**Forecasting Value: DCF/KVD[1]**
**Farm Hill Group, Ltd.**
**In-Class Problem[2]**

*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, such as Farm Hill, 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 risk-free firms in this industry 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. The firm's outstanding bonds have a coupon rate of 14%, pay interest twice a year, and at the end of 2014, 15 years remaining to maturity, and are currently callable.**

**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.**

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[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.

**You'll note that in working through this case I've calculated everything for Q1-7 without using the Best Owner Premium for expenses. While this isn't always a great idea, it allows me to help you see the effects of using Best Owner Premiums (for revenues, expense, and debt) as I provide an answer to Q8.**

1. **Calculate Farm Hill's NOPLAT, Invested Capital, ROIC 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.*

**NOPLAT** = EBIT x (1-T)
= 8.65 x (1-.34) = 5.709

**Invested Capital** = Net Working Capital + Fixed Operating Assets
= (93.483 – 30. 571) + (32.17 + 14.76) = 109.843

**ROIC** = $\frac{NOPLAT}{IC} = \frac{5.709}{109.843}$ = .052 or 5.20%

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

V = E + P + D = 62.663 + 0.125 + 55.52 = 118.31

$R_{ECAPM} = R_F + (R_M - R_F)\beta$
= .04 + (.07 - .04)(0.96) = .0688 or 6.88%

$R_P = \frac{Preferred\ Dividends}{Preferred\ Stock} = \frac{0.025}{0.125}$ = 0.20 or 20%

$R_D$ = YTM = .06 or 6%

$= \left(\frac{62.663}{118.310}\ x\ 0.0688\right) + \left(\frac{0.125}{118.310}\ x\ 0.20\right) + \left(\frac{55.522}{118.310}\ x\ 0.06\right)(1 - 0.34)$
= 0.03644 + 0.0002113 + 0.01858
= .0552 or 5.20%

2. **What is the current market value of Farm Hill's bonds?**

Market Value of Bonds = $C\ \frac{\left(1-\frac{1}{(1+YTM)^N}\right)}{YTM} + \frac{Face}{(1+YTM)^N}$

$= 70\ \frac{\left(1-\frac{1}{(1.03)^{30}}\right)}{.03} + \frac{1000}{(1.03)^{30}}$

= 1,784.017 per bond

The firm has 30.584 bonds outstanding for a total market value of 54,562.3759 or 54.5624.

**3. What is Farm Hill's current enterprise value (market based)?**

$EV = Market\ Cap\ Equity + Market\ Value\ Debt - Cash.$ In this case the market value of equity includes common and preferred stock valued as of 12/31/2014 at 62.663 and 0.125 respectively. Market value of debt include the market value of the firm's bonds at 54.5624 plus the outstanding balance on the firm's mortgage of 0.96 for a total of 55.5224. The firm's cash (cash and securities) is 7.933.

EV = 62.663 + 0.125 + 55.522 – 7.933 = 110.377

4. **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 | 0.60% | Quality product increase, proportionately; over and above market |
| Total Increase | 8.60% | |

*Note that national expansion increase at 3.5% is not expressly used as this is already reflected in the 6% general market increase.*

**5. Provide forecast ratios for Farm Hill's operating expense and interest categories.**

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

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

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

**$FR_{DEP}$** = $\frac{Depresication_t}{Revenue_t} = \frac{3.890}{253.640} = 0.0153$ or 1.53%

**$FR_{Interest}$** = $\frac{Interest_t}{Debt_{t-1}} = \frac{4.360}{26.65} = 0.16.6$ 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. Since forecast ratios express an expense as a percentage of revenues, it's best to identify the forecast ratio, convert the ratio to a value, and then reduce that value by the expected expense decrease. In this case I'm not going to decrease depreciation as this is not a directly manageable expense but is a function of the cost of existing capital equipment and IRS published depreciation schedules. I'm also not going to decrease interest expense here as these are functions of long term debt contracts. So it's really only COGS and S&A that might immediately be managed. At the end of this solution set I offer an alternative set of expense reductions inclusive of reduced interest expense.*

