

## WHY ARE DIVIDENDS DIFFERENT FROM FCFE?

- The FCFE is a measure of what a firm can afford to pay out as dividends. Dividends paid are different from the FCFE for a number of reasons --
  - Desire for Stability
  - Future Investment Needs
  - Tax Factors
  - Signalling Prerogatives

### I. THE CONSTANT GROWTH FCFE MODEL

#### *The Model*

The value of equity, under the constant growth model, is a function of the expected FCFE in the next period, the stable growth rate and the required rate of return.

$$P_0 = \frac{FCFE_1}{r - g_n}$$

where,

$P_0$  = Value of stock today

$FCFE_1$  = Expected FCFE next year

$r$  = Cost of equity of the firm

$g_n$  = Growth rate in FCFE for the firm forever

*This model is appropriate when*

- The firm has to be in steady state. This also implies that.
  - (1) Capital expenditure is not significantly greater than depreciation.
  - (2) The beta of the stock is close to one or below one.
- The firm has FCFE which are significantly different from dividends, or dividends are not relevant.
- The leverage is stable.

*Illustration 7: FCFE Stable Growth Model: Telefonica de Espana*

*Rationale for using Model*

- Given that the market that it serves (Spain) is reaching maturity (40.5 phone lines per 100 people), and the regulations on local pricing, it is unlikely that Telefon. Espana will be able to register above-normal growth. It is expected to grow about 10% a year in Spanish peseta terms.
- Telefonica pays out much less in dividends than it generates in FCFE.

Dividends in 1995 = 54 Pt / share
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FCFE per Share in 1995 = 86.53 Pt / share

- The leverage is stable

#### *Background Information*

- Current Information:
  - Earnings per Share = 154.53 Pt
  - Capital Expenditures per share = 421 Pt
  - Depreciation per share = 285 Pt
  - Change in Working Capital / Share = None
  - Debt Financing Ratio = 50%
- Earnings, Capital Expenditures and Depreciation are all expected to grow 10% a year
- The beta for the stock is 0.90, and the Spanish long bond rate is 9.50%. A premium of 6.50% is used for the Spanish market.

#### *Valuation*

- Cost of Equity =  $9.50\% + 0.90 (6.50\%) = 15.35\%$
- Expected Growth Rate = 10.00%
- Base Year FCFE

Earnings per Share		=	154.53
- (Capital Expenditures - Depreciation) (1 - Debt Ratio)	= (421-285)(1-.5)	=	- 68.00
- (Change in Working Capital) (1 - Debt Ratio)	= 0 (1-.5)	=	- 0.00
= FCFE		=	86.53

Value per Share = $86.53 (1.10) / (.1535 - .10) = 1779 \text{ Pt}$
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The stock was trading for 1788 Pt in January 1996.

*Illustration 8: Valuing a firm with depressed earnings: Daimler Benz*

*A rationale for using the FCFE Stable Model*

- As one of the largest firms in a mature sector, it is unlikely that Daimler Benz will be able to register super normal growth over time.
- Like most German firms, the dividends paid bear no resemblance to the cash flows generated.
- The leverage is stable and unlikely to change.

*Background Information*

- The company had a loss of 38.63 DM per share in 1995, partly because of restructuring charges in aerospace and partly because of troubles (hopefully temporary) at its automotive division.
- The book value of equity in 1995 was 20.25 billion DM.

- While the return on equity in 1995 period is negative, the five-year average (1988-1993) return on equity is 10.17%.,
- The company reported capital expenditures of 10.35 billion DM in 1995 and depreciation of 9.7 billion DM.
- The company has traditionally financed its investment needs with 35% debt and 65% equity.
- The working capital requirements are about 2.5% of revenues. The revenues in 1995 is 104 billion DM.
- The stock had a beta of 1.10, relative to the Frankfurt DAX. The German long bond rate is 6%. The risk premium for the German market is 4.5%.
- In the long term, earnings are expected to grow at the same rate as the world economy (6.5%).
- There are 51.30 million shares outstanding.

#### *Valuation*

- Estimating FCFE

$$\text{Normalized Net Income} = 20,250 * 0.1017 = 2059 \text{ million DM}$$

$$- (\text{Cap Ex} - \text{Deprec'n}) (1 - \text{Debt Ratio}) = (10,350 - 9,700) (1 - .35) = - 423 \text{ million DM}$$

$$- \text{Change in Working Capital} (1 - \text{Debt Ratio}) = (.025 * .065 * 104,000) * 0.65$$

$$= - 110 \text{ million DM}$$

$$= \text{Free Cash Flows to Equity} = 1526 \text{ million DM}$$

- Cost of Equity = 6% + 1.10 (4.5%) = 10.95%

$$\text{Value of Equity} = 1526 \text{ million DM} (1.065) / (.1095 - .065) = 36,521 \text{ million DM}$$

$$\text{Value per Share} = 36,521 / 51.30 = 712 \text{ DM}$$

The stock was trading for 814 DM in February 1996.

