IV. Getting Closure in Valuation

- 249
- Since we cannot estimate cash flows forever, we estimate cash flows for a "growth period" and then estimate a terminal value, to capture the value at the end of the period:

Value =
$$\sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

When a firm's cash flows grow at a "constant" rate forever, the present value of those cash flows can be written as:

```
Value = Expected Cash Flow Next Period / (r - g)
```

where,

r = Discount rate (Cost of Equity or Cost of Capital)

g = Expected growth rate forever.

This "constant" growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.

Getting to stable growth...

250

- A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:
 - there is no high growth, in which case the firm is already in stable growth
 - there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
 - there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)
- The assumption of how long high growth will continue will depend upon several factors including:
 - the size of the firm (larger firm -> shorter high growth periods)
 - current growth rate (if high -> longer high growth period)
 - barriers to entry and differential advantages (if high -> longer growth period)

Choosing a Growth Period: Examples

	Disney	Vale	Tata Motors	Baidu
Firm size/market size	Firm is one of the largest players in the entertainment and theme park business, but the businesses are being redefined and are expanding.	The company is one of the largest mining companies in the world, and the overall market is constrained by limits on resource availability.	Firm has a large market share of Indian (domestic) market, but it is small by global standards. Growth is coming from Jaguar division in emerging markets.	Company is in a growing sector (online search) in a growing market (China).
Current excess returns	Firm is earning more than its cost of capital.	Returns on capital are largely a function of commodity prices. Have generally exceeded the cost of capital.	Firm has a return on capital that is higher than the cost of capital.	Firm earns significant excess returns.
Competitive advantages	Has some of the most recognized brand names in the world. Its movie business now houses Marvel superheros, Pixar animated characters & Star Wars.	Cost advantages because of access to low-cost iron ore reserves in Brazil.	Has wide distribution/service network in India but competitive advantages are fading there.Competitive advantages in India are fading but Landrover/Jaguar has strong brand name value, giving Tata pricing power and growth potential.	Early entry into & knowledge of the Chinese market, coupled with government-imposed barriers to entry on outsiders.
Length of high- growth period	Ten years, entirely because of its strong competitive advantages/	None, though with normalized earnings and moderate excess returns.	Five years, with much of the growth coming from outside India.	Ten years, with strong excess returns.

Valuing Vale in November 2013 (in US dollars)

Let's start with some history & estimate what a normalized year will look like

	Year	Operating Income (\$)	Effective tax rate	BV of Debt	BV of Equity	Cash	Invested capital	Return on capital
	2009	\$6,057	27.79%	\$18,168	\$42,556	\$12,639	\$48,085	9.10%
_	2010	\$23,033	18.67%	\$23,613	\$59,766	\$11,040	\$72,339	25.90%
	2011	\$30,206	18.54%	\$27,668	\$70,076	\$9,913	\$87,831	28.01%
	2012	\$13,346	18.96%	\$23,116	\$78,721	\$3,538	\$98,299	11.00%
	2013 (TTM)	\$15,487	20.65%	\$30,196	\$75,974	\$5,818	\$100,352	12.25%
	Normalized	\$17,626	20.92%					17.25%

Estimate the costs of equity & capital for Vale

		Unlevered				
		beta of		Peer Group	Value of	Proportion
Business	Sample size	business	Revenues	EV/Sales	Business	of Vale
Metals & Mir	48	0.86	\$9,013	1.97	\$17,739	16.65%
Iron Ore	78	0.83	\$32,717	2.48	\$81,188	76.20%
Fertilizers	693	0.99	\$3,777	1.52	\$5,741	5.39%
Logistics	223	0.75	\$1,644	1.14	\$1,874	1.76%
Vale Operations		0.8440	\$47,151		\$106,543	100.00%

Market D/E = 54.99%

Marginal tax rate = 34.00% (Brazil)

Levered Beta = 0.844 (1+(1-.34)(.5499)) = 1.15Cost of equity = 2.75% + 1.15 (7.38%) = 10.87%

	% of revenues	ERP
US & Canada	4.90%	5.50%
Brazil	16.90%	8.50%
Rest of Latin America	1.70%	10.09%
China	37.00%	6.94%
Japan	10.30%	6.70%
Rest of Asia	8.50%	8.61%
Europe	17.20%	6.72%
Rest of World	3.50%	10.06%
Vale ERP	100.00%	7.38%