**6. 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.**

I've held the firm's ratio of debt to invested capital (D/IC) and revenue to invested capital (Revenue/IC) constant in this projection, based on 2014 values. Doing this supposes the firm's invested capital is, in part, a function of its willingness attract debt capital and employ leverage. This results in projecting Net Working Capital (NWC) and Fixed Asset changes as a function of revenue changes as these variables follow changes in revenue of 8.6%. Ultimately this allows is to project FCF. Recall that $NCS = \Delta FA = FA_1 - FA_0 + Depreciation$ and $IC = FA + NWC$, we then take $\Delta IC = NCS + \Delta NWC$ such that $IC_1 = IC_0 + \Delta IC = IC_0 + NCS + \Delta NWC$.

To project values for 2020 I've assumed a long run revenue growth rate of 3%. Though this is slightly higher than current expectations for changes in GDP, it seems reasonable for a firm in the building products industry with such a strong leadership role.

| Year | Debt | Revenue | COGS | S & A Expense | Dep | EBIT | Int Exp | IC | NOPLAT | Δ NWC | Δ FA | FCF | ROIC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 31.544 | 253.640 | 211.460 | 29.640 | 3.890 | 8.650 | 4.360 | 109.8425 | 5.709 | 2.472 | 4.040 | -0.803 | 0.0520 |
| 2015 | 34.257 | 275.453 | 229.646 | 32.189 | 4.225 | 9.394 | 5.161 | 119.289 | 6.200 | 2.546 | 4.161 | -0.507 | 0.0520 |
| 2016 | 37.203 | 299.142 | 249.395 | 34.957 | 4.588 | 10.202 | 5.604 | 129.548 | 6.733 | 2.623 | 4.286 | -0.175 | 0.0520 |
| 2017 | 40.402 | 324.868 | 270.843 | 37.964 | 4.982 | 11.079 | 6.086 | 140.689 | 7.312 | 2.701 | 4.415 | 0.196 | 0.0520 |
| 2018 | 43.877 | 352.807 | 294.136 | 41.228 | 5.411 | 12.032 | 6.610 | 152.788 | 7.941 | 2.782 | 4.547 | 0.612 | 0.0520 |
| 2019 | 47.650 | 383.148 | 319.431 | 44.774 | 5.876 | 13.067 | 7.178 | 165.928 | 8.624 | 2.866 | 4.683 | 1.075 | 0.0520 |
| 2020 | 49.080 | 394.643 | 329.014 | 46.117 | 6.053 | 13.459 | 7.796 | 170.906 | 8.883 | 2.952 | 4.824 | 1.107 | 0.0520 |

**7. Provide a DCF/KVD Model value forecast using a 5-year explicit value period.**

**DCF/KVD:** $Value_{DCF/KVD} = PV_{DCF} + PV_{CV}$

This breaks into two parts: the use of a DCF Model to assign value during the explicit period and a KVD Model to assign value beyond that point. In order to assign value based on a DCF model, we'll use the FCF values from our table of values for the explicit period, but we need to think about what we'll use for the *r* in this model, and based on the values available to us I think we need to use WACC.

The KVD Models is calculated in two parts: Part One is a simple DCF model based on projected FCF and assigns value during the explicit forecast period based on a discount rate and time – in this case we're using WACC as the discount rate.

We can think about the DCF equation as follows:

$$PC_{DCF} = \sum \frac{FCF_t}{(1+WACC)^t}$$

$$= \frac{-.507}{1.0552^1} + \frac{-.175}{1.0552^2} + \frac{.1962}{1.0552^3} + \frac{.612}{1.0552^4} + \frac{1.075}{1.0552^5}$$

= -.481 - .158 + .167 + .493 + .821

= 1.107 This is $PV_{DCF}$

Part Two is the Key Driver Model and assigns a continuing value after the explicit period. Part Two creates a value in the future, the same year as the end of the explicit period, and needs to be discounted back to a present value to be relevant to us – we'll use WACC for this as well.

$$CV = \frac{NOPLAT_{2020}\left(1-\frac{g}{ROIC_{2020}}\right)}{WACC-g} = \frac{8.883\left(1-\frac{0.03}{0,0552}\right)}{0.0552-0.03} = 148.822$$

$$PV_{CV} = \frac{CV}{(1+WACC)^t} = \frac{148.822}{1.0552^5} = 113.742$$

As $Value_{DCF/KVD} = PV_{DCF} + PV_{CV}$ we now sum the terms as follows:

