



**POLITECNICO
DI MILANO**

Company valuation (DCF)

Exercises with solutions

Accounting, Finance & Control

1 Terminal value

The company Alabama has an estimation of its FCFF and FCFE for 2014. In particular, its FCFF for 2014 will be 20 while its FCFE for 2014 will be 15. The company is now interested in computing also its Terminal Value in different scenarios:

1. The FCFF will remain constant over years and equal to the one of 2014.
2. The FCFF will grow at a rate of 2% for each year, starting from 2015.
3. The FCFF will remain constant for next 10 years. After this period, the FCFF will be null.
4. The FCFF will grow at a rate of 2% for each one of next 10 years. After this period, the FCFF will be null.
5. The FCFE will remain constant over years and equal to the one of 2014.
6. The FCFE will grow at a rate of 3% for each year, starting from 2015.
7. The FCFE will remain constant for next 7 years. After this period, the FCFE will be null.
8. The FCFE will grow at a rate of 3% for each one of next 7 years. After this period, the FCFE will be null.

Assuming an equity cost of capital of 10% and a WACC of 8%, estimate the TV of the company in each of the previous situations.

1.1 Solution

1. $TV = \frac{FCFF}{WACC} = \frac{20}{8\%} = 250$
2. $TV = \frac{FCFF \times (1+g)}{WACC-g} = \frac{20 \times 1.02}{8\%-2\%} = 340$
3. $TV = \frac{FCFF}{WACC} \times \left(1 - \frac{1}{(1+WACC)^t}\right) = \frac{20}{8\%} \times \left(1 - \frac{1}{1.08^{10}}\right) = 134.2$
4. $TV = \frac{FCFF \times (1+g)}{WACC-g} \times \left(1 - \frac{(1+g)^t}{(1+WACC)^t}\right) = \frac{20 \times 1.02}{8\%-2\%} \times \left(1 - \frac{1.02^{10}}{1.08^{10}}\right) = 148.0$
5. $TV = \frac{FCFE}{k_e} = \frac{15}{10\%} = 150$
6. $TV = \frac{FCFE \times (1+g)}{k_e-g} = \frac{15 \times 1.03}{10\%-3\%} = 220.7$
7. $TV = \frac{FCFE}{k_e} \times \left(1 - \frac{1}{(1+k_e)^t}\right) = \frac{15}{10\%} \times \left(1 - \frac{1}{1.10^7}\right) = 73.0$
8. $TV = \frac{FCFE \times (1+g)}{k_e-g} \times \left(1 - \frac{(1+g)^t}{(1+k_e)^t}\right) = \frac{15 \times 1.03}{10\%-3\%} \times \left(1 - \frac{1.03^7}{1.10^7}\right) = 81.4$

2 Company valuation

Table 1 shows the estimated FCFF and FCFE of Gamma in years n+1 and n+2. In years n+1 and n+2 the estimated WACC of Gamma is 10%. Unfortunately, you are not able to make analytical estimations beyond year n+2. As such, you forecast two scenarios.

In the first case, you assume that FCFF will remain constant after year n+2. In the second scenario you assume that FCFF will grow by 2% starting from year n+3. In both cases the WACC will be 10% for the years following n+2.

Compute the EV in the two scenarios.

Table 1

	n+1	n+2
Revenues	945	992,3
EBITDA	283,5	297,7
- D&A	-25	-25
EBIT	258,5	272,7
- Taxes	-77,6	-81,8
+ D&A	25,0	25,0
- ΔNWC	-11,0	-16,0
- ΔCAPEX	-100,0	0,0
FCFF	95,0	199,9
+ New debt	50,0	0,0
-Debt repayment	-20,0	-20,0
- Net fin. expenses	-3,5	-3,5
- Dividends	0	-5
FCFE	121,5	171,4

2.1 Solution

1. $g=0$

$$TV = \frac{FCFF}{WACC} = \frac{199,9}{10\%} = 1998,7$$

$$EV = \frac{95}{1.1^1} + \frac{199,9}{1.1^2} + \frac{1998,7}{1.1^2} = 1903,3$$

2. $g=0$

$$TV = \frac{FCFF \times (1 + g)}{WACC - g} = \frac{199,9 \times 1.02}{8\%} = 2548,4$$

$$EV = \frac{95}{1.1^1} + \frac{199,9}{1.1^2} + \frac{2548,4}{1.1^2} = 2357,6$$

3 Company valuation

As a consultant, you have been asked to evaluate the Equity Value of the company Sama. This company operates mainly in Europe in the beverage industry.

You have just estimated the company P&L for next 3 years (Table 1). Furthermore, you know that the company will do capital expenditures in in 2015 (25 mln euro), 2016 (33 mln euro) and 2017 (36 mln euro). Moreover, you expect that there will be changes in the financial structure, as reported in Table 2. Finally, you have prospects of the net working capital for the next 3 years (Table 3). After the period of analytic forecast, the FCFE are supposed to increase infinitely at a rate of 3%.