### What is wrong with this valuation? FCFE Stable

- |  | <i>Solution</i>                                  |
|--|--|
| • If you get a low value from this model, it may be because  |  |
| - capital expenditures are too high relative to depreciation | Use a smaller Cap Ex or use the 2-stage model.   |
| - working capital as a percent of revenues is too high       | Normalize this ratio, using historical averages. |
| - the beta is high for a stable firm                         | Use a beta closer to one                         |
| • If you get too high a value, it is because                 |  |
| - Capital expenditures are lower than depreciation           | Set Capital expenditures equal to depreciation   |
| - Working capital ratios % of revenue is negative            | Set equal to zero                                |
| - the expected growth rate is too high for a stable firm     | Use a growth rate closer to GNP growth           |

## II. THE TWO-STAGE FCFE MODEL

### *The Model*

The value of any stock is the present value of the FCFE per year for the extraordinary growth period plus the present value of the terminal price at the end of the period.

$$\begin{aligned}\text{Value} &= \text{PV of FCFE} & + & \text{PV of terminal price} \\ &= \text{FCFE}_t / (1+k_e)^t & + & P_n / (1+k_e)^n\end{aligned}$$

where,

$\text{FCFE}_t$  = Free Cashflow to Equity in year t

$P_n$  = Price at the end of the extraordinary growth period

$k_e$  = Cost of equity during high growth phase

The terminal price is generally calculated using the infinite growth rate model,

$$P_n = \text{FCFE}_{n+1} / (k_{e,n} - g_n)$$

where,

$k_{e,n}$  = Cost of Equity during stable growth phase

$g_n$  = Growth rate after the terminal year forever.



### *Calculating the terminal price*

- The same caveats that apply to the growth rate for the stable growth rate model, described in the previous section, apply here as well.
- In addition, the assumptions made to derive the free cashflow to equity after the terminal year have to be consistent with this assumption of stability. (Difference between capital expenditures and depreciation will narrow; Beta closer to one)

### *Estimating Net Capital Expenditures in Steady State*

**1. The Bludgeon Approach:** Assume that capital expenditures offset depreciation, resulting in a net cap ex of zero.

Limitations: If net cap ex is zero, where is real growth coming from?

**2. Industry Averages:** Use industry average ratios of cap ex to depreciation to determine the net cap ex in stable growth. (See Industry Average Table on last page)

Limitations: Industry averages may themselves shift over time; Firms may vary within the industry.

**3. Firm-Specific Approach:** Use the firm's characteristics to estimate what the net cap ex will need to be in steady state. Based upon the increase in earnings before interest and taxes and return on capital in the steady state period, the net capital expenditures can be estimated as follows:

Net Capital Expenditures in terminal year = (Increase in EBIT(1-t) in terminal year/ Estimated Return on Capital during stable growth.

Thus, if a firm with earnings before interest and taxes of \$ 150 million in the last year of high growth expects growth of 5% in perpetuity and has a return on capital of 12.5%, the net capital expenditures in the terminal year will be as follows (Tax rate=40%):

Net Cap Ex =  $150 (.6) (.05) / .125 = \$ 36$  million

Note that 12.5% of \$ 36 million yields the earnings growth of the next year.