$Value_{DCF/KVD}$ = 1.107 + 113.53.5783 = 114.586

| | KVD | |
|---|---|---|
| | | Total |
| **FCF** | **$PV_{DCF(FCF)}$** | **$PV_{DCF(FCF)}$** |
| -0.803 | | |
| -0.507 | -0.481 | -0.481 |
| -0.175 | -0.158 | -0.638 |
| 0.196 | 0.167 | -0.471 |
| 0.612 | 0.493 | 0.022 |
| 1.075 | 0.821 | 0.844 |
| 1.107 | | |
| | **$PV_{DCF}$** | 0.844 |
| | **$CV_{KVD}$** | 148.822 |
| | **$PV_{CV}$** | 113.742 |
| | **$VALUE_{KVD}$** | 114.586 |

**8. Given your assessment for this firm, how else might you seek to improve the firm's value were you a potential new owner?**

*As indicated in the preface to Q1, I didn't include the Best Owner Premiums for expenses or interest in the estimations for Q1-7, so we'll bring them in now. We'll also consider how persistent the Best Owner Premium is for future Sales values.*

Our sales forecast rate of 8.6% includes a BOP of 2%. I'm making the assumption that this is not a persistent increase for each period and am reducing the sales growth rate by 1% after the first year and the other 1% after the second.

I'm also going to assume the BOP for expense is consistent for each of the appropriate expense categories, which would not include either depreciation or interest.

I've reduced the forecasted expense for COGS and S&A by 3% for each period as indicated. I've not included this BOP for depreciation based on the premise that depreciation is exogenous and not within an owner's control.

I've finally taken a more aggressive stance on an observable BOP for interest, though was not expressly stated. We're told the firm can borrow at 6% and the firm's bonds are callable. So I've indicated a substantial interest savings by refinancing all of the debt at 6% (recall the coupon rate on the bonds are at 14%). This has no impact on EBIT or NOPLAT, but does impact EBIT, NOPLAT or FCF, but clearly effects Net Income and NOPAT. There is also no impact on WACC, which is 5.2%.

The overall impact on the firm for the relevant BOPs is to increase ROIC from 5.2% to 9.54%. This results in ROIC > WACC, whereas we'd been facing a scenario in which ROIC < WACC such that growth destroys value for the firm.

The following provides a revenue and expense forecast (values in millions):

| Year | Debt | Revenue | COGS | S & A Expense | Dep | EBIT | Int Exp | IC | NOPLAT | Δ NWC | Δ FA | FCF | ROIC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 31.544 | 253.640 | 211.460 | 29.640 | 3.890 | 8.650 | 4.360 | 109.8425 | 5.709 | 2.472 | 4.040 | -0.803 | 0.0520 |
| 2015 | 34.257 | 275.453 | 222.756 | 31.223 | 4.225 | 17.249 | 1.893 | 119.289 | 11.384 | 2.546 | 4.161 | 4.677 | 0.0954 |
| 2016 | 36.860 | 296.387 | 239.686 | 33.596 | 4.546 | 18.560 | 2.055 | 128.355 | 12.250 | 2.623 | 4.286 | 5.341 | 0.0954 |
| 2017 | 39.293 | 315.949 | 255.505 | 35.814 | 4.846 | 19.785 | 2.212 | 136.826 | 13.058 | 2.701 | 4.415 | 5.942 | 0.0954 |
| 2018 | 41.886 | 336.802 | 272.368 | 38.177 | 5.165 | 21.091 | 2.358 | 145.857 | 13.920 | 2.782 | 4.547 | 6.590 | 0.0954 |
| 2019 | 44.651 | 359.031 | 290.345 | 40.697 | 5.506 | 22.483 | 2.513 | 155.483 | 14.839 | 2.866 | 4.683 | 7.289 | 0.0954 |
| 2020 | 45.990 | 369.802 | 299.055 | 41.918 | 5.672 | 23.157 | 2.679 | 160.148 | 15.284 | 2.952 | 4.824 | 7.508 | 0.0954 |

And further results in a KVD style valuation estimate increase of n early 200% as a result of an increasing scale economy on sales and expenses measured in the 2-3% range!