Table 1: Forecasted P&L

P&L (data in mln euros)	2014	ESTIMATIONS		
		2015	2016	2017
Revenue	235,0	210,0	230,0	240,0
Operating cost (OpEx)	-102,0	-95,0	-125,0	-104,0
EBITDA	133,0	115,0	105,0	136,0
D&A	-21,0	-23,0	-29,0	-31,0
EBIT	112,0	92,0	76,0	105,0
Financial revenues/expenses	-10,0	9,0	-10,0	-12,0
EBT	102,0	101,0	66,0	93,0
Income tax expenses	-35,7	-35,4	-23,1	-32,6
Profit for the year	66,3	65,7	42,9	60,5

Table 2: Forecasted Financial Structure

Balance Sheet (data in mln euros)	2014	ESTIMATIONS		
		2015	2016	2017
Debt	112	102	110	121
Shareholders Equity	54	62	65	61
Total equity and liabilities	166	164	175	182

No changes in share capital

Table 3: Forecasted Net Working Capital

(data in mln euros)	2014	ESTIMATIONS		
		2015	2016	2017
Accounts Receivable	64	64	64	64
Inventories	33	35	40	44
Accounts Payable	35	41	39	41

In order to estimate the Equity Value, you need to estimate the cost of equity. Sama is not listed but you have some data about comparable companies (Table4), the main market indexes and the yields on 10Y Government Bonds (Table5). After the period of analytic forecast, the corporate tax rate and the cost of equity are supposed to remain constant and equal to those of 2017.

Table 4: Comparable Companies

Assumption: The values of the comparable companies are assumed to remain unchanged over years (so as their Beta Unlevered)

Comparable Companies	E	D	Corporate tax	Beta L
1	100,0	180,0	35%	0,90
2	60,0	120,0	38%	1,00
3	85,0	161,5	38%	1,15
4	90,0	148,5	35%	0,85

Table 5: Market indexes and 10-year government bond yields

Assumption: The value of the selected r_f and r_m are assumed to remain unchanged over years

Market index	Yield
Eurostoxx	15%
FTSE MIB	13%
FTSE 100	17%
10-year Government Bonds	Yield
Germany	0,84%
Britain	2,23%
Italy	2,39%
Switzerland	0,45%
United States	2,39%
Canada	2,03%

Now you should have all the data to estimate the Equity value of Sama.

3.1 Solution

1. Estimation of FCFF and FCFE

	2015	2016	2017
EBIT	92,0	76,0	105,0
- TAXES (corporate tax: TAXES/EBT=35%)	-32,2	-26,6	-36,8
+D&A	23,0	29,0	31,0
- DELTA NWC	4,0	-7,0	-2,0
-CAPEX	-25,0	-33,0	-36,0
FCFF	61,8	38,4	61,3
NET FIN EXP./REV.	5,9	-6,5	-7,8
NET DEBT	-10,0	8,0	11,0
FCFE	57,7	39,9	64,5

2. Estimation of Ke

- The adequate risk free rate is 0,84% while the adequate market return is 15%. Given the assumption under Table 5, the values of r_f and r_m will remain constant over years.
- The $\text{Beta}_{U, \text{average}}$ is estimated through comparable companies. Given the assumption under Table 4, the Beta_U (and the $\text{Beta}_{U, \text{average}}$) will remain constant over years.

	E	D	Corporate tax	Beta L	D/E	Beta U
1	100,0	180,0	35%	0,90	1,8	0,41
2	60,0	120,0	38%	1,00	2	0,45
3	85,0	161,5	38%	1,15	1,9	0,53
4	90,0	148,5	35%	0,85	1,65	0,41
						0,45 Beta U, avg

It is now possible to estimate the K_e through the CAPM. Note that the Beta_L of Sama will change in the period of analytic forecast since the financial structure is changing. After that period, the K_e will remain at 15,4% (since in the main text it is assumed that it will not change after the analytic period of forecast). The corporate tax rate is also constant.

	2015	2016	2017
r_f	0,84%	0,84%	0,84%
r_m	15,0%	15,0%	15,0%
D/E (Sama)	1,65	1,69	1,98
tax rate (Sama)	35%	35%	35%
BL (Sama)	0,93	0,94	1,03
K_e	14,0%	14,2%	15,4%

3. Estimation of Equity Value

$$TV = \frac{FCFE_T \times (1 + g)}{k_{e,T} - g} = \frac{64,5 \times 1,03}{15,4\% - 3\%} = 534,4$$

$$E = \frac{57,7}{1,14^1} + \frac{39,9}{1,142^2} + \frac{64,5}{1,154^3} + \frac{534,4}{1,154^3} = 470,6$$

4 Company valuation

Green is a listed company operating in the energy sector, mainly in Spain. The following tables report the current company BS and P&L and forecasted numbers for the next two years (“n+1” and “n+2”).

