

Forecasting Value: DCF/DG¹
Farm Hill Group, Ltd.
In-Class Problem²

The subject firm for the problems represented in this case is The Farm Hill Group, Ltd., a fictional firm for which hypothetical values have been presented. The Income Statement, Balance Sheet, and Other Financial Information used herein are also used in support of building a body of Corporate Finance In-Class Problems and Case Studies.

You've been assigned to review the financial statements of The Farm Hill Group, Ltd. preparatory to making a recommendation to your client regarding a possible investment in the firm. Farm Hill is a legacy manufacturer of a line of residential and commercial overhead doors and has historically generated strong profits for its stakeholders. In recent years the firm's management has seen troublesome declines in the midst of a market rebounding from a serious recession, resulting in concerned shareholders and a potentially interesting opportunity for the right owner.

Your client, a national construction product manufacturing and distribution operator, is interested in the firm based on the expectation it can lower Farm Hill operating costs by 3%³ and improve sales by 2%⁴, as a result of its combined buying power and managerial excellence, thereby increasing profits generally.

Farm Hill manufactures its products domestically and enjoys a competitive advantage over other producers based on quality rather than cost. The market for automatic overhead doors, like the residential and commercial construction market, is forecasted to have annual revenue increases of 6% over the next 5-8 years and is reflective of a modestly healthy national expansion of some 3.5% generally. The market for quality products is positioned to capture an additional 10%, proportionately, over and above the market increase.

Interest rates for credit worthy corporate borrowers in the current market are 6% with expected increases to as much as 8% in the next 2-4 years. The cost of equity capital for firms in this industry with very low beta factors, virtually risk free in your estimation, is 4%, while the market rate for firms with a beta factor of 1.00 is 7%: Farm Hill enjoys a beta factor of 0.96.

Finally, your client is as interested in Farm Hill's Private Equity investment as it a wholly owned subsidiary providing financing for the firm's retail and commercial customers, a profitable and complementing business unit your client's firm does not currently enjoy.

As you review Farm Hill's financial statements, consider how your client may realize value through a potential acquisition, and prepare to offer a recommendation, the following items will aid you in forming a production value for the firm and its assets.

¹ This problem and solution set is intended to present an abbreviated discussion of the included finance concepts and is not intended to be a full or complete representation of them or the underlying foundations from which they are built.

² This problem set was developed by Richard Haskell, PhD (rhaskell@westminstercollege.edu), Gore School of Business, Westminster College, Salt Lake City, Utah (2015).

³ This expected decrease in costs may be thought of as a "best owner" decrease: see Appendix A

⁴ This expected increase in sales may be thought of as a "best owner" increase: see revenue projections in question 2.

I'm going to provide solutions in two separate ways: 1) without the lower costs expectations of the client since I'm not sure they're all that credible, and 2) with the lower cost expectations (found in Appendix A following the firm's financial statements).

1. Calculate Farm Hill's NOPLAT, Invested Capital, ROIC, FCF and WACC for 2014.

Note that I'm including values with respect to Private Equity since the client appears to value it as an important part of a potential investments

$$\begin{aligned} \text{NOPLAT} &= (\text{Operating Rev} - \text{Operating Exp}) + \text{Dep} - \text{Adjusted Tax} \\ &= (253.64 - 244.99)(1-.32) = 5.882 \end{aligned}$$

$$\begin{aligned} \text{Invested Capital} &= \text{Net Working Capital} + \text{Fixed Operating Assets} \\ &= (93.483 - 30.571) + 32.17 + 14.76 = 109.842 \end{aligned}$$

$$\text{ROIC} = \frac{\text{NOPLAT}}{\text{IC}} = \frac{5.882}{109.842} = .0535 \text{ or } 5.35\%$$

$$\begin{aligned} \text{FCF} &= \text{NOPLAT} + \text{Depreciation} + \Delta \text{NWC (increase)} + \Delta \text{NCS (increase)} \\ &= 5.882 + 3.890 - 2.472 - 7.936 = -.630 \end{aligned}$$

$$\text{WACC} = \left(\frac{E}{V} \times R_E\right) + \left(\frac{P}{V} \times R_P\right) + \left(\frac{D}{V} \times R_D\right)(1 - T_C)$$

