

GROWTH IN FCFE VERSUS GROWTH IN FCFF

- Leverage generally increases the growth rate in the FCFE, relative to the growth rate in the FCFF.
- The growth rate in earnings per share is defined to be:

$$g_{EPS} = b (ROC + D/E (ROC - i (1-t)))$$

where,

g_{EPS} = Growth rate in Earnings per share

b = Retention ratio = 1 - Payout ratio

ROC = Return on Assets = (Net Income + Interest Expense (1-t))/(BV of Debt + BV of Equity)

D/E = Debt/ Equity

i = Interest Expense/ Book Value of Debt

- The growth rate in EBIT will be a function of only the retention ratio and the return on assets and will generally be lower:

$$g_{EBIT} = b (ROC)$$

Illustration 12: Growth rate in FCFE and FCFF: Home Depot Inc.

Home Depot Inc. had earnings per share in 1992 of \$0.82, and had registered growth in earnings per share of 45% in the prior five years. The firm had return on assets of 12.82 %, a pre-tax interest rate of 7.7%, a debt-equity ratio of 36.59% and a retention ratio

of 91% in 1992 (The tax rate was 36%). Assuming that these levels will be sustained in the future, the growth rates in FCFE and FCFF will be as follows:

$$\begin{aligned}\text{Expected growth rate in FCFE} &= b (\text{ROC} + D/E (\text{ROC} - i (1-t))) \\ &= 0.91 (12.82\% + 0.3659 (12.82\% - 7.7\% (1-0.36))) \\ &= 14.29\%\end{aligned}$$

$$\begin{aligned}\text{Expected Growth rate in FCFF} &= b (\text{ROC}) \\ &= 0.91 * 12.82\% = 11.67\%\end{aligned}$$

The growth rate in free cashflows to equity is greater than the growth rate in the free cashflow to the firm because of the leverage effect.

VII. FCFF STABLE GROWTH FIRM

The Model

A firm with free cashflows to the firm growing at a stable growth rate can be valued using the following model:

$$\text{Value of firm} = \text{FCFF}_1 / (\text{WACC} - g_n)$$

where,

FCFF_1 = Expected FCFF next year

WACC = Weighted average cost of capital

g_n = Growth rate in the FCFF (forever)

The Caveats

- the growth rate used in the model has to be reasonable, relative to the nominal growth rate in the economy.
- the relationship between capital expenditures and depreciation has to be consistent with assumptions of stable growth.

Illustration 13: Valuing the Food Product Division at RJR Nabisco

A Rationale for using the Stable FCFF Model

- The division is in steady state; It is a large player in a stable market with strong competition. It cannot be expected to sustain high growth for any length of time.

- The division does not carry its own debt (though its parent company, RJR Nabisco, carries plenty). Thus, only the FCFF can be computed for the division.
- The entire division is up for sale, not just RJR's equity stake in the division.

Background Information

- In 1995, the food products division had revenues of \$ 7 billion on which it earned \$1.5 billion before interest and taxes.
- The division had capital expenditures of \$660 million and depreciation of \$550 million in 1994.
- The working capital as a percent of revenues has averaged 5% between 1993 and 1994. (Working capital increased \$350 million in 1994)
- The beta of comparable firms in the food products business is 1.05 and the average debt ratio at these firms is 23.67%. (The cost of debt at the largest of these firms is approximately 8.50%).
- The tax rate is assumed to be 36%.
- The cash flows to the firm are expected to grow 5% a year in the long term

Valuing the Division

- The estimated free cash flows to the firm (division) are as follows –

	Current	Next Year
EBIT (1-t)	\$ 960.00	\$ 1,008.00

- (Cap Ex - Depreciation)	\$ 110.00	\$ 115.50
- Change in Working Capital	\$ 150.00	\$ 17.50
= FCFF	\$ 700.00	\$ 875.00

- The cost of capital is computed, based upon comparable firms (in the food products business)
 - Beta (based upon comparable firms) = 1.05
 - Cost of Equity (based upon comparable firms) = 7.5% + 1.05 (5.50%) = 13.275%
 - Pre-tax Cost of Debt = 8.50%; After-tax cost of debt = 8.50% (1-.036) = 5.44%
 - Debt Ratio (based upon comparable firms) = 23.67%
 - Cost of Capital (based upon comparable firms) = 13.275% (0.7633) + 5.44% (0.2367) = 11.42%
- The value of the division, using this cost of capital and an expected growth rate of 5%, were estimated as follows –

Value of Food Products Division = $\$ 875 / (.1142 - .05) = \13.629 billion

VIII & IX. TWO AND THREE STAGE VERSIONS OF THE FCFF MODEL

The Model

The value of the firm, in the most general case, can be written as the present value of expected free cashflows to the firm:

$$\text{Value of Firm} = \sum_{t=1}^{t=\infty} \frac{\text{FCFF}_t}{(1 + \text{WACC})^t}$$

where,

FCFF_t = Free Cashflow to firm in year t

WACC = Weighted average cost of capital

If the firm reaches steady state after n years, and starts growing at a stable growth rate g_n after that, the value of the firm can be written as:

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{FCFF}_t}{(1 + \text{WACC})^t} + \frac{[\text{FCFF}_{n+1} / (\text{WACC} - g_n)]}{(1 + \text{WACC})^n}$$

Firm Valuation versus Equity Valuation

- The value of equity, however, can be extracted from the value of the firm by subtracting out the market value of outstanding debt.