P&L (data in mln euro)	n (base year)	n+1	n+2
Revenue	310.0	325.0	333.0
Operating cost (OpEx)	-210.0	-230.5	-225.5
EBITDA	100.0	94.5	107.5
D&A	-10.5	-11.0	-12.5
EBIT	89.5	83.5	95.0
Financial expenses	-4.9	-4.55	-4.2
EBT	84.6	78.95	90.8
Income tax expenses	-29.61	-27.63	-31.78
Profit for the year	54.99	51.32	59.02

BS (data in mln euro)	n (base year)	n+1	n+2
Inventories	12.5	11.5	13.3
Account receivables	17.2	16.8	14.9
Fixed Assets	121.4	131.5	136.7
Total assets	151.1	159.8	164.9
Debt	70.0	65.0	60.0
Shareholders Equity	68.7	81.6	91.8 <i>no equity increase</i>
Accounts Payables	12.4	13.2	13.1
Total equity and liabilities	151.1	159.8	164.9

The CFO has estimated the beta of the company by regressing the stock returns against the market index returns. The resulting beta was 1.3. Nevertheless, the CFO of the company would like to check this number. He decides to take the comparables of the company and analyse them. The following table summarizes his main findings:

Company	Listing	Beta	Debt	Assets	Kd	Tax rate
A	Listed	1.2	20	50	6.5%	30%
B	Not listed	-	23	50	5.5%	34%
C	Listed	1.4	35	81	4.6%	35%
D	Listed	1.3	25	48	3.2%	37%
E	Listed	1.5	45	87	7.4%	39%

In a relevant financial newspaper, one can find the following data:

Dow Jones	5.33%
S&P 500	9.34%
FTSE 100	8.74%
CAC	6.74%
DAX	7.65%
IBEX	8.10%
FTSE MIB	5.25%

US Government bond	1.79%
Italian Government bond	2.50%
French Government bond	1.87%
German Government bond	0.98%
Spanish Government bond	3.12%
UK Government bond	0.65%

Questions

1. Estimation of the cost of equity:
 - a. If possible, compute the cost of equity in different years using the beta of the company as estimated through the regression. Assume that this beta will not change over time. Furthermore, assume that the market parameters (risk free and market return) remain constant.
 - b. If possible, compute the cost of equity in different years using the “control” betas as estimated through comparables. Assume that the average unlevered beta not change over time as well as the market parameters.
2. If possible, compute the WACC in different years using the K_e estimated in **point 1.a**.
3. If possible, provide an estimation of company FCFF for the following years.
4. If possible, estimate the asset-side TV of the company under the assumption of a constant growth of 3% for the years following $n+2$. Assume the WACC will remain constant in the following years and equal to the one of year $n+2$.
5. If possible, provide an estimation of company Enterprise Value in year n .

4.1 Solution

1. Estimation of the cost of equity:

- a. If possible, compute the cost of equity in different years using the beta of the company as estimated through the regression. Assume that this beta will not change over time. Furthermore, assume that the market parameters (risk free and market return) remain constant.

$$\beta_L = 1.3$$

$$r_f = 0.98\%$$

$$r_m = 8.10\%$$

$$K_e = r_f + \beta_L (r_m - r_f) = 10.24\%$$

(K_e is the same in all years since parameters are assumed to be constant)

- b. If possible, compute the cost of equity in different years using the “control” betas as estimated through comparables. Assume that the average unlevered beta not change over time as well as the market parameters.

Company	β_U
A	0.818
B	-
C	0.937
D	0.772
E	0.907

$$\beta_U (\text{AVG}) = \mathbf{0.858}$$

	n	n+1	n+2
β_L	1.43	1.30	1.22
K_e	11.14%	10.26%	9.69%

(β_L changes because the capital structure changes over time)

2. If possible, compute the WACC in different years using the K_e estimated in **point 1.a.**

	n	n+1	n+2
WACC	7.37%	7.71%	7.99%

3. If possible, provide an estimation of company FCFF for the following years.

	n+1	n+2
EBIT	83,50	95.00
- TAXES	-29.23	-33.25
+ D&A	11.00	12.50
- CAPEX	-21.10	-17.70
- DELTA NWC	2.20	0.00
FCFF	46.38	56.55

4. If possible, estimate the asset-side TV of the company under the assumption of a constant growth of 3% for the years following n+2. Assume the WACC will remain constant in the following years and equal to the one of year n+2.

Perpetuity with growth

$$TV = \frac{56.55(1+3\%)}{(7.99\%-3\%)} = 1167.6$$

5. If possible, provide an estimation of company Enterprise Value in year n.

$$EV = \frac{46.38}{(1+7.71\%)^1} + \frac{56.55}{(1+7.99\%)^2} + \frac{1167.6}{(1+7.99\%)^2} = 1092.79$$

5 Company valuation

Alpha Services is a non listed financial company operating in Europe. In order to estimate the cost of capital of the company, the CFO has found three listed comparable companies (next table) whose beta has been estimated through a regression. All information about comparables is assumed to remain constant over time. The CFO assumes that the risk free rate is 1% and the market premium is 8% (all parameters constant over time).

Comparable companies:

	Assets	Debt	Accounts payable	Beta	Tax rate	Kd
A	325	200	5	1.30	40%	5.70%
B	790	530	10	1.25	30%	7.00%
C	730	540	10	1.35	35%	7.40%

Scenario 1

The CFO of the company has made some prospects for year n+1 (data are provided in the following tables). The outstanding debt has to be repaid in constant quota of 25 mln euro each year. Considering these prospects, the CFO of the company thinks that he will not be able to do investments in the following years. According to his estimations, both cash flows and cost of capital in an equity-side approach will remain constant forever following year n+1.