$$V = E + P + D = 5.570 + 0.090 + 31.544 = 37.204$$

$$R_D = \frac{\text{Interest Paid}_{2014}}{\text{Interest Bearing Debt}_{2013}} = \frac{4.36}{26.65} = .1636 \text{ or } 16.36\%$$

$$R_P = \frac{\text{Preferred Dividends}}{\text{Preferred Stock}} = \frac{0.025}{0.090} = .2778 \text{ or } 27.78\%$$

$$\begin{aligned} R_{E_{\text{CAPM}}} &= R_F + (R_M - R_F)\beta \\ &= .04 + (.07 - .04)(0.96) = .0688 \text{ or } 6.88\% \end{aligned}$$

$$\begin{aligned} &= \left(\frac{5.570}{37.204} \times 0.0688\right) + \left(\frac{0.090}{37.204} \times 0.2778\right) + \left(\frac{31.544}{37.204} \times .1636\right)(1 - 0.32) \\ &= 0.0103 + 0.000672 + (0.1387)(0.68) \\ &= .1053 \text{ or } 10.53\% \end{aligned}$$

2. Provide a well-reasoned and detailed "top-down", 5-year revenue projection for Farm Hill's critical operations.

Best Owner	2.00%	Client expects increase in Revenue as a result of their participation
Market	6.00%	Market increase forecast
Quality	<u>0.60%</u>	Quality product increase, proportionately; over and above market
Total Increase	8.60%	

Note that national expansion increase at 3.5% not used as this is reflected in 6% market increase

3. Provide forecast ratios for Farm Hill’s operating expense and interest categories.

$$FR_{REV} = 8.60\%$$

$$FR_{COGS} = \frac{COGS_t}{Revenue_t} = \frac{211.460}{253.64} = 0.8337 \text{ or } 83.37\%$$

$$FR_{S\&A} = \frac{S\&A_t}{Revenue_t} = \frac{29.640}{253.64} = 0.1169 \text{ or } 11.69\%$$

$$FR_{DEP} = \frac{Depreciation_t}{Revenue_t} = \frac{3.890}{253.640} = 0.0153 \text{ or } 1.53\%$$

$$FR_{Interest} = \frac{Interest_t}{Debt_{t-1}} = \frac{4.360}{26.65} = 0.16.6 \text{ or } 16.36\%$$

Note that I haven’t changed any of the expense forecasts to reflect the “best owner” decrease in costs referenced in the introduction. While it might be reasonable to forecast this expected decrease, which would be represented by a 3% reduction in the numerator of each of the operating expense based forecast ratios. Appendix A includes a forecast and valuation analysis representing this increase.

4. Provide a forecast schedule of NOPLAT, Invested Capital, ROIC and FCF for a sufficient number of years to support a 5-year explicit period and continuing value forecast.

Year	Debt	Rev	COGS	S&A Exp	Dep	Int Exp	IC	NOPLAT	Δ NWC	NCS	FCF	ROIC
2014	31.544	253.640	211.460	29.640	3.890	4.360	109.842	5.882	2.472	7.930	-0.630	0.0535
2015	31.544	275.453	229.646	32.189	4.225	5.161	109.842	6.388	2.685	8.612	-0.684	0.0582
2016	31.544	299.142	249.395	34.957	4.588	5.161	109.842	6.937	2.915	9.353	-0.743	0.0632
2017	31.544	324.868	270.843	37.964	4.982	5.161	109.842	7.534	3.166	10.157	-0.807	0.0686
2018	31.544	352.807	294.136	41.228	5.411	5.161	109.842	8.182	3.438	11.030	-0.876	0.0745
2019	31.544	383.148	319.431	44.774	5.876	5.161	109.842	8.885	3.734	11.979	-0.952	0.0809
2020	31.544	416.099	346.902	48.625	6.382	5.161	109.842	9.649	4.055	13.009	-1.034	0.0878

