

Forecasting Value: FCF & KVD Models¹
Central Camp Railroad, LTD.
In-Class Problem²

The subject firm for the problems represented in this case, Central Camp Railroad, Ltd. is, 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.

Central Camp Railroad (CCRR), a privately held company, is considering a public offering for their equity shares as an exit strategy for the firm's principal shareholders. Rail transport is a capital intensive industry with firms enjoying some monopoly power given access to certain rail lines and transport corridors, in which CCRR has invested heavily. As can be seen through the following FCF and NOPLAT values, the firm is pursuing a growth strategy and has explicitly forecast values for 2017-2021, with assumed values for 2022 based on an expected long-run growth in the rail trans industry of 2.5%.

	FCF	NOPLAT
2017	40,119,581	50,822,081
2018	41,122,570	52,154,133
2019	42,150,634	53,457,986
2020	43,204,400	54,794,435
2021	44,284,510	56,164,296
2022	45,391,623	57,568,404

As the firm's CFO, you've been assigned to identify a valuation of the firm from the firm's perspective, based on the following information and the available set of income statement, balance sheet, and market values as of year-end 2016:

Bond Portfolio		Equity Portfolio	
YTM	6.31%	R _M	9.00%
Years remaining	20	Beta	1.35
P/YR	2	R _F	2.15%
Coupon Rate	8.00%	Investor Required Returns	18.00%
Face Value (per bond)	1000		
# Bonds outstanding	165,750		

Outsized returns in industries requiring high levels of capital and for which firms have some form of monopoly power may not be reasonable. These firms often enjoy their market positions as a function of state-level protection and are commonly subject to regulatory oversight at which pricing is determined and the level of profit may be limited. The trade-off being an assurance of profit assuming demand remains robust. As such, investors seeking these returns may find less than favorable reactions from existing stakeholders as offers are made and evaluated.

1. Calculate a market based WACC for the firm as of year-end 2016. Show all of your work

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 (2017).

Capital Components (Market)	Value	Weight
Common	312,500,000.000	49.34%
Preferred	50,000,000.000	7.89%
Debt	270,828,193.265	42.76%
Total	633,328,193.27	100.00%

$$R_E \text{ (via CAPM)} = R_F + (R_M - R_F) \times B = .0215 + (.09 - .0215) \times 1.35 = .1140 \text{ or } 11.40\%$$

$$R_P = \text{Pref Div/Mkt Val Pref} = 9,000,000/50,000,000 = .18 \text{ or } 18\%$$

$$R_D = \text{YTM} = .0631$$

$$\text{Tax Rate} = .35 \text{ or } 35\%$$

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

$$= .4934 \times .1140 + .0789 \times .18 + .4276 \times .0631 \times (1 - .35) = .0880$$

2. Given the cash flows indicated, estimate the firm's value as of the end of 2016 using a Free Cash Flow augmented form of the Dividend Growth (Dividend Yield) model from the perspective of the firm.

Show all of your work in the multi-column format discussed in class

$$\text{Value}_{\text{FCF}} = \sum \frac{\text{FCF}_i}{(1 + \text{WACC})^t} + \frac{\frac{\text{FCF}_1}{(\text{WACC} - g)}}{(1 + \text{WACC})^t}$$

Period	FCF	PV _{DCF(FCF)}	Total PV _{DCF(FCF)}
0	39,141,054		
1	40,119,581	36,875,025	36,875,025
2	41,122,570	34,740,185	71,615,211
3	42,150,634	32,728,940	104,344,151
4	43,204,400	30,834,133	135,178,284
5 (0)	44,284,510	29,049,025	164,227,309
6 (1)	45,391,623		
		PV _{DCF(FCF)}	164,227,309
		CV _{FCF}	720,640,573
		PV _{CV}	472,713,952
		VALUE	636,941,261