P&L (data in mln euro)	n (base year)	n+1
Revenue	550.00	540.00
Operating cost (OpEx)	-450.00	-475.00
EBITDA	100.00	65.00
D&A	-20.00	-30.00
EBIT	80.00	35.00
Financial expenses	-15.00	-13.50
EBT	65.00	21.50
Income tax expenses	-26.00	-8.60
Profit for the year	39.00	12.90

BS (data in mln euro)	n (base year)	n+1
Inventories	10.00	20.00
Account receivables	5.00	0.00
Fixed assets	390.00	360.00
<i>Total assets</i>	<i>405.00</i>	<i>380.00</i>

Shareholders equity	145.00	150.00	<i>No equity increase</i>
Debt	250.00	225.00	
Accounts Payables	10.00	5.00	
<i>Total liabilities</i>	<i>405.00</i>	<i>380.00</i>	

Questions

1. In this scenario, estimate the cost of capital of Alpha in year $n+1$ according to the equity side logic.
2. In this scenario, estimate the flows of Alpha according to the equity side logic.
3. In this scenario, estimate the Equity Value of Alpha.

Scenario 2

The CFO is not satisfied with the prospects of scenario 1. As such, he decides to finance additional investments issuing a new bank loan of 50 mln euros in year $n+1$. This additional loan will have the same interest rate as the other debts of the company and it will be repaid in constant quota of 10 mln euro each year starting from $n+1$. With this additional financing the CFO expects to do additional investments. As such, fixed assets will grow by 30 mln euro if compared to the value of fixed assets of year $n+1$ in scenario 1. These new fixed assets will be amortized in constant quota of 5 mln euro each year starting from $n+2$.

In this scenario, cash flows in the equity-side logic will grow forever at a constant rate of 4% following year $n+1$. Nonetheless, he assumes that the tax rate and the cost of capital in equity-side logic will remain constant forever after $n+1$.

BS (data in mln euro)	n (base year)	n+1	
Inventories	10.00	20.00	
Account receivables	5.00	10.00	
Fixed assets	390.00	390.00	
<i>Total assets</i>	<i>405.00</i>	<i>420.00</i>	
Shareholders equity	145.00	150.00	<i>No equity increase</i>
Debt	250.00	265.00	
Accounts Payables	10.00	5.00	
<i>Total liabilities</i>	<i>405.00</i>	<i>420.00</i>	

Questions

4. In this scenario, estimate the cost of capital of Alpha in year $n+1$ according to the equity side logic.
5. In this scenario, estimate the flows of Alpha according to the equity side logic.
6. In this scenario, estimate the Equity Value of Alpha.
7. Considering the Equity Value in the two scenarios, would you suggest the manager to raise additional debt in compliance with scenario 2?
8. Which of the two strategies is more convenient in terms of cost of capital in year $n+1$ (considering both equity and asset side logics)?

5.1 Solution

1. In this scenario, estimate the cost of capital of Alpha in year n+1 according to the equity side logic.

Company	β_U
A	0.650
B	0.503
C	0.458

$$\beta_U (\text{AVG}) = \mathbf{0.537}$$

NB: for the computation of D/E of comparables, D includes only the debt bearing an interest (no accounts payable). Equity is computed as Assets- Debt-Accounts payable.

$$\beta_L = 1.02$$

$$K_e = 0.01 + 1.02 * 0.08 = 9.16\%$$

2. In this scenario, estimate the flows of Alpha according to the equity side logic.

	n+1
EBIT	35
- Taxes	-14
+ D&A	30
- Capex	0
- Delta NWC	-10
FCFF	41
- Net fin. exp.	-8.1
- Debt repay	-25
+ New debt	-
FCFE	7.9

3. In this scenario, estimate the Equity Value of Alpha.

TV: perpetuity with no growth

$$TV = \frac{7.9}{9.16\%} = 86.23$$

$$E = \frac{7.9}{(1+9.16\%)^1} + \frac{86.23}{(1+9.16\%)^1} = 86.23$$

4. In this scenario, estimate the cost of capital of Alpha in year n+1 according to the equity side logic.

$$\beta_L = 0.537 * (1 + (1-0.4) * 265/150) = 1.11$$

$$K_e = 9.85\%$$

5. In this scenario, estimate the flows of Alpha according to the equity side logic.

	n+1
EBIT	35
- Taxes	-14
+ D&A	30
- Capex	-30
- Delta NWC	-20
FCFF	1
- Net fin. exp.	-9.9
- Debt repay	-35
+ New debt	50
FCFE	6.1

6. In this scenario, estimate the Equity Value of Alpha.

TV: perpetuity with growth

$$TV = \frac{6.1(1+4\%)}{9.85\% - 4\%} = 108.46$$

$$E = \frac{6.1}{(1+9.85\%)^1} + \frac{108.46}{(1+9.85\%)^1} = 104.26$$

7. Considering the Equity Value in the two scenarios, would you suggest the manager to raise additional debt in compliance with scenario 2?

Yes, because raising new debt increases the equity value of the company. Indeed, additional debt allows new investments to be done.