- The advantage of using the firm valuation approach is that cashflows relating to debt do not have to be considered. In cases where the leverage is expected to change significantly over time, this is a significant saving. The firm valuation approach does, however, require information about debt ratios and interest rates to estimate the weighted average cost of capital.
- The value for equity obtained from the firm valuation and equity valuation approaches will be the same if:
 - (a) Consistent assumptions are made about growth in the two approaches
 - (b) Bonds are correctly priced

Best suited for:

- Firms which have very high leverage and are in the process of lowering their leverage or vice versa.
- Firms which have negative FCFE, but have positive FCFF.

Illustration 14: Federated Department Stores: Valuing an over-leveraged firm using the FCFF approach

A Rationale for using the Two-Stage FCFF Model

- The earnings before interest and taxes at Federated in 1994, which amounted to \$531 million, were still well below EBIT in 1988 of \$628 million. The earnings are expected to grow at rates slightly above-stable for the next five years as the firm recovers.
- The leverage in 1994 was still significantly above desirable levels, largely as a consequence of the leveraged buyout in the late eighties. It was anticipated that this debt ratio would be lowered gradually over the next five years to acceptable levels.

Background Information

- Base Year Information
 - Earnings before interest and taxes in 1994 = \$ 532 million
 - Capital Expenditures in 1994 = \$310 million
 - Depreciation in 1994 = \$207 million
 - Revenues in 1994 = \$ 7230 million
 - Working Capital as percent of revenues = 25.00%
 - Tax rate = 36%
- High Growth Phase
 - Length of High Growth Phase = 5 years
 - Expected Growth Rate in FCFF = 8%
 - Financing Details
 - Beta during high growth phase = 1.25
 - Cost of Debt during high growth phase = 9.50% (pre-tax)
 - Debt Ratio during high growth phase = 50%
- Stable Growth Phase

- Expected growth rate in FCFF = 5%
- Financing Details
 - Beta during stable growth phase = 1.00
 - Cost of Debt during stable growth phase = 8.50%
 - Debt Ratio during stable growth phase = 25%
- Capital expenditures are offset by depreciation.

Valuation

The forecasted free cashflows to the firm over the next five years are provided below:

	1	2	3	4	5	Terminal year
EBIT	\$574.45	\$620.41	\$670.04	\$723.64	\$781.54	\$820.61
- t (EBIT)	\$ 206.80	\$223.35	\$241.21	\$260.51	\$281.35	\$295.42
- (Cap Ex - Depreciation)	\$111.24	\$120.14	\$129.75	\$140.13	\$151.34	\$0.00
- Ch Working Capital	\$144.58	\$156.15	\$168.64	\$182.13	\$196.70	\$132.77
= FCFF	\$101.83	\$120.77	\$130.44	\$140.87	\$152.15	\$392.42

Cost of Equity during high growth phase = $7.5\% + 1.25(5.5\%) = 14.38\%$

Cost of Capital during high-growth phase = $14.38\% (0.5) + 9.50\% (1-0.36) (0.5) = 10.23\%$

The free cashflow to the firm in the terminal year is estimated to be \$392.42 million.

FCFF in terminal year = $EBIT_6 (1-t) - (Rev_6 - Rev_5) * \text{Working Capital as \% of Revenue}$