### Capital Expenditures, Depreciation and Working Capital Ratios by SIC Code

<i>SIC</i>	<i>Industry</i>	<i>Cap Exp/Rev</i>	<i>Deprec/Rev</i>	<i>Cap Ex/Deprec</i>	<i>WC/Revenue</i>	<i>Non Cash WC/Revenue</i>
1	Agricultural - Crops	7.18%	3.73%	221.07%	18.43%	13.13%
2	Agricultural Production	9.03%	6.05%	174.35%	16.51%	11.21%
8	Forestry	19.16%	8.28%	265.60%	8.61%	8.61%
10	Fishing, Hunting and Trappin	59.28%	11.64%	308.17%	33.69%	23.19%
12	Coal Mining	14.33%	8.06%	151.18%	13.03%	7.73%
13	Oil and Gas Extraction	37.90%	20.61%	181.71%	11.80%	6.50%
14	Mining of Non-metals	11.59%	7.26%	136.19%	14.33%	9.03%
15	Building Contractors	3.87%	4.17%	110.89%	23.26%	17.96%
16	Heavy Construction	2.96%	2.67%	172.25%	2.88%	2.88%
17	Construction- Special Trade	1.85%	1.68%	121.37%	16.06%	10.76%
20	Food and Kindred Products	5.75%	4.02%	163.17%	10.33%	5.03%
21	Tobacco Products	3.36%	3.01%	123.07%	7.46%	7.46%
22	Textile Mill Products	5.92%	4.98%	111.05%	22.18%	16.88%
23	Apparel & Other Finished Products	4.16%	3.40%	168.14%	33.21%	22.71%
24	Lumber & Wood Products	7.04%	4.99%	210.15%	27.49%	16.99%
25	Furniture & Fixtures	5.28%	3.46%	150.54%	19.48%	14.18%
26	Paper & Allied Products	13.26%	5.61%	183.06%	13.44%	8.14%
27	Printing & Publishing	4.86%	5.61%	95.33%	8.71%	8.71%
28	Chemicals & Allied Products	8.87%	6.48%	171.24%	27.89%	17.39%
29	Petroleum Refining	10.79%	7.29%	157.72%	4.78%	4.78%
30	Rubber & Plastic Products	6.99%	4.32%	159.96%	21.32%	16.02%
31	Leather & Leather Products	2.59%	1.63%	182.55%	23.60%	18.30%
32	Stone, Clay, Glass & Concrete	8.16%	5.57%	153.12%	17.80%	12.50%
33	Primary Metal Industries	6.26%	4.26%	167.93%	16.35%	11.05%
34	Fabricated Metal Products	5.66%	3.98%	141.95%	26.93%	16.43%
35	Industrial & Commercial Machinery	5.52%	4.80%	149.85%	24.25%	18.95%
36	Electronic and Electrical Equipment	8.02%	4.50%	195.20%	35.61%	25.11%

37	Transportation Equipment	5.00%	4.09%	133.08%	15.47%	10.17%
38	Measuring, Analyzing & Controlling Instruments	5.03%	4.16%	145.18%	32.76%	22.26%
39	Miscellaneous Manufacturing	5.67%	3.85%	189.95%	29.81%	19.31%
40	Railroad Transportation	17.31%	7.35%	255.77%	-3.89%	-3.89%
41	Suburban Transit and Highway Transportation	4.49%	3.93%	114.35%	11.42%	6.12%
42	Motor Freight Transportation	12.49%	7.10%	179.36%	4.96%	4.96%
44	Water Transportation	20.13%	11.22%	261.95%	6.63%	6.63%
45	Air Transportation	14.77%	5.64%	243.04%	2.81%	2.81%
46	Pipelines	18.12%	11.06%	170.93%	-1.30%	-1.30%
47	Transportation Services	15.24%	6.31%	218.04%	10.66%	5.36%
48	Communications	58.07%	18.29%	227.79%	18.73%	13.43%
49	Electric, Gas & Sanitary Services	13.55%	9.99%	146.32%	0.89%	0.89%
50	Wholesale trade - Durable goods	2.28%	1.22%	182.68%	15.08%	9.78%
51	Wholesale trade-Nondurable goods	1.36%	1.31%	115.06%	9.89%	9.89%
52	Building materials, hardware & Garden Dealers	5.38%	1.54%	420.83%	19.00%	13.70%
53	General Merchandise	3.83%	2.10%	195.95%	15.05%	9.75%
54	Food Stores	3.72%	2.24%	170.53%	2.44%	2.44%
55	Auto Dealers & Gas Service Stations	9.36%	2.75%	344.58%	1.09%	1.09%
56	Apparel & Accessory Stores	5.54%	3.08%	212.30%	22.97%	17.67%
57	Home Furniture, Furnishings & Equip Stores	6.90%	4.14%	270.97%	14.36%	9.06%
58	Eating & Drinking Establishments	20.59%	4.86%	395.69%	7.83%	7.83%
59	Miscellaneous Retail	3.62%	1.70%	250.99%	17.31%	12.01%
60	Depository Institutions	1.24%	3.57%	34.78%	-1.32%	-1.32%
61	Non-depository Institutions	0.96%	0.75%	103.07%	0.35%	0.35%
62	Security & Commodity Brokers, Dealers ..	5.09%	9.79%	61.09%	16.98%	11.68%
63	Insurance Carriers	3.16%	2.53%	126.46%	17.17%	11.87%
64	Insurance Agents, Brokers & Services	2.03%	2.72%	74.56%	22.45%	17.15%
65	Real Estate	3.66%	3.35%	110.33%	5.56%	5.56%
67	Holding & Other Investment Services	4.83%	4.81%	110.52%	7.68%	7.68%
70	Hotels, Rooming Houses & Lodging Places	55.88%	6.38%	329.77%	-0.10%	-0.10%
72	Personal Services	8.83%	6.28%	146.84%	22.92%	17.62%