8. Which of the two strategies is more convenient in terms of cost of capital in year n+1 (considering both equity and asset side logics)?

Ke (scen 1) = 9.16%
WACC (scen 1) = 5.82%

Ke (scen 2) = 9.85%
WACC (scen 2) = 5.86%

The cost of capital of the second scenario is higher and therefore less convenient (at least in year n+1). But, as seen before, the equity value is nonetheless higher.

6 Company valuation

Delta is an unlisted company and the CFO would like to estimate its value. Delta is based in France but it operates only in Germany. You have the following information:

- In 2014 the cost of equity capital computed through comparable companies methodology is 8.5%
- In 2014 the tax rate is 30%
- The company does not plan an increase of equity in the following years
- Cash flows and costs of capital will remain constant for 10 years after 2017
- The company will close in 2027

The following table reports some risk-free rates and market returns (constant over time)

Risk free rate		Market return	
France	1.0%	DAX (Germany)	5.0%
Germany	0.7%	CAC (France)	6.5%
Spain	1.3%	IBEX (Spain)	7.3%
UK	0.8%	FTSE 100 (Italy)	6.8%

The company had also prepared the forecasts for 2015, 2016 and 2017

P&L (data in mln euro)		2015	2016	2017
Revenue		115.2	117.8	118.9
Operating cost (OpEx)		-78.9	-79.2	-80.3
EBITDA		36.3	38.6	38.6
D&A		-12.0	-13.0	-14.0
EBIT		24.3	25.6	24.6
Financial expenses		-6.8	-8.0	-8.0
EBT		17.5	17.6	16.6
Income tax expenses		-3.5	-4.0	-4.0
Profit for the year		14.0	13.6	12.6
BS (data in mln euro)		2015	2016	2017
	2014 (base year)			
Inventories	11.1	23.7	24.8	25.3
Account receivables	10.0	12.8	10.7	11.7
Fixed Assets	380.1	398.8	432.2	432.9
Total assets	401.2	435.3	467.7	469.9
Debt	180.0	198.0	220.0	220.0
Shareholders Equity	200.0	211.9	224.5	228.8
Accounts Payables	21.2	25.4	23.2	21.1
Total equity and liabilities	401.2	435.3	467.7	469.9

1. Please compute the betas of the company in 2014 and discuss from a theoretical point of view the differences between levered and unlevered beta.

Suddenly the Government announces that the tax rate will increase at 40% in 2015 and it will then remain constant over time. The CFO of the company is even more interested in understanding the value of the company he is running. Please, support him with your analyses, considering this new scenario. Assume that only the Balance Sheet will remain unaffected by this decision i.e. assume the Balance Sheet data will remain constant by assumption. (Consider this scenario for all the following points).

2. Please compute the cost of capital according to the two logics from 2015 to 2017.
3. Please give an explanation from a theoretical point of view of which is the impact of an increase of the tax rate on the equity cost of capital.
4. Which are the company annual cash flows in the asset side logic?
5. Which are the company annual cash flows in the equity side logic?
6. Which is the Terminal Value in the asset side logic?
7. Which is the Terminal Value in the equity side logic?
8. If possible, estimate the value of the firm in the asset side logic at the beginning of 2015.

6.1 Solution

1. Please compute the betas of the company in 2014 and discuss from a theoretical point of view the differences between levered and unlevered beta.

$$K_e = 0.7\% + \beta_L (5.0\% - 0.7\%) = 8.5\%$$

$$\beta_L = 1.814$$

$$\beta_U = 1.113$$

(The theoretical explanation requires the description of the meaning of beta and of the determinants of each beta – capital structure or industry ... – see slides for details)

2. Please compute the cost of capital according to the two logics from 2015 to 2017.

	2014	2015	2016	2017	
Ke	8.50%	8.17%	8.30%	8.25%	
β_L	1.814	1.737	1.767	1.755	β_L changes because the capital structure changes.
β_U	1.113				
tax rate	30%	40%	40%	40%	
Kd		3.43%	3.64%	3.64%	Capital structure changes.
WACC		5.22%	5.27%	5.27%	

3. Please give an explanation from a theoretical point of view of which is the impact of an increase of the tax rate on the equity cost of capital.

(Ke decreases. Explanation of the effects of the tax shield that affects β_L)

4. Which are the company annual cash flows in the asset side logic?

	2015	2016	2017
EBIT	24.30	25.60	24.60
-TAXES	-9.72	-10.24	-9.84
+D&A	12.00	13.00	14.00
-CAPEX	-30.70	-46.40	-14.70
-DELTA NWC	-11.20	-1.20	-3.60
FCFF	-15.32	-19.24	10.46

5. Which are the company annual cash flows in the equity side logic?

	2015	2016	2017
FCFF	-15.32	-19.24	10.46
-NET FIN. EXP.	-4.08	-4.80	-4.80
DELTA DEBT	18.00	22.00	0.00
FCFE	-1.40	-2.04	5.66

6. Which is the Terminal Value in the asset side logic?

Annuity for 10 years, no growth

$$TV = \frac{10.46}{5.27\%} \left(1 - \frac{1}{(1+5.27\%)^{10}} \right) = 79.71$$

