FIN521: Advanced Corporate Finance

Case 3: Midland Energy

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1. For what types of decisions are Mortensen's estimates of Midland's cost of capital used?

- Midland's cost of capital are used in analysis including asset appraisals for both capital budgeting and financial accounting, performance assessments, M&A proposals, and stock repurchase decisions.

2.
a. What is Midland's current Net Debt and market leverage? (you can assume all cash is excess except "restricted cash")

- Net Debt = Current portion of LT debt + LT debt - Cash and Cash Equivalent = 101,845 - 19,206 = 82,639
- Market leverage = Debt/ ($stock * share outstanding) = 82,639 / 130168.61 = 63.49%

b. Calculate Midland's current cost of equity, cost of debt, and corporate (firm-level) WACC. Note: To calculate the cost of debt capital you can assume that the firm's β_D=0.05, and that this debt beta stays constant in a reasonable range around the Midland's target leverage (*i.e.*, *ignore* the yield spreads given in Table 1 in the case and the discussion on the bottom of page 5).

Risk free rate	4.98%
EMRP	5.00%
βd	0.05
tax	40.00%
Cost of Debt	5.23%

βe	1.25
Cost of Equity	11.23%

Equity	130168.61	61.17%
Debt	82,639	38.83%
Total	212807.6808	
WACC	8.09%	

c. What would Midland's corporate cost of equity and WACC be if Midland reaches its "target" leverage of 42.2% (net)debt/value?

Target Leverage	42.20%	Unlevered cost of asset	8.90%
spread to treasury	1.62%	Target cost of equity	10.58%
Target Cost of debt	6.60%	Target WACC	7.79%

3. Should Midland use a single corporate WACC for evaluating investment opportunities in all of its divisions? Why or why not?

- No, as risk exposure, business characteristics and beta of each divisions are different, separate cost of debt and equity should be used.

4.

a. Using the data provided in Exhibit 5, compute a separate cost of capital for the E&P and R&M divisions. Assume the E&P division has a 46% D/V and the R&M division has a 31% D/V. Also assume (following Table 12.3 in the textbook) that at these debt levels, the E&P division's $\beta_{D,E\&P}=0.05$ and the R&M division's $\beta_{D,R\&M}=0.1$

βd (E&P)	0.05	βe (E&P)	1.21
Cost of Debt	5.23%	Cost of Equity	11.03%
D/V	46%	WACC	7.40%

,where equity beta of E&P division is equity beta of Wide Plain Petroleum, with similar capital structure.

βd(R&M)	0.1	βe(R&M)	1.335
Cost of Debt	5.48%	Cost of Equity	11.66%
D/V	31%	WACC	9.06%

,where equity beta of R&M is average equity beta of Arkana Petroleum Corp.(1.25) and Dameron Fuel Services(1.42).

b. What are the drivers that causes these WACCs to differ from one another?

- As two divisions of business have different betas as they contains the different risk exposure. As a result, both cost of debt and equity of E&P division are smaller than that of R&M division.
- But most of all, Capital structure is the key driver to decide WACC as leverage provides the tax benefit. Highly leveraged company takes more advantage through debt financing

and lower WACC. Therefore, WACC of E&P with high leverage as 46% is way smaller than that of R&M even though difference in debt cost of capital and equity cost of capital is less than 1%.

5. a. Collect data on comparables (*i.e.*, at least three companies with businesses related to the Petrochemicals industry) from your favorite source of financial information (e.g., CapitalIQ, Bloomberg, Yahoo Finance), and use this data to compute a cost of capital for the Petrochemical division (you would ideally get this data from around the same time in 2007, although that's not required). Assume the Petrochemicals division has a 40% D/V ratio and β_D=0.05.

- We picked up 6 petrochemical company as comparable company and take the average of six equity betas to calculate the cost of equity of Midland's petrochemical division.

