

University of Stavanger (UiS)  
Takehome Exam MØA 370 Valuation  
Fall 2020

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The number in brackets is the points for each problem. The points sum to 100.

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**Exercise 1.** *WACC* [2.5]

Which of the following statements is FALSE?

- (a) Because the WACC incorporates the tax savings from debt, we can compute the levered value of an investment, which is its value including the benefit of interest tax shields given the firm's leverage policy, by discounting its future free cash flow using the WACC.
- (b) The WACC incorporates the benefit of the interest tax shield by using the firm's before-tax cost of capital for debt.
- (c) When the market risk of the project is similar to the average market risk of the firm's investments, then its cost of capital is equivalent to the cost of capital for a portfolio of all of the firm's securities; that is, the project's cost of capital is equal to the firm's weighted average cost of capital (WACC).
- (d) A project's cost of capital depends on its risk.

**Exercise 2.** *Quick-Link* [2.5]

Quick-Link has debt outstanding whose market value is \$200 million, and equity outstanding with a market value of \$800 million. Quick-Link is in the 34% tax bracket, and its debt is considered risk free. Merrill Lynch has provided an equity beta of 1.50. Given a risk free rate of 3% and an expected market return of 12%, calculate the discount for a scale enhancing project in the hypothetical case that Quick-Link is all equity financed.

**Exercise 3.** *Sterling* [10]

The CFO of Sterling Chemical is interested in evaluating the cost of equity capital for his firm. However, Sterling uses very little debt in its capital structure (the firm's debt-to-equity capitalization ratio is only 20%), while larger chemical firms use substantially higher amounts of debt. The following table shows the levered equity betas, debt-to-equity ratios, and debt betas for three of the largest chemical firms:

Company Name	Levered Equity Betas	Debt/Equity Capitalization	Assumed Debt Betas
Eastman Chemical Co. (EMN)	1.7900	30.77%	0.30
Celanese Corp. (CE)	1.9800	23.55%	0.30
Dow Chemical Company (DOW)	1.7100	21.60%	0.30

The current tax rate is 38%.

1. Use the information given above to estimate the unlevered equity betas for each of the companies.
2. If Sterling's debt-to-equity capitalization ratio is 0.20 and its debt beta is 0.30, what is your estimate of the firm's levered equity beta?

**Exercise 4.** *S&S Soap Company* [25]

S&S Soap Company was formed in 2010 with the merger of the Sparkle Soap Company, headquartered in Los Angeles, California, producers of Bolt, the leading laundry detergent on the West Coast, and Shine Soap Company, headquartered in Boston, Massachusetts, producers of Fluffy, a major laundry detergent on the East Coast. As a result of the merger, S&S was producing and marketing two major product lines. Although these products were in direct competition, they were not without product differentiation: Bolt was a low-suds, concentrated powder, and Fluffy was a more traditional powder detergent. Each line brought with it considerable brand loyalty, and, by 2019, sales from the two detergent lines had increased tenfold from their 2010 levels with both products now being sold nationally.

In the face of increased competition and technological innovations, S&S spent \$6 million over the past five years developing and test marketing a new, highly concentrated liquid laundry detergent. S&S's new laundry detergent, which they called Blast, had many obvious advantages over the conventional powdered products. It was felt that with Blast the consumer would benefit in three major areas. Blast was so highly concentrated that only 2 ounces was needed to do an average load of laundry as compared with 8 to 12 ounces of powdered detergent. Moreover, being a liquid, it was possible to pour Blast directly on stains and hard-to-wash spots, eliminating the need for a pre-soak and giving it cleaning capabilities that powders could not possibly match. And, finally, it would be packaged in a lightweight, unbreakable plastic bottle with a sure-grip handle, making it much easier to use and more convenient to store than the bulky boxes of powdered detergents with which it would compete.

To produce the Blast detergent, S&S would need to purchase new specialized machinery and packing equipment at a cost of \$20 million. The estimated useful life of the new machinery and packaging equipment was 5 years, after which it would have no salvage value. For tax purposes, S&S would use straight-line depreciation, a depreciable life of 5 years, and a zero salvage value for the new machinery and packing equipment. The production of Blast would require S&S to increase its investment in working capital (i.e. current assets less current liabilities). The level of working capital necessary to support the Blast project is estimated to be 10 percent of annual gross sales. The production facilities needed to produce the Blast detergent at full capacity would be leased at a cost of \$2.5 million per year. These annual lease payments would be contractually fixed for the next 10 years.

The production of the Blast detergent creates a unique problem for S&S because of the interdependencies that exist between the firm's various product lines. Since Blast will compete directly against powdered detergents, sales of the firm's existing product lines, Bolt and Fluffy, may be eroded. However, because of stiff competition in the laundry products industry, S&S expects a similar product to Blast to be introduced by one of its competitors within two years. Also, as a matter of policy, S&S allocates a portion of company's general and administrative overhead costs to each product line. The allocation of overhead to the Blast project would be \$3 million per year, even though the Blast product line would create only \$2 million per year in incremental overhead expenses. Estimates of the after-tax profits for the Blast project are given in Table 1. The analysis is restricted to 10 years, because the management of S&S expect future product developments to improve the gentleness of liquid detergents, making Blast obsolete after 10 years.

S&S management feels that, given the risks involved, a 15 percent nominal discount rate should be used to evaluate the Blast project.

