

Valuation: Final Exam

Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You are trying to value Cyclops Oil and have collected the following information:
 - In the most recent twelve months, the company reported an after-tax operating loss of \$52.5 million on revenues of \$2.1 billion. During those twelve months, oil prices averaged \$45/barrel.
 - The company has a book value of equity of \$1,800 million, book value of debt of \$1,000 million and a cash balance of \$800 million

The oil price has rebounded to \$70 a barrel and you have run regressions of Cyclop's revenues and operating margins against oil price/barrel and the results are below:

Cyclops Revenues (in millions) = $100 + 50.00 (\text{Oil Price}/\text{barrel})$

Cyclops After-tax Operating Margin (in decimals) = $-0.25 + 0.005 (\text{Oil Price}/\text{barrel})$

The cost of capital for the company is 10% in perpetuity.

- a. Assume that you want to be oil price neutral, i.e., value the company given the oil price today. If you expect the oil-price neutral earnings to grow 6% a year for the next three years, while maintaining this normalized return on capital, estimate the free cash flows to the firm for the next three years. (3 points)

- b. After year 3, the company expects the business to be in secular decline and operating earnings to decline 3% each year in perpetuity. If you assume that the company will be able to sustain its return on capital in perpetuity, estimate the terminal value (at the end of year 3). (1.5 points)
- c. Estimate the value per share today, if there are 100 million shares outstanding. (1.5 points)

2. You are trying to price a Crest Technologies, a start-up and have the following projections (in millions) for the next five years:

	1	2	3	4	5
Revenues	\$10.00	\$50.00	\$100.00	\$250.00	\$500.00
EBITDA	\$(25.00)	\$(40.00)	\$(50.00)	\$(20.00)	\$50.00
Tax Rate	0%	0%	0%	0%	30%
FCFF	\$(50.00)	\$(100.00)	\$(150.00)	\$(100.00)	\$(25.00)
Cost of capital	12%	12%	12%	12%	12%

You have run a regression of EV/EBITDA against tax rate and EBITDA margin (EBITDA/Sales) for more established firms in the business and have the following:

$$\text{EV/EBITDA} = 10.00 + 90.00 (\text{EBITDA Margin}) - 10.00 (\text{Tax Rate})$$

[All numbers in the regression are entered in decimals, i.e., 20% is 0.20]

- a. If the cost of capital is 12% and you have \$50 million of net debt outstanding today, estimate what you would pay for equity today, based upon your expected pricing in year 5 and incorporating the effect of cash flows for the next five years. (3 points)

- b. The negative cash flows that are forecast for the next five years are called “cash burn” and will require fresh capital to be raised. Assuming that the company plans to issue only equity to meet these needs, estimate how much of a discount you are already applying to your equity value (in part a) to reflect this dilution? (1.5 points)

- c. Now assume that there is a chance that capital markets will freeze up, making it impossible to raise capital and that the probabilities of that happening, by year, are below:

Year	1	2	3	4	5
Probability of capital freeze	15%	10%	10%	5%	5%

Estimate the value of equity with this probability considered, assuming that if capital is unavailable, the business will have to shut down and equity will be worth nothing. (1.5 points)

3. You are valuing Dalco Drugs, a pharmaceutical company with a large cosmetics business. Due to legal and political pressures, the company has had to show restraint in pricing in both divisions. The table below summarizes the key operating numbers for both divisions:

	Pharmaceuticals	Cosmetics
Revenues (in millions)	\$1,500	\$1,000
After-tax Operating Income next year (millions)	\$90	\$120
Invested Capital (millions)	\$900	\$ 1000
Beta	1.44	1.92
Cost of equity	11.64%	14.52%
Cost of capital	8.32%	9.76%

The net debt in Dalco is currently \$ 1.2 billion in market value terms. The risk free rate is 3% and the equity risk premium is 6%. The tax rate is 40%.

- a. Value the equity in the company today, with its operating mix intact, assuming that both divisions will grow 3% a year forever, while maintaining their current returns on invested capital. (3 points)

- b. Now assume that you plan to sell the pharmaceutical business for \$1.2 billion and use the proceeds to pay off all its debt. After the divestiture, the company will be able to raise cosmetics prices, thus increasing the after-tax operating margin to 15% for that business. Assuming that the growth rate remains 3%, estimate the value of equity in the company after the sale. (3 points)

4. You have been asked to estimate the value of synergy in the merger of DirectCom, a movie streaming firm, and Movie Magic, an entertainment company and have been provided with the following information on the two companies:

	DirectCom	Movie Magic
Revenues (millions)	\$750.00	\$250.00
After-tax Operating Income next year (millions)	\$60.00	\$30.00
Cost of capital	9.00%	8.00%
Return on capital	7.50%	6.00%
Net Debt (millions)	\$100.00	\$50.00
Number of shares (millions)	125	50

Both firms are in stable growth, growing 3% a year in perpetuity.