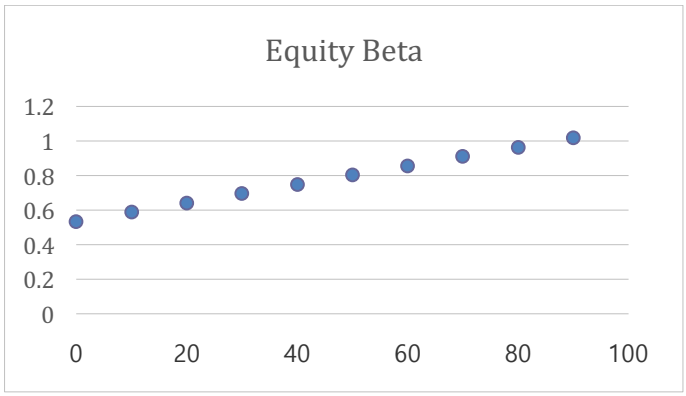
Beta in 2007	
BASF	0.88
Dow Chemical	0.95
Ineos	0.56
Dupont	1.15
Formosa Plastics	0.71
Mitsubishi Chemical	0.91
Average Beta	**0.86**

- By using the average beta above, cost of equity of petrochemical division of Midland Energy was calculated, and it was 8.30%. Using debt beta, cost of debt was calculated as 6.05%. Given D/V = 40%, and tax rate = 40%, WACC is calculated as 6.4344%.

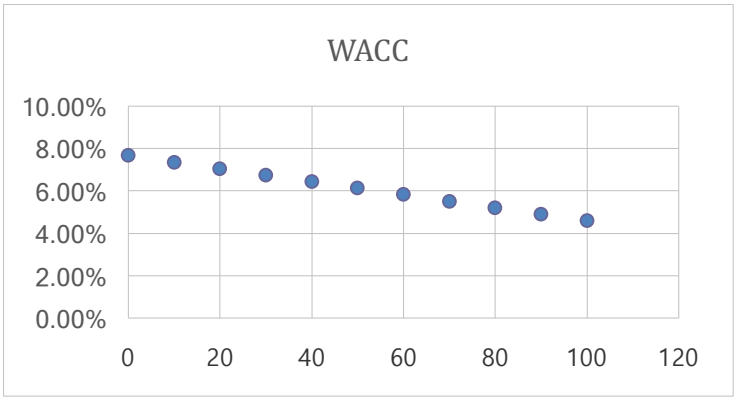
b. How would the equity beta and WACC vary for different levels of leverage for this division? Plot i) equity beta on D/V, and ii) WACC on D/V (for each D/V between 0%-100% in 10% increments). *Hint:* You will need to "guesstimate" how β_D will change with leverage, but you nevertheless know that $\beta_{E \text{ at } D/V=0\%} = \beta_{D \text{ at } D/V=100\%} = \beta_A$.

- We assumed that debt beta increases linearly from zero to asset beta as D/V increases. It makes equity beta equal to asset beta when D/V = 0, and debt beta equal to asset beta when D/V = 100%.

- The plot below represents equity beta corresponding to D/V ratio. It can be shown that equity beta increases as debt-to-value ratio increases. It is consistent to Modigliani and Miller theorem.



- The plot below shows WACC correspond to D/V ratio. It shows that WACC decreases as debt-to-value ratio increases. It is because increase in debt has a tax shield.



6. Bonus question (somewhat difficult): How could you use only data from the case to estimate a WACC for the Petrochemical division? What are potential shortfalls of this method? *Hint:* The beta of a portfolio is a value-weighted average of the betas of the individual assets; to get estimates of the "stand-alone" divisional enterprise values of the E&P and R&M divisions you may, for example, use revenue multiples with their comps.

Enterprise Value				
Market Value of Equity	130,169			
Net Debt	82,639			
Enterprise Value	212,808			
Using Comps, estimate EV of each division				
	E&P	***R&M***	***Petrochemicals***	***Whole***
Operating Revenue	22,357	202,971	23,189	
EV / Revenue	3.70	0.51		
Estimated Enterprise Value	82,751	103,048	27,009	
Weight	38.89%	48.42%	12.69%	
WACC	7.40%	9.06%	**6.48%**	8.09%

- We used the following steps to get petrochemicals' WACC.
- step1 : Calculate Enterprise Value of comparable companies
- step2 : Calculate EV/Sales(multiple)
- step3 : Petrochemicals EV = Whole EV - (E&P EV + R&M EV)
- step4 : Calculate each division weight
- step5 : Calculate Petrochemical's WACC