5. Provide DCF/DG Model value forecasts using a 5-year explicit value period.

DCF/DG

In order to assign value based on a DCF model, we’ll use the NOPLAT values from our table of values for the explicit period. This is a model in two parts in which Part One is a simple Discounted Cash Flow Models assigning a value for the explicit forecast period, and Part Two uses a modified version of the Dividend Growth Model and assigns a continuing value beyond the explicit period. We need

to recall that the valuation assigned in Part Two is a future value and must be time discounted back to a present value – we'll use WACC for this discounting.

$$\text{Value}_{\text{DCF/DG}} = \sum \frac{\text{NOPLAT}_t}{(1+WACC)^t} + PV_{CV}$$

$$CV = \frac{\text{NOPLAT}_{2020}}{WACC-g} = \frac{9.64948}{0.1053 - 0.086} = 499.9731$$

$$PV_{CV} = \frac{499.9731}{1.1053^5} = 303.072$$

This is the present value of PV_{CV}

Now you can think about the DCF equation as follows:

$$\begin{aligned} \text{Value}_{\text{DCF}} &= \sum \frac{\text{NOPLAT}_t}{(1+WACC)^t} \\ &= \frac{6.388}{1.1053^1} + \frac{6.937}{1.1053^2} + \frac{7.534}{1.1053^3} + \frac{8.182}{1.1053^4} + \frac{8.885}{1.1803^5} \\ &= 5.7793 + 5.6784 + 5.5792 + 5.4818 + 5.3861 \\ &= 27.905 \end{aligned}$$

$$\text{Value}_{\text{DCF/DG}} = 27.905 + 303.072 = 330.977$$

6. Discuss the basic structure and outcome issues with respect to DCF/DG models.

The DCF/DG (modified) model considers the PVEXPLICIT and PVCV values in which the PVEXPLICIT value is simply a DCF model with stated cash flows for a specified period of time and the PVCV value is the present value of some continuing value calculated as of some point in the future using a modified Dividend Growth model as follows: $CV = \frac{\text{NOPLAT}_t}{(WACC-g)}$. This value must be converted to a present value as follows: $PV_{CV} = \frac{CV}{(1+WACC)^t}$.

THE DCF/DG model, though interesting, misses the valuation dynamic observed when a firm's ROIC \neq WACC. When ROIC = WACC growth is neutral in terms of value creation. Whereas when ROIC > WACC growth creates value, and as ROIC < WACC growth destroys value.

The Farm Hill Group, Ltd. Balance Sheet (millions) Year Ending December 31						The Farm Hill Group, Ltd. Income Statement (millions) January 1 - December 31		
	2013	2014		2013	2014		2013	2014
Current Assets			Current Liabilities			Income		
Cash & Securities	9.780	7.933	Accounts Payable	13.360	6.641	Product Sales	234.980	252.780
Accounts Receivable	37.470	38.910	Other	21.150	23.930	Private Equity	0.550	0.860
Inventory	47.700	46.640	Total	34.510	30.571	Total Income	235.530	253.640
Total	94.950	93.483						
			Long Term Debt			Expenses		
Fixed Assets			Mortgages	0.320	0.960	COGS	196.690	211.460
PPE	28.130	32.170	Bonds	26.330	30.584	Sales & Admin	23.500	29.640
Total	28.130	32.170	Total	26.650	31.544	Depreciation	3.640	3.890
						Total Expenses	223.830	244.990
Other Assets			Owner's Equity			Interest Paid		
Private Equity	14.760	14.760	Common Stock	5.440	5.570	General Interest	3.720	4.360
			Preferred Stock	0.080	0.090	Total Interest Paid	3.720	4.360
Total Assets	137.840	140.413	Accumulated Retained Earnings	71.160	72.639			
			Total	76.680	78.299	Taxable Income	7.980	4.290
						Taxes Paid	2.554	1.373
			Total Liabilities and Owner's Equity	137.840	140.413	Net Income	5.426	2.917
Additional Financial Information								
Preferred Stock Value	2013	2014	Common Stock Value	2013	2014	Distribution of Earnings		
Shares Outstanding (millions)	0.040	0.050	Shares Outstanding (millions)	5.440	5.570	Dividends (Common)	1.360	1.413
12/31 Price per Share	2.500	2.500	12/31 Price per Share	12.000	11.250	Dividends (Preferred)	0.020	0.025
Market Value (millions)	0.100	0.125	P/E Multiple	22.000	24.000	Addition to Retained Earnings	4.046	1.479
			EPS	0.998	0.524			
Book Value / Liabilities	26.650	31.544	Market Value (millions)	65.280	62.663			