73	Business Schools	7.18%	5.07%	157.94%	33.70%	23.20%
75	Auto Repair, Services & parking	22.46%	7.09%	290.58%	5.28%	5.28%
76	Miscellaneous Repair Services	1.16%	1.08%	108.00%	42.36%	31.86%
78	Motion Pictures	10.08%	12.74%	266.50%	34.18%	23.68%
79	Amusement & Recreation Services	25.24%	8.41%	365.09%	3.79%	3.79%
80	Health Services	5.93%	3.58%	189.30%	20.73%	15.43%
82	Educational Services	7.94%	5.57%	147.03%	25.03%	14.53%
87	Engineering, Accounting, Research Services	45.91%	16.34%	212.40%	65.37%	54.87%
	Average	11.27%	5.61%	184.95%	16.30%	11.74%

*Works best for:*

- firms where growth will be high and constant in the initial period and drop abruptly to stable growth after that.
- Dividends are very different from FCFE or not relevant / measurable (private firms, IPOs)
- Firms which don't pay dividends but have negative FCFE.

*Illustration 9: Two-Stage FCFE Model: Amgen Inc*

*A Rationale for using the Model*

- *Why two-stage?* While Amgen has had a history of extraordinary growth, its growth is moderating because – (a) it is becoming a much larger company and (b) its products are maturing and may face competition soon.
- *Why FCFE?* Amgen does not pay dividends, but has some FCFE. This FCFE is likely to increase as the growth rate moderates, and the firm gets larger.
- Leverage is stable.

*Background Information*

- Current Earnings / Capital Expenditures
  - Earnings per share in 1995 = \$ 1.95
  - Capital Expenditures in 1995 per share = \$ 0.40

- Depreciation per share in 1995 = \$0.32
- Revenues per share = \$ 7.45
- Inputs for the High Growth Period
  - Length of high growth period = 5 years
  - Growth Rate inputs:
    - Return on Equity = 21.74% (This is much lower than the current return on equity of about 28%; This ROE is going to be difficult to sustain as the firm gets larger)
    - Retention Ratio = 100% (The firm pays no dividends now, and is unlikely to do so in the near future because its stockholders are more interested in price appreciation.

$\text{Expected Growth Rate} = 1 * 21.74\% = 21.74\%$
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- The beta during the high growth phase is expected to be 1.30

$\text{Cost of Equity} = 6.00\% + 1.30 (5.50\%) = 13.15\%$
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- Capital expenditures, depreciation and revenues are expected to grow at the same rate as earnings (21.74%)
- Working capital is expected to be 20% of revenues.
- The debt ratio is approximately 9.55%; it is expected to remain unchanged.

- Inputs for the Stable Growth

- Expected Growth Rate = 6%
- Beta during stable growth phase = 1.10 : Cost of Equity = 6.00% + 1.1 (5.5%) = 12.05%
- Capital expenditures and depreciation are assumed to continue growing 6% a year.
- Working capital is expected to be 20% of revenues.
- The debt ratio is expected to remain at 9.55%.

*Estimating the value:*

- The first component of value is the present value of the expected FCFE during the high growth period.

	1	2	3	4	5
Earnings	\$2.37	\$2.89	\$3.52	\$4.28	\$5.21
- (CapEx-Depreciation)*(1- )	\$0.09	\$0.11	\$0.13	\$0.16	\$0.19
- Working Capital*(1- )	\$0.29	\$0.36	\$0.43	\$0.53	\$0.64
Free Cashflow to Equity	\$1.99	\$2.43	\$2.95	\$3.60	\$4.38
Present Value @ 13.15%	\$1.76	\$1.89	\$2.04	\$2.19	\$2.36

PV of FCFE during high growth phase = \$1.76 + \$1.89 + 2.04 + 2.19 + 2.36 = \$10.25

The price at the end of the high growth phase (end of year 5), can be estimated using the constant growth model.

$$\text{Terminal price} = \text{Expected FCFE}_{n+1} / (r - g_n)$$

$$\text{Expected Earnings per share}_6 = 5.21 * 1.06 = \$ 5.52$$

$$\text{Expected FCFE}_6 = \text{EPS}_6 - \text{Net Capital Expenditures} - \text{Working Capital} (1 - \text{Debt Ratio})$$

$$= \$ 5.52 - \$0.20 (1-.0955) - \$ 0.24 (1-.0955) = \$ 5.11$$

$$\text{Terminal price} = \$ 5.11 / (.1205 - .06) = \$ 84.39$$

The present value of the terminal price can be then written as -

$$\text{PV of Terminal Price} = \frac{\$84.39}{(1.1315)^5} = \$45.50$$

The cumulated present value of dividends and the terminal price can then be calculated as follows:

$\text{PV today} = \text{PV of FCFE during high growth phase} + \text{PV of Terminal Price} = \$10.25 + \$45.50 = \$55.75$
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Amgen was trading at \$60.75 in February 1996, at the time of this analysis.



