POLITECNICO
DI MILANO

Cost of capital

Exercises with solutions

Accounting, Finance & Control

2018-2019

Table 1 – to be used for the following exercises

10-Year Government Bond Yields

AMERICAS		Yield
United States	**More US Treasuries**	2.06%
Canada		1.91%
Mexico (USD)		3.19%
Brazil (USD)		3.90%

EUROPE		Yield
Germany		0.78%
Britain	**More UK Gilts**	1.99%
France		1.16%
Italy		2.45%
Spain		2.14%

Source: bloomberg.com

1 Cost of capital

You are a financial analyst and your clients (who are financial investors) asked you to estimate the cost of capital (WACC) of Andromeda, a manufacturing company producing and exporting its products only in Europe.
Reading the company reports you get to know that Andromeda has 700 mln € financial debts bearing an annual interest rate of 7.5%. The market capitalization (i.e. equity) of the company is 350 mln € and the corporate tax rate is 35%. Luckily you also have a trustworthy estimation of the equity beta (i.e. beta levered) equal to 1.2.
You are committed to do a reliable estimation of the cost of capital of Andromeda and, therefore, you read the latest financial market data on government bonds (10Y Government Bonds) in Table 1. Finally, you find estimations about the expected returns on the main market indexes. In particular, the expected return on Euro Stoxx is 15% while FTSE MIB is forecasted at 20%.

- Compute Andromeda's WACC

1.1 Solution

$$k_e = 0.78\% + 1.2 \times (15\% - 0.78\%) = 17.84\%$$

$$\text{WACC} = \frac{700}{(700+350)} \times 7.5\% \times (1 - 35\%) + \frac{350}{(700+350)} \times 17.84\% = 9.20\%$$

2 Cost of capital

Your clients are satisfied with your estimations of Andromeda but now they ask you to estimate the cost of capital of another manufacturing company, Carlton. Carlton has financial debts valued 880 mln € and a financial leverage (D/E) equal to 2.2. The annual interest rate on debt is 8% and tax rate is 36%.

Unluckily, Carlton is not listed and, therefore, you have to estimate Beta by yourself. As such, you decide to find out some comparable companies.
Carlton is comparable to Andromeda since they have similar capital structures, lines of business and they both produce and export only in Europe. You also find another comparable company (Belisarius). Information are reported in the following table:

Comparable companies	**Financial Debt Mln €**	**Market Capitalization Mln €**	**β_L**	**Corporate Tax rate**
Andromeda (A)	700	350	1.20	35%
Belisarius (B)	850	490	1.30	35%

The Euro Stoxx return is 15% while the S&P500 is forecasted at 14%.

- Which is your estimation of Carlton's Ke? Is it an aggressive or defensive stock? Why?
- Which is the WACC of Carlton?

2.1 Solution

Find $\beta_{U\,(AVG.)}$ from comparable companies:

Comparable companies	**Financial Debt Mln €**	**Market Capitalization Mln €**	**β_L**	**Corporate Tax rate**	**β_U**
Andromeda(A)	700	350	1.20	35%	0.52
Belisarius (B)	850	490	1.30	35%	0.61
				$\beta_{U\,(AVG.)}$	0.57

$\beta_L(\text{CARLTON}) = 0.57 \times [1 + (1 - 36\%) \times 2.2] = 1.36$ (Aggressive stock, $\beta_L > 1$)

$K_e(\text{CARLTON}) = 0.78\% + 1.36 \times (15\% - 0.78\%) = 20.17\%$

$$\text{WACC(CARLTON)} = \frac{880}{(880+400)} \times 8\% \times (1 - 36\%) + \frac{400}{(880+400)} \times 20.17\% = 9.82\%$$

3 Cost of capital

After having completed the previous analyses successfully, Carlton's managers give you a task. In particular, they have to decide if issuing additional 40 mln € of new debt. The overall average cost of debt would raise at 8.5%. Everything else been equal (i.e. the total amount of equity remains constant as well as the tax rate), which are the changes in the cost of capital of the firm?