**KVD (values in millions)**

| FCF | $PV_{DCF(FCF)}$ | Total $PV_{DCF(FCF)}$ |
|---|---|---|
| -0.803 | | |
| 4.677 | 4.432 | 4.432 |
| 5.341 | 4.796 | 9.229 |
| 5.942 | 5.057 | 14.286 |
| 6.590 | 5.315 | 19.601 |
| 7.289 | 5.571 | 25.172 |
| 7.508 | | |
| | **$PV_{DCF}$** | 25.172 |
| | **$CV_{KVD}$** | 415.263 |
| | **$PV_{CV}$** | 317.378 |
| | **$VALUE_{KVD}$** | 342.550 |

**The Farm Hill Group, Ltd.**
**Balance Sheet (millions)**
**Year Ending December 31**

| | 2013 | 2014 |
|---|---|---|
| Current Assets | | |
| Cash & Securities | 9.780 | 7.933 |
| Accounts Receivable | 37.470 | 38.910 |
| Inventory | 47.700 | 46.640 |
| Total | 94.950 | 93.483 |
| | | |
| Fixed Assets | | |
| PPE | 28.130 | 32.170 |
| Total | 28.130 | 32.170 |
| | | |
| Other Assets | | |
| Private Equity | 14.760 | 14.760 |
| | | |
| Total Assets | 137.840 | 140.413 |

| | 2013 | 2014 |
|---|---|---|
| Current Liabilitites | | |
| Accounts Payable | 13.360 | 6.641 |
| Other | 21.150 | 23.930 |
| Total | 34.510 | 30.571 |
| | | |
| Long Term Debt | | |
| Mortgages | 0.320 | 0.960 |
| Bonds | 26.330 | 30.584 |
| Total | 26.650 | 31.544 |
| | | |
| Owner's Equity | | |
| Common Stock | 5.440 | 5.570 |
| Preferred Stock | 0.080 | 0.090 |
| Accumulated Retained Earnings | 71.160 | 72.639 |
| Total | 76.680 | 78.299 |
| | | |
| Total Liabilities and Owner's Equity | 137.840 | 140.413 |

**Additional Financial Information**

| Preferred Stock Value | 2013 | 2014 |
|---|---|---|
| Shares Outstanding (millions) | 0.040 | 0.050 |
| 12/31 Price per Share | 2.500 | 2.500 |
| Market Value (millions) | 0.100 | 0.125 |
| | | |
| Book Value / Liabilities | 26.650 | 31.544 |

| Common Stock Value | 2013 | 2014 |
|---|---|---|
| Shares Outstanding (millions) | 5.440 | 5.570 |
| 12/31 Price per Share | 12.000 | 11.250 |
| P/E Multiple | 22.000 | 24.000 |
| EPS | 0.998 | 0.524 |
| Market Value (millions) | 65.280 | 62.663 |

**The Farm Hill Group, Ltd.**
**Income Statement (millions)**
**January 1 - December 31**

| | 2013 | 2014 |
|---|---|---|
| Income | | |
| Product Sales | 234.980 | 252.780 |
| Private Equity | 0.550 | 0.860 |
| Total Income | 235.530 | 253.640 |
| | | |
| Expenses | | |
| COGS | 196.690 | 211.460 |
| Sales & Admin | 23.500 | 29.640 |
| Depreciation | 3.640 | 3.890 |
| Total Expenses | 223.830 | 244.990 |
| | | |
| Interest Paid | | |
| General Interest | 3.720 | 4.360 |
| Total Interest Paid | 3.720 | 4.360 |
| | | |
| Taxable Income | 7.980 | 4.290 |
| Taxes Paid | 2.554 | 1.373 |
| Net Income | 5.426 | 2.917 |
| | | |
| Distribution of Earnings | | |
| Dividends (Common) | 1.360 | 1.413 |
| Dividends (Preferred) | 0.020 | 0.025 |
| Addition to Retained Earnings | 4.046 | 1.479 |