### What is wrong with this valuation? FCFE 2 Stage

- If you get a extremely low value from the 2-stage FCFE, the likely culprits are
  - earnings are depressed due to some reason (economy...) Use normalized earnings
  - capital expenditures are significantly higher than depreciation in stable growth phase Offset capital expenditures by depreciation (or)  
Reduce the difference for stable growth period
  - the beta in the stable period is too high for a stable firm Use a beta closer to one.
  - working capital as % of revenue is too high to sustain Use a working capital ratio closer to industry
  - the use of the 2-stage model when the 3-stage model is more appropriate Use a three-stage model
- If you get an extremely high value,
  - earnings are inflated above normal levels Use normalized earnings
  - capital expenditures offset depreciation during high growth period Capital expenditures should be set higher
  - capital expenditures are less than depreciation Set capital expenditures equal to depreciation.
  - the growth rate in the stable growth period is too high for stable firm Use a growth rate closer to GNP growth

### III. THE E-MODEL - A THREE STAGE FCFE MODEL

#### *The Model*

The E model calculates the present value of expected free cash flow to equity over all three stages of growth:

$$P_0 = \sum_{t=1}^{t=n1} \frac{FCFE_t}{(1+k_e)^t} + \sum_{t=n1+1}^{t=n2} \frac{FCFE_t}{(1+k_e)^t} + \frac{P_{n2}}{(1+k_e)^n}$$

where,

$P_0$  = Value of the stock today

$FCFE_t$  = FCFE in year t

$k_e$  = Cost of equity; can vary across periods from  $k_e$  during the high growth phase to  $k_{e,n}$  during the stable growth phase

$P_{n2}$  = Terminal price at the end of transitional period =  $FCFE_{n2+1}/(k_{e,n} - g_n)$

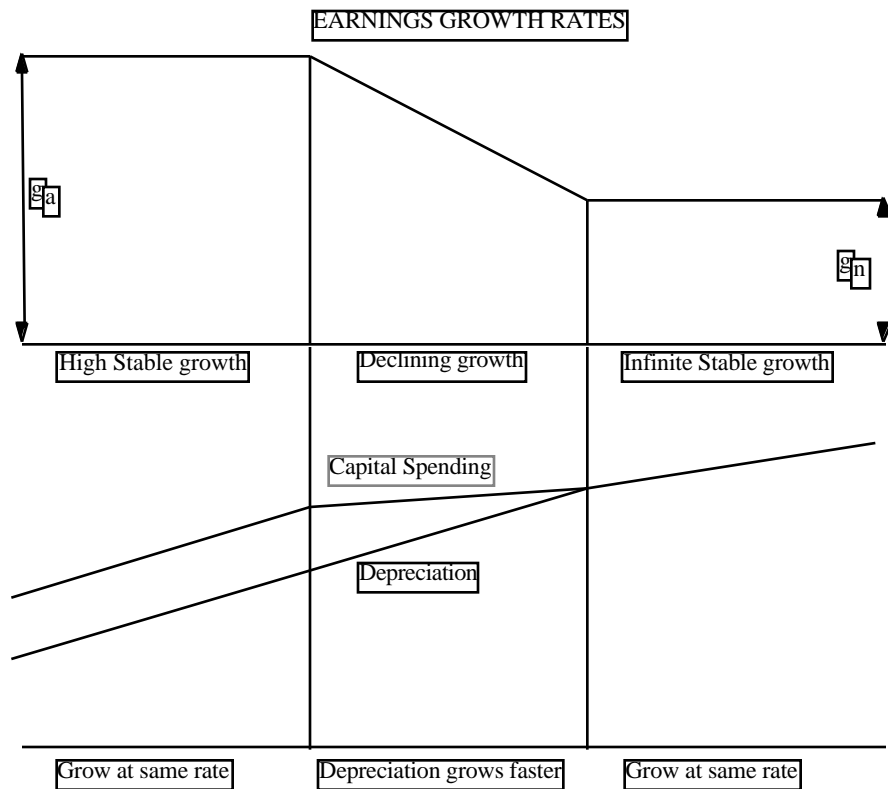
n1 = End of initial high growth period

n2= End of transition period

*Caveats in using model*

*1. Capital Spending versus Depreciation*

- In the high growth phase, capital spending is likely to much larger than depreciation. In the transitional phase, the difference is likely to narrow and capital spending and depreciation should be in rough parity in the stable growth phase.



## 2. Risk

- Over time, as these firms get larger and more diversified, the average betas of these portfolios move towards one.