3.1 Solution

$$D'(CARLTON) = 920;\ E(CARLTON) = 400;\left(\frac{D}{E}\right)'(CARLTON) = 2.3;\ tc(CARLTON) = 0.36$$

$$\beta'_L(CARLTON) = 0.57 \times [1 + (1 - 36\%) \times 2.3] = 1.40$$

$$K'_e(CARLTON) = 0.78\% + 1.40 \times (15\% - 0.78\%) = 20.69\%$$

$$WACC'(CARLTON) = 10.06\%$$

4 Cost of capital

PigmaCo, a US-based company, has to estimate its equity cost of capital and WACC. The company is not listed but some comparable companies have been identified. You have also available the Balance Sheet of PigmaCo whose main data are the following: Equity 650 mln$, Financial Debt 350 mln$ bearing an interest of 4%, tax rate 35%. Each of the 20 mln shares of the company has a price of 32.5$. As for market indexes, the FTSE MIB is forecasted at 20% while S&P500 is 14%. (For risk free rates refer to Table 1).

Comparable companies	Financial Debt (Mln $)	Market Capitalization (Mln $)	β_L	Corporate Tax rate
Comp 1	400	230	1,20	35%
Comp 2	700	400	1,10	32%
Comp 3	600	350	1,15	35%
Comp 4	500	290	1,00	32%

Provide an estimation of its cost of equity and WACC.

4.1 Solution

First, it is necessary to estimate Betas of PigmaCo though comparable companies:

Comparable companies	Financial Debt Mln $	Market Capitalization Mln $	β_L	Corporate Tax rate	D/E	β_U
Comp 1	400	230	1.20	35%	1.74	0.56
Comp 2	700	400	1.10	32%	1.75	0.50
Comp 3	600	350	1.15	35%	1.71	0.54
Comp 4	500	290	1	32%	1.72	0.46
PigmaCo	350	650	0,70	35%	0,54	0,52 (avg)

Second, it is necessary to select the adequate proxies to estimate the cost of equity capital remembering that PigmaCo is a US-based company.

r_f=2.06%

r_m=14%

Finally, the equity cost of capital of the company is:

$K_e = 2.06\% + 0.70 \times (14\% - 2.06\%) = 10.4\%$

And its WACC is:

$$\text{WACC} = \frac{350}{1000} \times 4\% \times (1 - 35\%) + \frac{650}{1000} \times 10.4\% = 7.67\%$$

5 Cost of capital

You are asked to evaluate the cost of capital of Shelt whose main businesses are related to the production and sale of steel in Europe. However, this company is not listed. Furthermore, it is not possible to find any comparable company. Nonetheless, you have Beta industry that can be useful for your estimations.

Table 2

Industry	Number of firms	Avg. Levered Beta	Market D/E ratio	Tax rate	Unlevered Beta
Oil-Gas Distribution	12	1,02	53,4%	18,1%	0,71
Restaurant	65	1,16	13,2%	19,2%	1,05
Drug	223	1,08	14,8%	5,1%	0,94
Biotechnology	214	1,23	15,9%	3,0%	1,07
Internet	194	1,17	2,3%	8,4%	1,15
Entertainment	76	1,60	33,9%	12,6%	1,24
Bank	416	0,77	128,2%	16,4%	0,37
Steel	33	1,65	56,2%	24,2%	1,16
Automotive	12	1,73	103,4%	16,2%	0,93
Natural gas utility	27	0,46	66,2%	28,8%	0,31
Water utility	11	0,49	73,2%	31,5%	0,33

Shelt has a debt of 520 mln € bearing an interest of 5%, the market capitalization is 260 mln € and the corporate tax rate is 30%. The European market the most appropriate to evaluate the cost of capital of Shelt and the index has a return of 6.8%. Referring to the data provided, and risk free rates in Table 1, estimate the company equity cost of capital and WACC.

5.1 Solution

The unlevered beta of the company is 1.16 (industry unlevered beta).

$$\beta_L(\text{SHELT}) = 1.16 \times \left[1 + (1 - 30\%) \times \frac{520}{260}\right] = 2.784$$

$$K_e(\text{SHELT}) = 0.78\% + 2.784 \times (6.8\% - 0.78\%) = 17.540\%$$

$$\text{WACC (SHELT)} = \frac{520}{780} \times 5\% \times (1 - 30\%) + \frac{260}{780} \times 17.540\% = 8.18\%$$