$$= \$ 820.61 (1-0.36) - \$ 132.77 = \$ 392.42 \text{ millions}$$

Cost of Equity during stable growth phase = $7.50\% + 1.00 (5.50\%) = 13.00\%$

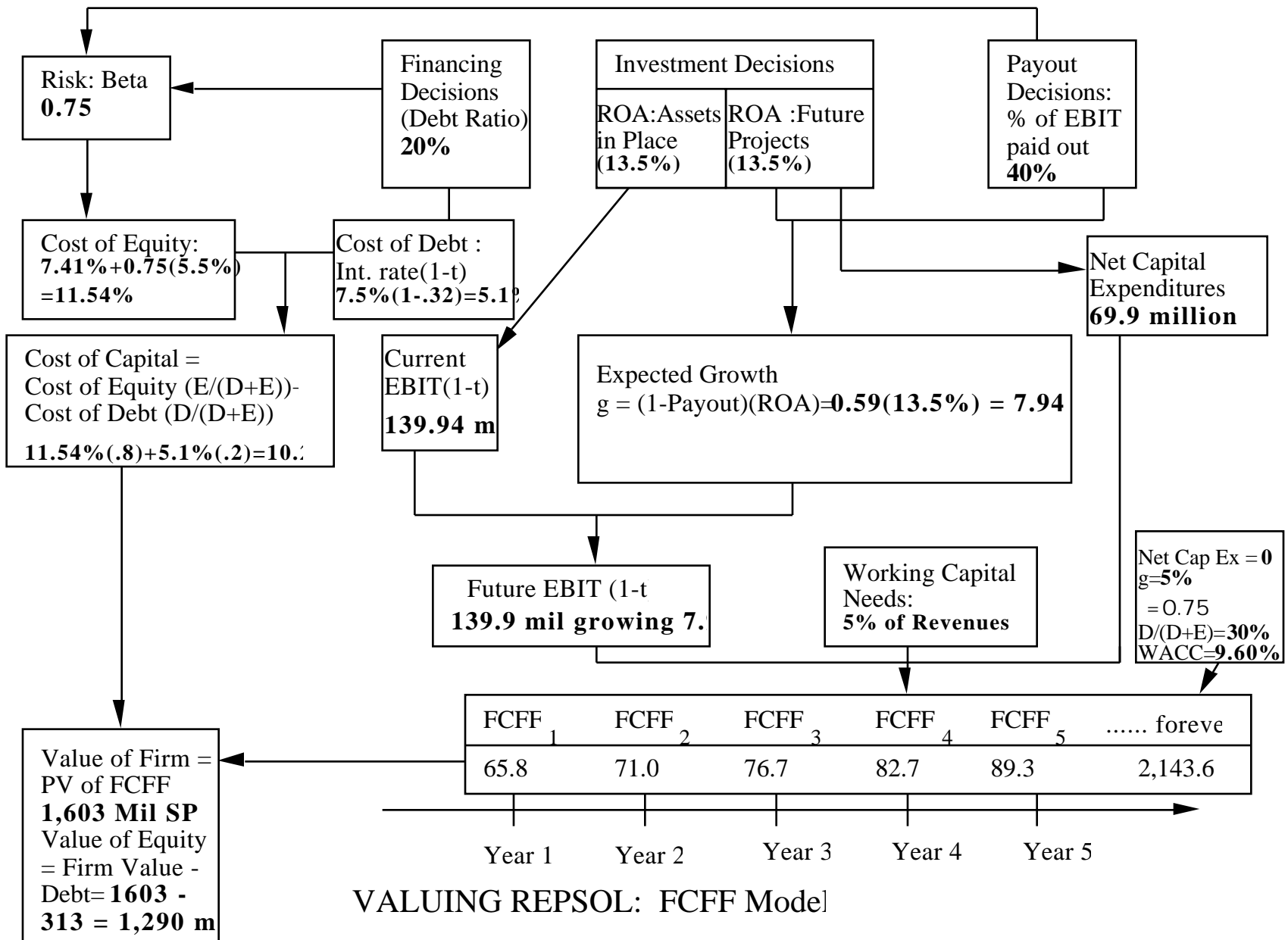
Cost of Capital in stable growth phase = $13.00\% (0.75) + 8.50\% (1-0.36) (0.25) = 11.11\%$

Terminal value of the firm = $\$ 392.42 / (.1111 - .05) = \$ 6,422 \text{ millions}$

The value of the firm is then the present value of the expected free cashflows to the firm and the present value of the terminal value:

PV of FCFF	\$487.17
PV of Terminal Value =	\$3,946.93
Value of Firm =	\$4,434.11
Value of Debt =	\$2,740.58
Value of Equity =	\$1,693.52
Value Per Share =	\$13.38

Federated Department Stores was trading at \$21 per share in March 1995.



VALUING REPSOL: FCF Model

Illustration 15 : Valuing with the Three-stage FCFF model: LIN Broadcasting

- *A Rationale for using the Three-Stage FCFF Model*
- *Why three-stage?* LIN Broadcasting in a fast growing firm in a fast growing industry segment. Revenues are expected to grow 30% a year for the next few years.
- *Why FCFF?* LIN Broadcasting has never made a profit after taxes, even though it has posted high growth, because it has had high leverage and non-operating expenses. Prior to these charges, however, it earned a healthy operating income of \$128 million in 1994. Thus, though FCFE are negative, FCFF are positive.
- The financial leverage is high but can be expected to decline as the industry stabilizes.

