
- **Application to strategy:** Does not give an insight into the drivers of earnings growth, particularly balance sheet items, so is not suited to strategy analysis.
- **Suspect accounting:** Relies on earnings numbers that can be suspect (Chapter 17).
- **Forecast horizon:** Forecast horizons can be shorter than those for DCF analysis and more value is typically recognized in the immediate future. But the forecast horizon does depend on the quality of the accrual accounting (Chapter 16).

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Reverse Engineering: Nike

Nike trades at $57 (in 2003)

$$\$57 = \frac{1}{0.10}\left[2.83 + \frac{0.162}{1.10 - g}\right]$$

g = 1.044 (a 4.4% growth rate)

Convert growth in AEG to an earnings forecast for 2005:

Eps forecast (2004):	3.22	
Normal earnings (2005)	= 1.10 x 3.22	3.542
AEG (2005)	= 0.162 x 1.044	0.169
Cum-dividend eps forecast (2005)		3.711
Earnings on 2004 dividends		(0.065)
Eps forecast (2005)		3.646

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