7. Which is the Terminal Value in the equity side logic?

Annuity for 10 years, no growth

$$TV = \frac{5.66}{8.25\%} \left(1 - \frac{1}{(1+8.25\%)^{10}} \right) = 37.56$$

8. If possible, estimate the value of the firm in the asset side logic at the beginning of 2015.

$$EV = \frac{-15.32}{(1+5.22\%)^1} + \frac{-19.24}{(1+5.27\%)^2} + \frac{10.46}{(1+5.27\%)^3} + \frac{79.71}{(1+5.27\%)^3} = 45.36$$

7 Company valuation

Summer is a non-listed company operating mainly in France. The CFO of the company has the following information:

- In 2014, the beta levered of the company estimated through comparable companies is 1.6;
- The tax rate is 30%, assumed to be constant over time;
- The CFO has also some data of market indexes that are assumed to be constant over time. Indexes are reported in **Table 1**;
- In 2014, the company has a debt of 150 mln euro to be repaid in constant quota of 50 mln euro each year starting from 2015 (see **Table 2**).

Table 1 – Indexes

Risk free rate	
France	2.0%
Germany	1.0%
UK	0.7%
Italy	3.0%
Market return	
DAX (Germany)	5.0%
CAC (France)	7.0%
IBEX (Spain)	7.3%
FTSE 100 (Italy)	6.8%

Table 2 – The debt scheduled repayment

	2014	2015	2016
<i>Debt</i>	150	100	50
<i>Repayment of debt</i>		-50	-50
<i>Financial expenses</i>		-10	-5

The CFO of the company wants to assess the equity value of the company under different scenarios.

Scenario 1

In the first scenario the CFO assumes that the company will not do new investments and will not issue new debts. He also assumes that the cash flows and cost of capital will remain constant after year 2016. His forecasts are reported in the next table:

Table 3 – Forecasts in Scenario 1

	2014	2015	2016
EBITDA	185,0	100,0	90,0
EBIT	155	70	60
Accounts receivable	30	25	30
Accounts payable	65	45	50
Inventories	20	40	55
Shareholder's equity	120	120	120

1. In this scenario, estimate the cost of capital in 2015 and 2016 according to the equity side logic.
2. In this scenario, estimate the annual cash flows till 2016 according to the equity side logic.
3. In this scenario, estimate the Equity Value.

Scenario 2

In the second scenario, the CFO assumes to buy new equipment in 2015. As such, he forecasts capital expenditures in 2015 for a total amount of 50 mln euro. The new equipment bears a D&A of 5 mln euro each year starting from 2015. In 2016 he does not forecast any capital expenditures.

Thanks to the new equipment bought in 2015, the CFO estimates that the EBIT will be 115 mln euro in 2015 and 2016. The net working capital and the shareholder's capital are assumed to be the same as in Scenario 1.

The CFO plans to issue an additional bank loan of 60 mln euro at the beginning of 2015 bearing an interest rate 1% higher than the other debts of the company. This additional loan will be repaid in a bullet solution in 2020.

Finally, the CFO assumes that the cost of capital will remain constant after year 2016 while cash flows will grow at a constant rate of 2% after year 2016.

4. In this scenario, estimate the cost of capital in 2015 and 2016 according to the equity side logic.
5. In this scenario, estimate the annual cash flows till 2016 of according to the equity side logic.
6. In this scenario, estimate the Equity Value.
7. All the rest being equal, which is the impact of a debt increase on the cost of equity capital? Which is the impact of an equity increase on the cost of equity capital? Explain why from a theoretical point of view.

7.1 Solution

1. In this scenario, estimate the cost of capital in 2015 and 2016 according to the equity side logic.

	2015	2016
β_L	1.35	1.10
tax	30%	30%
r_f	1%	1%
r_m	7%	7%
K_e	9.11%	7.61%

$$\beta_U = 1.6 / (1 + (1 - 30\%) * 150 / 120) = 0.85$$

BL changes over time since the capital structure changes

2. In this scenario, estimate the annual cash flows till 2016 according to the equity side logic.

	2015	2016
EBIT	70	60
-Taxes	-21	-18
+D&A	30	30
-Capex	0	0
-Delta NWC	-35	-15
FCFF	44	57
-Net fin. exp.	-7	-3.5
- Debt repay	-50	-50
+ New debt	0	0
FCFE	-13	3.5

3. In this scenario, estimate the Equity Value.

TV: Perpetuity with no growth

$$TV = \frac{3.5}{7.61\%} = 45.97$$

$$E = \frac{-13}{(1+9.11\%)^1} + \frac{3.5}{(1+7.61\%)^2} + \frac{45.97}{(1+7.61\%)^2} = 30.80$$

4. In this scenario, estimate the cost of capital in 2015 and 2016 according to the equity side logic.

	2015	2016
β_L	1.65	1.40
tax	30%	30%
r_f	1%	1%
r_m	7%	7%
K_e	10.90%	9.41%

$$\beta_U = 0.85$$

β_L changes over time. The debt in 2015 is 160 mln euro while in 2016 is 110 mln euro.