Vale's rating: A-Default spread based on rating = 1.30% Cost of debt (pre-tax) = 2.75% + 1.30% = 4.05%

Cost of capital = 11.23% (.6452) + 4.05% (1-.34) (.3548) = 8.20%

Assume that the company is in stable growth, growing 2% a year in perpetuity

Reinvestment Rate $-\frac{g}{2\%} - \frac{2\%}{1159\%}$	Value of operating assets	= \$202,832
ROC = 17.25%	+ Cash & Marketable Securities	= \$ 7,133
17626(1 - 2002)(1 - 1150)	- Debt	= \$ 42,879
Value of Operating Assets = $\frac{17,826(12092)(11159)}{(1159)} = $202,832$	Value of equity	= \$167,086
(.08202)	Value per share	=\$ 32.44
Aswath Damodaran	Stock price (11/2013)	= \$ 13.57

252 Aswath Damodaran

Estimating Stable Period Inputs after a high growth period: Disney

- <u>Respect the cap</u>: The growth rate forever is assumed to be 2.5%. This is set lower than the riskfree rate (2.75%).
- Stable period excess returns: The return on capital for Disney will drop from its high growth period level of 12.61% to a stable growth return of 10%. This is still higher than the cost of capital of 7.29% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year.
- <u>Reinvest to grow</u>: Based on the expected growth rate in perpetuity (2.5%) and expected return on capital forever after year 10 of 10%, we compute s a stable period reinvestment rate of 25%:
 - □ Reinvestment Rate = Growth Rate / Return on Capital = 2.5% /10% = 25%
 - Adjust risk and cost of capital: The beta for the stock will drop to one, reflecting Disney's status as a mature company.
 - Cost of Equity = Riskfree Rate + Beta * Risk Premium = 2.75% + 5.76% = 8.51%
 - The debt ratio for Disney will rise to 20%. Since we assume that the cost of debt remains unchanged at 3.75%, this will result in a cost of capital of 7.29%
 - □ Cost of capital = 8.51% (.80) + 3.75% (1-.361) (.20) = 7.29%

V. From firm value to equity value per share

Approach used	To get to equity value per share
Discount dividends per share at the cost of equity	Present value is value of equity per share
Discount aggregate FCFE at the cost of equity	Present value is value of aggregate equity Subtract the value of equity options given to managers and divide by number of shares.
Discount aggregate FCFF at the cost of capital	 PV = Value of operating assets + Cash & Near Cash investments + Value of minority cross holdings -Debt outstanding = Value of equity -Value of equity options =Value of equity in common stock / Number of shares

Valuing Deutsche Bank in early 2008

- 255
- To value Deutsche Bank, we started with the normalized income over the previous five years (3,954 million Euros) and the dividends in 2008 (2,146 million Euros). We assumed that the payout ratio and ROE, based on these numbers will continue for the next 5 years:
 - Payout ratio = 2,146/3954 = 54.28%
 - Expected growth rate = (1-.5428) * .1181 = 0.054 or 5.4%
 - Cost of equity = 9.23%

Year	Net Income	Payout Ratio	Dividends	PV @ 9.23%
2008	4,167 €	54.28%	2,262 €	2,071 €
2009	4,392 €	54.28%	2,384 €	1,998 €
2010	4,629 €	54.28%	2,513€	1,928 €
2011	4,879 €	54.28%	2,648 €	1,861 €
2012	5,143 €	54.28%	2,791 €	1,795 €
				9,653 €

Aswath Damodaran

Deutsche Bank in stable growth

256

At the end of year 5, the firm is in stable growth. We assume that the cost of equity drops to 8.5% (as the beta moves to 1) and that the return on equity also drops to 8.5% (to equal the cost of equity). Stable Period Payout Ratio = 1 - g/ROE = 1 - 0.03/0.085 = 0.6471 or 64.71% Expected Dividends in Year 6 = Expected Net Income₅ * (1+g_{Stable})* Stable Payout Ratio = €5,143 (1.03) * 0.6471 = €3,427 million
 Terminal Value = Expected Dividends₆/(Cost of Equity-g) = 3,247/(.085-.03) = 62,318 million Euros
 PV of Terminal Value = Terminal Value_n/(1+Cost of Equity_{High growth})ⁿ = 62,318/(1.0923)⁵ = 40,079 mil Euros
 Value of equity = €9,653+ €40,079 = €49,732 million Euros
 Value of equity per share = Value of Equity = 49,732/(474.2) = 104.88 Euros/share

Stock was trading at 89 Euros per share at the time of the analysis.