Background Information

- Current Earnings
 - EBIT in 1994 = \$ 128.3 million
 - Capital Expenditures in 1994 = \$ 150.5 million
 - Depreciation & Amortization in 1994 = \$ 125.1 million
 - Working Capital was about 10% of revenues in 1994.
- Inputs for the High Growth Period
 - Length of the High Growth Period = 5 years

- Expected growth rate in Revenues / EBIT = 30.00%
- Financing Details
 - Beta during High Growth Period = 1.60
 - Cost of Equity during High Growth Period = 7.5% + 1.60 (5.5%) = 16.30%
 - The firm will continue to use debt heavily during this period (Debt Ratio = 60%), at a pre-tax cost of debt of 10%.
- Capital Expenditures and Depreciation are expected to grow at the same rate as revenues and EBIT.
- Working Capital will remain at 10% of revenues during this period.

$\text{Weighted Average Cost of Capital} = 16.30\% (0.40) + 10\% (0.64) (0.60) = 10.36\%$

- Inputs for the transition period
 - Length of the transition period = 5 years
 - Growth rate in EBIT will decline from 30% in year 5 to 5% in year 10 in linear increments.
 - Capital expenditures will grow 8% a year and depreciation will grow at 12% a year during the transition period.
 - Financing Details
 - Beta will drop to 1.25 for the entire transition period.
 - The debt ratio during this phase will drop to 50%, and the pre-tax cost of debt will be 9%.

- Working Capital will remain at 10% of revenues during the period.

Weighted Average Cost of Capital = 14.38 % (0.50) + 9% (0.64) (0.50)= 10.07%
--

- Inputs for the Stable Growth
 - Expected Growth Rate in revenues and EBIT= 5%
 - Capital expenditures and depreciation will grow at the same rate as EBIT.
 - Beta during stable growth phase = 1.00 : Cost of Equity = 7.50% + 1.0 (5.5%) = 13%
 - Debt Ratio during stable phase = 40%; Pre-tax cost of debt will be 8.5%.

Estimating the Value

- These inputs are used to estimate free cash flows to the firm, the cost of capital and the present values during the high growth and transition period –

Period	EBIT(1-t)	Cap Exp	Depreciation	Chg. WC	FCFF	Debt Ratio	Beta	WACC	Present Value
1	\$106.75	\$195.65	\$162.63	\$20.66	\$53.07	60.00%	1.60	10.36%	\$48.09
2	\$138.77	\$254.35	\$211.42	\$26.86	\$68.99	60.00%	1.60	10.36%	\$56.64
3	\$180.40	\$330.65	\$274.84	\$34.91	\$89.68	60.00%	1.60	10.36%	\$66.72
4	\$234.52	\$429.84	\$357.30	\$45.39	\$116.59	60.00%	1.60	10.36%	\$78.60
5	\$304.88	\$558.80	\$464.49	\$59.00	\$151.57	60.00%	1.60	10.36%	\$92.59

6	\$381.10	\$603.50	\$520.23	\$63.92	\$233.90	50.00%	1.25	10.07%	\$129.81
7	\$457.31	\$651.78	\$582.65	\$63.92	\$324.27	50.00%	1.25	10.07%	\$163.50
8	\$525.91	\$703.92	\$652.57	\$57.53	\$417.03	50.00%	1.25	10.07%	\$191.05
9	\$578.50	\$760.24	\$730.88	\$44.10	\$505.04	50.00%	1.25	10.07%	\$210.20
10	\$607.43	\$821.05	\$818.59	\$24.26	\$580.70	50.00%	1.25	10.07%	\$219.58

The terminal value at the end of year 10 can be calculated based upon the FCFF in year 11, the stable growth rate of 5% and the cost of capital in the stable growth phase –

FCFF in year 11 = FCFF in year 10 * 1.05 = \$ 580.70 (1.05) = \$609.73

Cost of Capital in stable period = 13.00% (0.6) + 8.5% (1-.36) (0.4) = 9.98%

Terminal price = \$ 609.73 / (.0998 - .05) = \$ 12,253.55 millions

The components of value are as follows:

Present Value of FCFF in high growth phase:	\$342.64
Present Value of FCFF in transition phase:	\$914.15
Present Value of terminal firm value at end of transition:	\$4,633.49
Value of LIN Broadcasting :	\$5,890.27
Less: Value of Outstanding Debt :	\$1,806.60
Value of Equity in LIN Broadcasting:	\$4,083.67
Value per share:	\$79.29

What is wrong with this model? (All FCFF Models)

The issues are the same as in the FCFE Models. (See end of sections on two-stage and three-stage FCFE Models)

In addition,

- the value of the firm may be less than value of debt
 - In some cases, this is entirely feasible. The firm is bankrupt.
 - In other cases, this may be because the EBIT is depressed. If this is the case, normalize the EBIT.