3. Given the cash flows indicated, estimate the firm's value as of the end of 2016 using the Key Value Driver model from the perspective of the firm. Show all of your work in the multi-column format discussed in class

$$\text{Value}_{\text{KVD/FCF}} = \sum \frac{\text{FCF}_t}{(1+WACC)^t} + \frac{\text{NOPLAT}_1 \left(1 - \frac{g}{\text{ROIC}}\right)}{\frac{WACC - g}{(1+WACC)^t}}$$

Period	FCF	PV _{DCF(FCF)}	Total PV _{DCF(FCF)}
0	39,141,054		
1	40,119,581	36,875,025	36,875,025
2	41,122,570	34,740,185	71,615,211
3	42,150,634	32,728,940	104,344,151
4	43,204,400	30,834,133	135,178,284
5 (0)	44,284,510	29,049,025	164,227,309
6 (1)	45,391,623		
		PV_{DCF}	164,227,309
		CV_{KVD}	731,687,398
		PV_{CV}	479,960,266
		VALUE	644,187,575

4. If the values you've calculated using the FCF and KVD models result in different outcomes, specify why they are different and what might be done to reconcile the differences. Be specific here and use as much quantitative detail as you either have available or can calculate given the data at your disposal. This might best include some formation of FCF using available resources.

The values resulting from these models are different only to the extent that the cash flow variable employed in the continuation values differs. While they are each conceptually equal to free cash flow, the FCF model uses $\text{FCF} = \text{NOPLAT} + \text{Depreciation} - \Delta\text{NWC} - \text{NCS}$ and the KVD model uses $\text{FCF} = \text{NOPLAT} \left(1 - \frac{g}{\text{ROIC}}\right)$. At a given value for g , these equations result in the same value for free cash flow at continuing value time 1 (CV_1).

Based on the information provided, we know

$$\begin{aligned} \text{FCF} &= \text{NOPLAT} + \text{Depreciation} - \Delta\text{NWC} - \text{NCS} \\ &= 45,391,623 \end{aligned} \tag{4.1}$$

We also know

$$\text{FCF} = \text{NOPLAT} \left(1 - \frac{g}{\text{ROIC}}\right) \tag{4.2}$$

If we substitute values for FCF from 4.1 into 4.2 and further substitute values for $NOPLAT_1$ and ROIC from the data provided into 4.2 the resulting equation is

$$45,391,623 = 57,568,404 \times \left(1 - \frac{g}{ROIC}\right) \quad (4.3)$$

Rearrange 4.3 to solve for g

$$g = \left(1 - \frac{45,391,623}{57,568,404}\right) \times .1254 = .02652 \text{ or } 2.652\%$$

This value of g differs from that used on the KVD model. The data provided suggested a long term growth rate of 2.5%, slightly lower than the g calculated above, resulting in a KVD Model valuation slightly greater than that calculated with the FCF model.

5. **You've also been asked to help the firm's stakeholders, of which you are one, to prepare for possible offers from private equity investors interested in acquiring all or part of the firm. At what valuation might you expect private equity investors would be interested in the firm and how, or why, might this differ from the value(s) you've estimated? Show all of your work in the multi-column format discussed in class – you only need to use one of the models indicated (FCF or KVD), but should be prepared to defend why you've chosen the one you've used.**

When valuing the firm based on the investor required return of 18% (hurdle rate), the values fall dramatically, as shown below. The initial valuation estimates based on WACC were not dissimilar to the firm's Enterprise Value of \$615,768,667, which was low enough (when compared to the initial estimates) to suggest an investment may be warranted and could possibly result in an economic profit, or a return in excess of the discount rate (WACC). But the firm's EV is already well above the estimates using the investor's required return as the discount rate, so why would the current owners entertain an offer from such an investor group? Is the 18% required return reasonable given the risk/reward scenario of this railroad. For many reasons, it likely is not and current owners would not entertain such an offer. Further, investors interested in firms in this space may not be likely to seek a high risk/reward opportunity.