Valuing Deutsche Bank in 2016

257

Deutsche Bank: A Crisis Valuation (October 2016)



Valuing Tata Motors with a FCFE model in November 2013: The high growth period

- We use the expected growth rate of 24.13%, estimated based upon the 2013 values for ROE (29.97%) and equity reinvestment rate (80.5%):
 - □ Expected growth rate = 29.97% * 80.5% = 24.13%
- □ The cost of equity for Tata Motors is 13.50%:

Cost of equity = = 6.57% + 0.964 (7.19%) = 13.50%

□ The expected FCFE for the high growth period

	Current	1	2	3	4	5
Expected growth rate		24.13%	24.13%	24.13%	24.13%	24.13%
Net Income	98,926₹	122,794₹	152,420₹	189,194₹	234,841₹	291,500₹
Equity Reinvestment Rate	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%
Equity Reinvestment	79,632₹	98,845₹	122,693₹	152,295₹	189,039₹	234,648₹
FCFF	19 29⊿₹	23 040₹	29 727₹	36 899₹	45 802₹	56 852₹
PV of FCFE@13.5%	13,234	21,100₹	23,075₹	25,235₹	27,597₹	30,180₹

Aswath Damodaran

258

Sum of PV of FCFE = 127,187₹

Stable growth and value....

259

- After year five, we will assume that the beta will increase to 1 and that the equity risk premium will decline to 6.98% percent (as the company becomes more global). The resulting cost of equity is 13.55 percent.
 Cost of Equity in Stable Growth = 6.57% + 1(6.98%) = 13.55%
- We will assume that the growth in net income will drop to 6% and that the return on equity will drop to 13.55% (which is also the cost of equity). Equity Reinvestment Rate _{Stable Growth} = 6%/13.55% = 44.28%
 FCFE in Year 6 = ₹291,500(1.06)(1 0.4428) = ₹ 136,822million
 Terminal Value of Equity = ₹136,822/(0.1355 0.06) = ₹ 2,280,372 million

□ To value equity in the firm today

Value of equity = PV of FCFE during high growth + PV of terminal value = ₹127,187 + 2,280,372/1.1355⁵ = ₹742,008 million

Dividing by 2694.08 million shares yields a value of equity per share of ₹275.42, about 40% lower than the stock price of ₹427.85 per share.



Disney: Inputs to Valuation

	High Growth Phase	Transition Phase	Stable Growth Phase
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	31.02% (Effective)	31.02% (Effective)	31.02% (Effective)
	36.1% (Marginal)	36.1% (Marginal)	36.1% (Marginal)
Return on Capital	12.61%	Declines linearly to 10%	Stable ROC of 10%
Reinvestment Rate	53.93% (based on normalized	Declines gradually to 25%	25% of after-tax operating
	acquisition costs)	as ROC and growth rates	income.
		drop:	Reinvestment rate = g/ ROC
			= 2.5/10=25%
Expected Growth	ROC * Reinvestment Rate =	Linear decline to Stable	2.5%
Rate in EBIT	0.1261*.5393 = .068 or 6.8%	Growth Rate of 2.5%	
Debt/Capital Ratio	11.5%	Rises linearly to 20.0%	20%
Risk Parameters	Beta = 1.0013 , $k_e = 8.52\%\%$	Beta changes to 1.00;	Beta = 1.00; $k_e = 8.51\%$
	Pre-tax Cost of Debt = 3.75%	Cost of debt stays at 3.75%	Cost of debt stays at 3.75%
	Cost of capital = 7.81%	Cost of capital declines	Cost of capital = 7.29%
		gradually to 7.29%	



Investment decision affects risk of assets being finance and financing decision affects hurdle rate



Disney: Corporate Financing Decisions and Firm Value

Ways of changing value...