1. Should S&S go ahead with the Blast project?
2. Are there any strategic aspects of the Blast project that are not captured by the NPV

**Table 1** S&S Soap Company

Net profit estimates for the Blast Soap Project. (All figures in millions.)

	2020	2021	2022	2023	2024	2025-29
Units sold	7.5	12.5	17.5	22.5	27.5	30
Sales	15	25	35	45	55	60
Cost of goods sold (1)	10.5	17.5	24.5	31.5	38.5	42
Depreciation (2)	4	4	4	4	4	
Lease payments	2.5	2.5	2.5	2.5	2.5	2.5
Overhead expense (3)	3	3	3	3	3	3
Operating profit	-5	-2	1	4	7	12.5
Taxes (4)	2	0.8	-0.4	-1.6	-2.8	-5
After tax profit	-3	-1.2	0.6	2.4	4.2	7.5
Profit erosion (5)	-0.5	-1	-2	-2	-2	-2
Net profit	-3.5	-2.2	-1.4	0.4	2.2	5.5

(1) Cost of goods sold are assumed to be a constant 70% of sales

(2) Depreciation is computed using the straight-line method, a 5-year depreciable life, and a zero salvage value. The cost of the new machinery and equipment is \$20 million at the end of 2019.

(3) Overhead expenses include \$2 million in incremental overhead and \$1 million in allocated general and administrative overhead.

(4) S&S has a marginal corporate tax rate of 40%.

(5) Profit erosion is the estimated lost after-tax profit due to the erosion of Bolt and Fluffy sales.

calculation, but deserve serious consideration?

### Exercise 5. *Rose Industries* [10]

Suppose that Rose Industries is considering the acquisition of another firm in its industry for \$100 million. The acquisition is expected to increase Rose's free cash flow by \$5 million the first year, and this contribution is expected to grow at a rate of 3% every year thereafter. Rose currently maintains a debt to equity ratio of 1, its corporate tax rate is 21%, its cost of debt  $r_D$  is 6%, and its cost of equity  $r_E$  is 10%. Rose Industries will maintain a constant debt-equity ratio for the acquisition.

1. What is Rose's unlevered cost of capital?
2. What is the unlevered value of Rose's acquisition?
3. Given that Rose issues new debt of \$50 million initially to fund the acquisition, find the present value of the interest tax shield for this acquisition.
4. What is the APV for the Rose acquisition?

### Exercise 6. *Carquest* [15]

The auto parts business has three large publicly held firms: O'Reilly Automotive Inc. (ORLY), Advance Auto Parts Inc. (AAP), and Auto Zone Inc. (AZO). In addition to these publicly held firms, Carquest is the largest privately held firm in the industry. Assume that in summer 2010, your investment banking firm is considering whether to approach the top management of O'Reilly with a proposal that they consider acquiring Carquest, which owns over 4,000 auto parts outlets in the United States. As a preliminary step in the evaluation of the possible acquisition,

you have assembled a team of analysts to prepare a preliminary analysis of acquisition price multiples that might be warranted based on current market conditions. The analyst team went to work immediately and compiled the following set of financial information and potential valuation ratios shown in Table 2

Financial Information (Millions)	O'Reilly	Advance	Auto Zone
Revenues	\$2,120.00	\$4,400.00	\$5,890.00
EBITDA	321.86	544.38	1,130.00
Net Income	171.62	240.16	562.44
Earnings per Share	1.507	2.183	7.301
Interest Bearing Debt	120.00	560.00	1,720.00
Common Equity	1,145.77	939.50	641.16
Total Assets	1,713.90	2,615.73	4,401.85
<b>Financial Ratios</b>			
Debt to Equity	0.105	0.596	2.683
Gross Margins	43.95%	47.25%	49.09%
Operating Margins	12.47%	9.42%	16.77%
Expected Growth in EPS (5 yrs)	18.50%	16.00%	13.00%
<b>Market Valuations (Millions)</b>			
Market Capitalization	\$ 3,240.00	\$ 3,040.00	\$ 6,290.00
Enterprise Value	3,360.00	3,600.00	8,010.00
<b>Valuation Ratios</b>			
Enterprise Value/EBITDA	10.44	6.61	7.09
P-E Ratio (Trailing)	19.42	13.30	11.56
P-E Ratio (Forward)	15.24	11.21	10.21
Beta	1.24	1.79	1.25

1. How would you use this information to evaluate a potential offer to acquire Carquest's equity?
2. What do you think is driving the rather dramatic differences in the valuation ratios of the three firms?

**Exercise 7.** *Gassled* [5]

In the discussion of the Gassled case, a distinction was made between acts of *omission* and acts of *commission*.

- Which party did we look at the actions of?
- Which of these two types actions was present in this case?
- What would have been the consequence of acts of the other type?

**Exercise 8.** *Siemens* [30]

A year after their successful IPO of Siemens spinoff *Healthineers*, Siemens went back to the capital markets with another spinoff, the Siemens oil and power division, which eventually started trading in late September 2020 under the name *Siemens Energy*. Enclosed with this exam is a number of quotes from newsmia articles about this spinoff.

1. Discuss the similarities and differences between the *Healthineers* and *Siemens Energy* listings, in particular discussing the *motivation* for the spinoffs and the *mechanics* of the transaction.