5. In this scenario, estimate the annual cash flows till 2016 according to the equity side logic.

	2015	2016
EBIT	115	115
-Taxes	-34,5	-34,5
+D&A	35	35
-Capex	-50	0
-Delta NWC	-35	-15
FCFF	30,5	100,5
-net fin. exp.	-11,62*	-8,12*
- Debt repay	-50	-50
+ New debt	60	0
FCFE	28,88	42,38

**The financial expenses are computed considering both the old and new debt. The new debt will not be rapid until 2020 and, therefore, interests of 11% (10%+1%) are computed on the total amount of the new debt (60 mln euro) in 2015 and 2016.*

	2015	2016
<i>Debt</i>	160	110
<i>Repayment of debt</i>	-50	-50
<i>Financial expenses</i>	-16,6= -10-60*11%	-11,6=-5-60*11%
<i>Net fin. expenses</i>	-11,62	-8,12

6. In this scenario, estimate the Equity Value.

TV: perpetuity with growth

$$TV = \frac{42.38 (1+2\%)}{9.41\% - 2\%} = 583.73$$

$$E = \frac{28.88}{(1+10.90\%)^1} + \frac{42.38}{(1+9.41\%)^2} + \frac{572.29}{(1+9.41\%)^2} = 549.13$$

7. All the rest being equal, which is the impact of a debt increase on the cost of equity capital? Which is the impact of an equity increase on the cost of equity capital? Explain why from a theoretical point of view. 2 POINTS

If D increases, Ke increases. If E increases, Ke decreases (all the rest being equal). Explain the impact considering the concepts of beta levered, volatility/risk.

8 Company valuation

Seven is an unlisted company operating in the automotive industry in France. The following tables report the forecasted BS and P&L for the next two years (“n+1” and “n+2”).

P&L (data in mln euro)	n+1	n+2
Revenue	154	170
Operating cost (OpEx)	-70	-76
EBITDA	84	94
D&A	-15	-20
EBIT	69	74
Financial expenses	-17.5	-16.0
EBT	51.5	58.0
Income tax expenses	-15.45	-17.4
Profit for the year	36.1	40.6

BS (data in mln euro)	n (base year)	n+1	n+2
Inventories	50	45	45
Account receivables	45	50	55
Fixed Assets	220	225	230
Total assets	315	320	330
Debt	180	175	160
Shareholders Equity	130	130	130
Accounts Payables	5	15	40
Total equity and liabilities	315	320	330

The following tables report some risk-free rates and market returns (constant over time).

Dow Jones	6.0%	US Government bond	0.90%
CAC (France)	7.0%	French Government bond	1.50%
DAX (Germany)	6.5%	German Government bond	1.00%
IBEX (Spain)	8.3%	Spanish Government bond	3.30%

To estimate the cost of capital the CFO of the company found some comparable companies as well as the beta industry (assume all the parameters in the next tables constant over time).

Comparables	Listing	Beta	Debt	Shareholders Equity	Accounts Payable	Kd	Tax rate
A	Listed	1.3	190	135	60	9.0%	30%
B	Not listed	-	210	162	50	8.5%	30%
C	Listed	1.5	200	144	55	8.0%	35%
D	Listed	1.4	100	77	30	9.5%	30%

Industry	Number of firms	Levered Beta	Unlevered Beta
Oil-Gas Distribution	12	1.02	0.71
Internet	194	1.17	1.15
Entertainment	76	1.6	1.24
Bank	416	0.77	0.37
Steel	33	1.65	1.16
Automotive	12	1.73	0.93

Questions

1. Please compute the cost of equity capital according to the beta industry.
2. Please compute the equity cost of capital using comparable companies.
3. Please compute the cost of capital in the asset side logic using the estimations done in question 2.
4. Please give an explanation from a theoretical point of view of the differences between beta estimated through comparable companies and beta industry. Explain which is the most accurate estimation and why.
5. Estimate the company annual cash flows in the asset and equity side logics.
6. Please estimate the value of the firm in the asset side logic assuming that the cash flows will grow at a constant rate of 1.5% following year $n+2$.

8.1 Solution

1. Please compute the cost of equity capital according to the beta industry.

	n+1	n+2
β_U - industry	0,930	0,930
β_L - using BU industry	1,806	1,731
K_e	11,84%	11,39%

2. Please compute the equity cost of capital using comparable companies.

Company	β_U	
A	0.655	
B		
C	0.788	
D	0.733	
$\beta_{U(AVG)} =$		0.726

	n+1	n+2
Tax rate	30%	30%
$\beta_{U(AVG)}$ - using comparables	0.726	0.726
B_L - using $\beta_{U(AVG)}$	1.409	1.351
K_e	9.45%	9.10%

3. Please compute the cost of capital in the asset side logic using the estimations done in question 2.

	n+1	n+2
WACC	8.05%	7.94%

4. Please give an explanation from a theoretical point of view of the differences between beta estimated through comparable companies and beta industry. Explain which is the most accurate estimation and why.

(See slides for the differences between the two beta) - The most accurate beta is estimated through comparable companies because it is likely that not all the companies included in the industry are really comparables.