### *Works best for:*

- firms with very high growth rates currently.
- firms whose dividends are significantly higher or lower than the FCFE or dividends are not measurable
- firms with stable leverage

### *Illustration 10: Valuing America Online with the 3-stage FCFE model*

#### *Rationale for using Three-Stage FCFE Model*

- *Why three stage?* The expected growth rate in earnings is in excess of 50%, partly because of the growth in the overall market and partly because of the firm's position in the business.
- *Why FCFE?* The firm pays out no dividends, but has negative FCFE, largely as a consequence of large capital expenditures.
- The firm uses little debt (about 10%) in meeting financing requirements, and does not plan to change this in the near future.

#### *Background Information*

- Current Information
  - Earnings per Share = \$ 0.38

- Capital Spending per Share = \$ 1.21
- Depreciation per Share = \$ 0.17
- Revenues per share = \$ 7.21
- Working Capital as a percent of revenues = 10.00% (This is significantly lower than the current WC ratio)
- Phase 1: High Growth Period
  - Length of the high growth period = 5 years
  - Expected growth rate in earnings during the period = 52% (from analyst projections and market growth)
  - Capital Spending, depreciation and revenues will grow 20% a year during this period (based upon past growth).
  - Working capital will remain at 10% of revenues
  - Approximately 10% of external financing will come from debt.
  - The beta for the high growth period is 1.60.
- Phase 2: Transition period
  - Length of the transition period = 5 years
  - Growth rate will decline from 52% in year 5 to 6% in year 10 linearly.
  - Capital Spending will grow 6% a year in this period, while depreciation will continue to grow 12% a year.
  - Revenues will increase 12% a year during this period; working capital will remain 10% of revenues.
  - The debt ratio will remain at 10% during this period

- The beta will decline linearly from 1.60 in year 5 to 1.20 in year 10.
- Phase 3: Stable Growth Phase
  - Earnings will grow 6% a year in perpetuity.
  - Capital expenditures will be 125% of depreciation during the high growth phase
  - Revenues will also grow 6% a year; Working capital will remain 10% of revenues.
  - The debt ratio will remain at 10% during this period.
  - The beta for the stock will be 1.20

*Valuing the Stock*

The following are the expected cashflows over both periods.

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<b>High Growth Period</b>					
Earnings	\$0.58	\$0.88	\$1.33	\$2.03	\$3.08
(CapEx-Depreciation)*(1-0.1)	\$1.12	\$1.34	\$1.61	\$1.94	\$2.32
Working Capital *(1-0.1)	\$0.13	\$0.16	\$0.19	\$0.22	\$0.27
FCFE	(\$0.67)	(\$0.62)	(\$0.47)	(\$0.13)	\$0.49
Present Value	(\$0.58)	(\$0.46)	(\$0.30)	(\$0.07)	\$0.23

<b>Transition period</b>					
<i>Year</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
Growth Rate	42.80%	33.60%	24.40%	15.20%	6.00%
Cumulated Growth	42.80%	90.78%	137.33%	173.41%	189.81%
Earnings	\$4.40	\$5.88	\$7.32	\$8.43	\$8.94
(CapEx-Depreciation)*(1-0.1)	\$2.44	\$2.56	\$2.68	\$2.81	\$2.95
Working Capital *(1-0.1)	\$0.19	\$0.22	\$0.24	\$0.27	\$0.30
FCFE	\$1.77	\$3.11	\$4.39	\$5.34	\$5.69
Beta	1.52	1.44	1.36	1.28	1.2
Cost of Equity	15.86%	15.42%	14.98%	14.54%	14.10%
Present Value	\$0.72	\$1.09	\$1.34	\$1.43	\$1.33

The free cashflow to equity in year 11, assuming that capital expenditures are offset by depreciation, is \$9.15, yielding a terminal price of \$ 112.94.

$$\begin{aligned} \text{FCFE in year 11} &= \text{EPS}_{11} - \text{Net Cap Ex (1- Debt Ratio)} - (\text{Rev}_{11} - \text{Rev}_{10}) * \text{Working Capital as \% of Revenues} * (1 - \text{Debt Ratio}) \\ &= (\$8.94 * 1.06) - \$0.35 (1 - .10) = \$9.15 \end{aligned}$$

$$\text{Cost of Equity in stable phase} = 7.5\% + 1.20 (5.50\%) = 14.10\%$$

$$\text{Terminal price} = \$9.15 / (.1410 - .06) = \$112.94$$

The present value of free cashflows to equity and the terminal price is as follows:

Present Value of FCFE in high growth phase =	(\$1.18)
Present Value of FCFE in transition phase =	\$5.91
Present Value of Terminal Price =	\$26.42
Value of the stock =	\$31.15

America Online was trading at \$86.75 in March 1995.