- a. Estimate the value per share of DirectCom, prior to the merger. (1 point)

- b. Estimate the value per share of Movie Magic, prior to the merger. (1 point)

- c. Now assume that combining the two firms will be able to cut annual operating expenses by \$18 million (on an after-tax basis), though it will take three years for these costs savings to show up. Estimate the value of synergy in this merger. (3 points)

- d. Assume that both companies were fairly priced before the acquisition and that DirectCom pays a 40% premium over market price to buy Movie Magic. Estimate the value per share for DirectCom after the acquisition. (1 point)

5. You are a private equity investor considering making a large infrastructure investment that will be done in two phases, with you preserving the option to back out of the investment after the first phase, if you so decide.
- a. The initial cost for phase 1 is \$1.5 billion and you expect to generate \$250 million in after-tax cash flows next year, growing at 2% for the next four years. Phase 1 ends after year 5.
 - b. If you choose to go on to phase 2, you have to invest an additional \$ 4.5 billion into the project at the end of year 5, bringing your total investment to \$6 billion, and you will be entitled to the cash flow from the project in perpetuity. Based on what you know now, you expect your year 5 cash flow to grow at 2% a year forever.

The risk free rate is 2% (for all maturities), the cost of capital is 10% for both phases and the standard deviation in project cash flow (and in value) is 20%.

- a. What is the net present value of the first phase of the investment? (2 points)

- b. What are the parameters that you would use to value the option to invest in the second phase? (Estimate each input into the option pricing model) (2 points, with ½ point off for each wrong input)

Value of underlying asset (S) =

Strike Price (K) =

r =

Life of the option (t) =

Standard deviation (σ) =

Cost of delay (y), if any =

- c. Value the option and evaluate whether you would make this investment. (2 points)

Cumulative Normal Distribution table

d	$N(d)$	d	$N(d)$	d	$N(d)$
-3.00	0.0013	-1.00	0.1587	1.05	0.8531
-2.95	0.0016	-0.95	0.1711	1.10	0.8643
-2.90	0.0019	-0.90	0.1841	1.15	0.8749
-2.85	0.0022	-0.85	0.1977	1.20	0.8849
-2.80	0.0026	-0.80	0.2119	1.25	0.8944
-2.75	0.0030	-0.75	0.2266	1.30	0.9032
-2.70	0.0035	-0.70	0.2420	1.35	0.9115
-2.65	0.0040	-0.65	0.2578	1.40	0.9192
-2.60	0.0047	-0.60	0.2743	1.45	0.9265
-2.55	0.0054	-0.55	0.2912	1.50	0.9332
-2.50	0.0062	-0.50	0.3085	1.55	0.9394
-2.45	0.0071	-0.45	0.3264	1.60	0.9452
-2.40	0.0082	-0.40	0.3446	1.65	0.9505
-2.35	0.0094	-0.35	0.3632	1.70	0.9554
-2.30	0.0107	-0.30	0.3821	1.75	0.9599
-2.25	0.0122	-0.25	0.4013	1.80	0.9641
-2.20	0.0139	-0.20	0.4207	1.85	0.9678
-2.15	0.0158	-0.15	0.4404	1.90	0.9713
-2.10	0.0179	-0.10	0.4602	1.95	0.9744
-2.05	0.0202	-0.05	0.4801	2.00	0.9772
-2.00	0.0228	0.00	0.5000	2.05	0.9798
-1.95	0.0256	0.05	0.5199	2.10	0.9821
-1.90	0.0287	0.10	0.5398	2.15	0.9842
-1.85	0.0322	0.15	0.5596	2.20	0.9861
-1.80	0.0359	0.20	0.5793	2.25	0.9878
-1.75	0.0401	0.25	0.5987	2.30	0.9893
-1.70	0.0446	0.30	0.6179	2.35	0.9906
-1.65	0.0495	0.35	0.6368	2.40	0.9918
-1.60	0.0548	0.40	0.6554	2.45	0.9929
-1.55	0.0606	0.45	0.6736	2.50	0.9938
-1.50	0.0668	0.50	0.6915	2.55	0.9946
-1.45	0.0735	0.55	0.7088	2.60	0.9953
-1.40	0.0808	0.60	0.7257	2.65	0.9960
-1.35	0.0885	0.65	0.7422	2.70	0.9965
-1.30	0.0968	0.70	0.7580	2.75	0.9970
-1.25	0.1056	0.75	0.7734	2.80	0.9974
-1.20	0.1151	0.80	0.7881	2.85	0.9978
-1.15	0.1251	0.85	0.8023	2.90	0.9981
-1.10	0.1357	0.90	0.8159	2.95	0.9984
-1.05	0.1469	0.95	0.8289	3.00	0.9987
-1.00	0.1587	1.00	0.8413		