5. Estimate the company annual cash flows in the asset and equity side logics.

	n+1	n+2
EBIT	69	74
-TAXES	-20.7	-22.2
+D&A	15	20
-DELTA NWC	10	20
-CAPEX	-20	-25
FCFF	53.3	66.8
-NET FIN. EXPENSES	-12.25	-11.2
-DEBT REPAYMENT	-5	-15
FCFE	36.05	40.6

6. Please estimate the value of the firm in the asset side logic assuming that the cash flows will grow at a constant rate of 1.5% following year n+2.

<i>TV (perpetuity with growth)=</i>	1052.36
<i>Enterprise value=</i>	1009.85

9 Company valuation

Loren is an unlisted company operating in the automotive industry in Spain. The following tables report the forecasted BS and P&L for the next two years (“n+1” and “n+2”). There is no dividend distribution and no capital increase.

P&L (data in mln euro)	n+1	n+2
Revenue	254	260
Operating cost (OpEx)	-180	-172
EBITDA	74	88
D&A	-12	-20
EBIT	62	68
Financial expenses	-13.5	-11.4
EBT	48.5	56.6
Income tax expenses	-14.55	-16.98
Profit for the year	33.95	39.02

BS (data in mln euro)	n (base year)	n+1	n+2
Inventories	58	90	85
Account receivables	75	65	55
Fixed Assets	270	285	290
Total assets	403	440	430
Debt	215	225	190
Shareholders Equity	180	190	200
Accounts Payables	8	25	40
Total equity and liabilities	403	440	430

The following tables report some risk-free rates and market returns (constant over time).

Dow Jones	6.0%	US Government bond	0.90%
CAC (France)	7.0%	French Government bond	1.50%
DAX (Germany)	6.5%	German Government bond	1.00%
IBEX (Spain)	8.3%	Spanish Government bond	3.30%

To estimate the cost of capital the CFO of the company found some comparable companies (assume all the parameters in the next tables constant over time).

Comparables	Listing	Beta	Debt	Shareholders Equity	Accounts Payable	Kd	Tax rate
Alfa	Listed	1.3	190	135	60	7.0%	32%
Beta	Listed	1.2	210	162	50	6.5%	30%
Gamma	Listed	1.5	200	144	55	6.0%	35%
Delta	Listed	1.4	100	77	30	5.5%	31%

Questions

1. Please compute the equity cost of capital.
2. Please compute the cost of capital in the asset side logic.
3. Please give an explanation from a theoretical point of view of the differences between the decision to ask a new mortgage or a line of credit.
4. Estimate the company annual cash flows in the asset and equity side logics.
5. Please estimate the value of the firm in the asset side logic assuming the cash flows will grow at a constant rate of 2.4% starting from year $n+2$ for the following five years. After that moment the company will be closed
6. Please indicate which are the changes in both costs of capital and flows computations in cases the company decides to undertake a new loan of 100 in year $n+1$, to be repaid starting from year $n+2$ with a constant quota of 20. Interests will be paid starting from year $n+1$ at rate of 6%. Please note the tax rate will remain constant at 30%.

9.1 Solution

1. Please compute the equity cost of capital.

Comparables	Listing	Beta	Debt	Shareholders Equity	Tax rate	BU
A	Listed	1.3	190	135	32%	0.664
B	Listed	1.2	210	162	30%	0.629
C	Listed	1.5	200	144	35%	0.788
D	Listed	1.4	100	77	31%	0.738

BU(avg)	0.705
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	n+1	n+2
Tax rate	30%	30%
BU (avg) - using comparables	0.705	0.705
BL - using BU (avg)	1.289	1.174
Ke	10.41%	9.57%

2. Please compute the cost of capital in the asset side logic.

	n+1	n+2
WACC	7.04%	6.95%

3. Please give an explanation from a theoretical point of view of the differences between the decision to ask a new mortgage or a line of credit.

(See slides for details)

4. Estimate the company annual cash flows in the asset and equity side logics.

	n+1	n+2
EBIT	62	68
-TAXES	-18.6	-20.4
+D&A	12	20
-DELTA NWC	-5	30
-CAPEX	-27	-25
FCFF	23.4	72.6
-NET FIN. EXPENSES	-13.5+4.05	-11.4+3.42
-DEBT REPAYMENT	10	-35
FCFE	23.95	29.62

5. Please estimate the value of the firm in the asset side logic assuming the cash flows will grow at a constant rate of 2.4% starting from year n+2 for the following five years. After that moment the company will be closed.

TV (annuity with growth)= 319.18

Enterprise value= 364.35

6. Please indicate which are the changes in both costs of capital and flows computations in cases the company decides to undertake a new loan of 100 in year n+1, to be repaid starting from year n+2 with a constant quota of 20. Interests will be paid starting from year n+1 at rate of 6%. Please note the tax rate will remain constant at 30%.

	n+1	n+2
Tax rate	30%	30%
BU (avg) - using comparables	0.705	0.705
BL - using BU (avg)	1.549	1.371
Ke	12.31%	11.01%
WACC	5.68%	5.79%

	n+1	n+2
-NET FIN. EXPENSES	-13.5-6+5.85	-11.4-6+5.22
-DEBT REPAYMENT	110	-55
FCFE	119.75	5.42