Appendix A: Forecast and Value Analysis

This analysis includes an expected 3% decrease in operating costs as a result of the “best owner” decrease proposed in the introduction. To do this I’ve multiplied each of the 2014 expense values by 3% in the numerator of the respective Forecast Ratios, resulting in adjusted ratios that can then be used in the forecast.

Adjusted Forecast Ratios

$$FR_{REV} = 8.60\%$$

$$FR_{COGS} = \frac{COGS_t}{Revenue_t} = \frac{211.460 \times 0.97}{253.64} = 0.8087 \text{ or } 8.087\%$$

$$FR_{S\&A} = \frac{S\&A_t}{Revenue_t} = \frac{29.640 \times 0.97}{253.64} = 0.1134 \text{ or } 11.34\%$$

$$FR_{DEP} = \frac{Depreciation_t}{Revenue_t} = \frac{3.890 \times 0.97}{253.640} = 0.0149 \text{ or } 1.49\%$$

$$FR_{Interest} = \frac{Interest_t}{Debt_{t-1}} = \frac{4.360 \times 0.97}{26.65} = 0.1587 \text{ or } 15.87\%$$

This changes WACC through the R_D value

$$WACC = \left(\frac{E}{V} \times R_E\right) + \left(\frac{P}{V} \times R_P\right) + \left(\frac{D}{V} \times R_D\right)(1 - T_C)$$

$$V = E + P + D = 5.570 + 0.090 + 31.544 = 37.204$$

$$R_D = \frac{Interest\ Paid_{2014}}{Interest\ Bearing\ Debt_{2013}} = \frac{4.229}{26.65} = .1587 \text{ or } 15.87\%$$

$$R_P = \frac{Preferred\ Dividends}{Preferred\ Stock} = \frac{0.025}{0.090} = .2778 \text{ or } 27.78\%$$

$$R_{E_{CAPM}} = R_F + (R_M - R_F)\beta$$

$$= .04 + (.07 - .04)(0.96) = .0688 \text{ or } 6.88\%$$

$$= \left(\frac{5.570}{37.204} \times 0.0688\right) + \left(\frac{0.090}{37.204} \times 0.2778\right) + \left(\frac{31.544}{37.204} \times .1587\right)(1 - 0.32)$$

$$= 0.0103 + 0.000672 + (0.135)(0.68)$$

$$= .1019 \text{ or } 10.19\%$$

Adjusted Revenue and Expense Forecast

Year	Debt	Revenue	COGS	S & A Expense	Depreciation	Interest Expense	Invested Capital	NOPLAT	Δ NWC	NCS	FCF	ROIC
2014	31.544	253.640	205.116	28.751	3.773	4.229	109.842	10.879796	2.472	7.930	4.251	0.0990
2015	31.544	275.453	222.756	31.223	4.098	5.006	109.842	11.815	2.685	8.612	4.617	0.1076
2016	31.544	299.142	241.913	33.909	4.450	5.006	109.842	12.832	2.915	9.353	5.014	0.1168
2017	31.544	324.868	262.718	36.825	4.833	5.006	109.842	13.935	3.166	10.157	5.445	0.1269
2018	31.544	352.807	285.311	39.992	5.249	5.006	109.842	15.134	3.438	11.030	5.913	0.1378
2019	31.544	383.148	309.848	43.431	5.700	5.006	109.842	16.435	3.734	11.979	6.422	0.1496
2020	31.544	416.099	336.495	47.166	6.190	5.006	109.842	17.84842	4.055	13.009	6.974	0.1625

Adjusted Valuation

$$DCF/DG = DCF + PV_{CV} = 52.094 + 692.77 = 744.86$$

Note the changes between this model valuation and those performed without the expense adjustment. The changes are substantial. These are driven by the changes in NOPLAT, FCF and ROIC; also substantial.