*Emerging Market Illustration 11: Valuing Titan Watches (India) with the 3-stage FCFE model*

*Rationale for using Three-Stage FCFE Model*

- *Why three stage?* The expected growth rate in earnings is 35%, partly because the overall market is huge (while 143 watches are purchased on average per 1000 people worldwide, only 17 are sold per 1000 are sold in India), and partly because of the company's strong brand name.
- *Why FCFE?* The firm pays out a dividend, but the dividend has been fixed at Rs 2.50 per share for three years. The free cash flows to equity are much more volatile and have generally been negative in the last few years.
- The firm uses little debt (about 10%) in meeting financing requirements, and does not plan to change this in the near future.

*Background Information*

- Current Information
  - Earnings per Share = Rs 6.20



- Capital Spending per Share = Rs 10.40
- Depreciation per Share = Rs 4.40
- Revenues per share = Rs 90.00
- Working Capital as a percent of revenues = 15.00%
- Phase 1: High Growth Period
  - Length of the high growth period = 5 years
  - Expected growth rate in earnings during the period = 35% (from analyst projections and market growth)
  - Capital Spending, depreciation and revenues will grow 30% a year during this period (based upon past growth).
  - Working capital will remain at 15% of revenues
  - Approximately 10% of external financing will come from debt.
  - The beta for the high growth period is 1.20.
- Phase 2: Transition period
  - Length of the transition period = 5 years
  - Growth rate in earnings will decline from 35% in year 5 to 12% in year 10 linearly.
  - Capital Spending will grow 10% a year in this period, while depreciation will continue to grow 15% a year.

- Revenues will increase 15% a year during this period; working capital will remain 15% of revenues.
- The debt ratio will remain at 10% during this period
- The beta will decline linearly from 1.20 in year 5 to 1.00 in year 10.
- Phase 3: Stable Growth Phase
  - Earnings will grow 12% a year in perpetuity.
  - Capital expenditures will be offset by depreciation.
  - Revenues will also grow 12% a year; Working capital will remain 15% of revenues.
  - The debt ratio will remain at 10% during this period.
  - The beta for the stock will be 1.00

The riskfree rate for the Indian market is 11%, and a 7.50% risk premium is employed.

*Valuing the Stock*

The following are the expected cashflows over both periods.

Year	1	2	3	4	5
<b>High Growth Period ( 5 years)</b>					
Earnings	Rs8.37	Rs11.30	Rs15.25	Rs20.59	Rs27.80
-(CapEx-Depreciation)*(1- )	Rs7.02	Rs9.13	Rs11.86	Rs15.42	Rs20.05

- Chg. Working Capital *(1- )	Rs3.65	Rs4.74	Rs6.16	Rs8.01	Rs10.41
FCFE	(Rs2.30)	(Rs2.57)	(Rs2.77)	(Rs2.84)	(Rs2.66)
Present Value	(Rs1.91)	(Rs1.78)	(Rs1.60)	(Rs1.37)	(Rs1.07)

<b>Transition period</b>					
Year	6	7	8	9	10
Growth Rate	30.40%	25.80%	21.20%	16.60%	12.00%
Cumulated Growth	30.40%	64.04%	98.82%	131.82%	159.64%
Earnings	Rs36.25	Rs45.61	Rs55.27	Rs64.45	Rs72.18
(CapEx-Depreciation)*(1- )	Rs21.32	Rs22.61	Rs23.89	Rs25.17	Rs26.40
Chg. Working Capital *(1- )	Rs6.77	Rs7.78	Rs8.95	Rs10.29	Rs11.84
FCFE	Rs8.17	Rs15.22	Rs22.43	Rs28.99	Rs33.95
Beta	1.16	1.12	1.08	1.04	1
Cost of Equity	19.70%	19.40%	19.10%	18.80%	18.50%
Present Value	Rs2.74	Rs4.28	Rs5.30	Rs5.76	Rs5.69

The free cashflow to equity in year 11, assuming that capital expenditures are offset by depreciation, is Rs 67.59, yielding a terminal price of Rs 112.94.

$$\begin{aligned} \text{FCFE in year 11} &= \text{EPS}_{11} - (\text{Rev}_{11} - \text{Rev}_{10}) * \text{Working Capital as \% of Revenues} * (1 - \text{Debt Ratio}) \\ &= (\text{Rs. } 72.18 * 1.12) - \text{Rs. } 14.73 (1 - .10) = \text{Rs } 67.59 \end{aligned}$$

Cost of Equity in stable phase =  $11\% + 1.00 * (7.50\%) = 18.50\%$

Terminal price =  $\text{Rs } 67.59 / (.185 - .12) = \text{Rs. } 1039.85$

The present value of free cashflows to equity and the terminal price is as follows:

Present Value of FCFE in high growth phase =	<b>(Rs7.73)</b>
Present Value of FCFE in transition phase =	<b>Rs23.77</b>
Present Value of Terminal Price =	<b>Rs174.39</b>
Value of the stock =	<b>Rs190.43</b>

Titan Watches was trading at Rs 125 at the time of this analysis.