Period	FCF Model			KVD Model (FCF)		
	FCF	PV _{DCF(FCF)}	Total PV _{DCF(FCF)}	FCF	PV _{DCF(FCF)}	Total PV _{DCF(FCF)}
0	39,141,054			39,141,054		
1	40,119,581	33,999,645	33,999,645	40,119,581	33,999,645	33,999,645
2	41,122,570	29,533,590	63,533,234	41,122,570	29,533,590	63,533,234
3	42,150,634	25,654,177	89,187,411	42,150,634	25,654,177	89,187,411
4	43,204,400	22,284,349	111,471,760	43,204,400	22,284,349	111,471,760
5 (0)	44,284,510	19,357,168	130,828,928	44,284,510	19,357,168	130,828,928
6 (1)	45,391,623			45,391,623		
		PV _{DCF(FCF)}	130,828,928		PV _{DCF}	130,828,928
		CV _{FCF}	292,849,180		CV	297,338,316
		PV _{CV(FCF)}	128,007,076		PV _{CV}	129,969,318
		VALUE _{FCF}	258,836,003		VALUE	260,798,246

Central Camp Railroad, Ltd. Balance Sheet Year Ending December 31						Central Camp Railroad, Ltd. Income Statement January 1 - December 31		
	2015	2016		2015	2016		2015	2016
Current Assets			Current Liabilities			Income		
Cash & Securities	16,500,000	17,500,000	Accounts Payable	16,500,000	18,500,000	Transportation Revenue	265,000,000	281,580,000
Accounts Receivable	6,500,000	7,500,000	Wages Payable	5,000,000	4,500,000	Operating Services	15,000,000	19,000,000
Inventory	-	-	Total	21,500,000	23,000,000	Investment Revenue	425,000	4,750,000
Total	23,000,000	25,000,000				Total Income	280,425,000	305,330,000
			Long Term Debt			Expenses		
Fixed Operating Assets			Mortgages	35,000,000	38,500,000	COGS	150,000,000	159,000,000
PPE	303,750,000	313,750,000	Bank Notes Payable	32,000,000	35,000,000	Sales & Marketing	28,000,000	32,000,000
Operating Investments	25,000,000	25,000,000	Bonds	176,000,000	165,750,000	Administration	14,500,000	15,829,148
Total	328,750,000	338,750,000	Total	243,000,000	239,250,000	Depreciation	17,600,000	22,130,000
						Total Expenses	210,100,000	228,959,148
Non-Operating Assets			Owner's Equity			EBIT	70,325,000	76,370,852
Land/Livestock	33,500,000	33,500,000	Common Stock	12,500,000	12,500,000			
Mining Interest	15,051,000	21,750,000	Preferred Stock	9,551,000	20,000,000	Interest Paid		
Total	48,551,000	55,250,000	Accumulated Retained Earnings	113,750,000	124,250,000	General Interest	19,440,000	19,140,000
			Total	135,801,000	156,750,000	Total Interest Paid	19,440,000	19,140,000
Total Fixed Assets	377,301,000	394,000,000				Taxable Income	50,885,000	57,230,852
Total Assets	400,301,000	419,000,000	Total Liabilities and Owner's Equity	400,301,000	419,000,000	Taxes Paid	17,809,750	20,030,798
						Net Income	33,075,250	37,200,054
						Distribution of Earnings		
Additional Financial Information						Dividends (Common)	14,075,250	17,700,054
Preferred Stock Value			Common Stock Value			Dividends (Preferred)	9,000,000	9,000,000
Shares Outstanding (millions)	7,823,125	10,000,000	Shares Outstanding (millions)	12,500,000	12,500,000	Addition to Retained Earnings	10,000,000	10,500,000
12/31 Price per Share	4.8	5.0	12/31 Price per Share	22.00	25.00			
Market Value (millions)	37,159,844	50,000,000	P/E Multiple	8.31	8.40			
			EPS	2.646	2.976			
			Market Value (millions)	275,000,000	312,500,000			
			Book Value / Long-Term Liabilities	243,000,000	239,250,000			