### Estimation Issues for Emerging Market Companies

#### *I. Estimating Risk Parameters*

<i>Option</i>	<i>Limitations</i>
1. Estimate the beta(s) by regressing returns on the stock against returns on the market index.  <i>Eg. Regress returns on Titan against Bombay Stock Exchange</i>	<ul style="list-style-type: none"> <li>• Stock might not have been listed long</li> <li>• Estimates might be very noisy</li> </ul>
2. Estimate the beta(s) by sector, rather than by company, within the local market.	<ul style="list-style-type: none"> <li>• Might not be many firms in the sector.</li> </ul>

<p><i>Eg. Estimate the betas for watch/electronic companies, and take the average across the sector.</i></p>	<ul style="list-style-type: none"> <li>• Too many differences across firms in each sector.</li> </ul>
<p>3. Use the beta from another market for a similar company. <i>Eg. Use the beta of a U.S. company or companies manufacturing watches.</i></p>	<ul style="list-style-type: none"> <li>• Risk levels might be different across countries because of differences in operating and regulatory risk.</li> </ul>
<p>4. Use accounting earnings to estimate betas instead of market prices. <i>Eg. Run a regression of Titan earnings against overall earnings.</i></p>	<ul style="list-style-type: none"> <li>• Accounting earnings may be even more volatile than stock prices.</li> <li>• There might not be a long enough history.</li> </ul>
<p>5. Use subjective risk measures - classify firms into risk classes and calculate expected returns by risk class. <i>Eg. Classify Titan as high, average or low risk, and demand appropriate returns.</i></p>	<ul style="list-style-type: none"> <li>• Subjective judgment might be erroneous.</li> <li>• This approach mixes firm-specific and market risk.</li> </ul>
<p>6. Make no risk adjustment. All firms have the same required rate of return.</p>	<ul style="list-style-type: none"> <li>• Will be disastrous if firms are of very different risk classes.</li> </ul>

## ***II. Estimating Cash Flows***

- There is not much historical data.

- The data is unreliable.
- The company and the economy are changing too fast.

While all these factors increase the uncertainty associated with the estimates, this noise is partially the result of poor information and partially the result of

### What is wrong with this valuation? FCFE 3 Stage

- If you get a extremely low value from the 3-stage FCFE, the likely culprits are
  - capital expenditures are significantly higher than depreciation in stable growth phase
    - Offset capital expenditures by depreciation (or)  
Cap Ex grows slower than depreciation during transition period
  - the beta in the stable period is too high for a stable firm
    - Use a beta closer to one.
  - working capital as % of revenue is too high to sustain
    - Use a working capital ratio closer to industry
- If you get an extremely high value,
  - capital expenditures offset depreciation during high growth period
    - Capital expenditures should be set higher
  - capital expenditures are less than depreciation
    - Set capital expenditures equal to depreciation.
  - Growth Period (High growth + transition) is too long
    - Use a shorter growth period
  - the growth rate in the stable growth period is too high for stable firm
    - Use a growth rate closer to GNP growth

## FCFE Valuation versus Dividend Discount Model Valuation

### *a. When they are similar*

- where the dividends are equal to the FCFE.
- where the FCFE is greater than dividends, but the excess cash is invested in projects with net present value of zero.

### *b. When they are different*

- when the FCFE is greater than the dividend and the excess cash either earns below-market interest rates or is invested in negative net present value projects
- the payment of smaller dividends than can be afforded to be paid out by a firm, lowers debt-equity ratios and may lead the firm to become underleveraged, causing a loss in value.
- In the cases where dividends are greater than FCFE, the firm will have to issue either new stock or new debt to pay these dividends leading to at least three negative consequences for value.
  - One is the flotation cost on these security issues, which can be substantial for equity issues, creates an unnecessary expenditure which decreases value.
  - Second, if the firm borrows the money to pay the dividends, the firm may become overleveraged (relative to the optimal) leading to a loss in value.



- Finally, paying too much in dividends can lead to capital rationing constraints where good projects are rejected, resulting in a loss of wealth.

### ***3. What does it mean when they are different?***

- The difference between the value from the FCFE model and the value using the dividend discount model can be considered one component of the value of controlling a firm - it measures the value of controlling dividend policy.
- In the more infrequent case, where the value from the dividend discount model exceeds the value from the FCFE, the difference has less economic meaning but can be considered a warning on the sustainability of expected dividends.

