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Current Research on Cost of Capital

Target capital structure in WACC, Beta Un-Levering and Re-Levering in corporate valuation - gross- or net-debt?¹

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For the valuation of unlisted companies cost of equity cannot be derived from observable market prices. Many practitioners work with industry betas that are adjusted for differences in the capital structure. The adjustment procedure (dubbed "un-levering and re-levering") is using a particular equation determining the impact of leverage upon the beta of a company. However it is not quite clear whether the equation should be used on the basis of gross debt or on the basis of net debt (i.e. the difference between gross debt and cash/financial assets). This note argues in favour of the use of net debt.

I. The problem

For the valuation of listed companies, the CAPM has prevailed as a model to derive the cost of equity in valuation practice. For unlisted companies, the transfer of estimated betas from a selected peer group or from the corresponding sector is recommended as an approximation.² Since betas are dependent on capital structure, a direct transfer of the estimated peer group -betas is only possible if the capital structures of the companies in the peer group or sector are equal to the one of the company to be valued. If this is not the case, an adaptation to different capital structures is recommended, referred as un-levering/re-levering. In this case, the following relationship between the beta of a levered firm (so-called equity -beta or levered beta β^E) and the beta of the same, but unlevered firm (so-called asset - beta or unlevered beta β^{Asset}) is assumed:

$$\beta^E = \beta^{Asset} \left[1 + (1 - \tau) \frac{D}{E} \right], \quad (1)$$

τ denotes the corporate tax rate and D/E the (target) leverage of the company. Equation (1) highlights on the one hand the additional financial leverage - risk arising from the risk-free payments to be made to the lenders. On the other hand, (1) assumes a tax system only considering corporate taxes. Interest is tax deductible, so that the company realizes an added value effect called tax shield from the proportional debt financing. In addition, the above equation implies a certain financing policy with a permanently constant debt level that is independent of the company's future development.³ The dampening effect on the leverage risk given in (1) by the factor $(1 - \tau)$ is explained by the fact that the appropriate tax savings occur without risk. Thus the increased risk from the proportional leverage is partly compensated. Finally, equation (1) assumes that the debt of the company is risk-free; technically speaking, the debt is - beta β^D as a risk measure for the creditor is zero.

The adjustment procedure proposed uses equation (1) first "backwards": The estimated equity - beta of the industry is "un-levered" – thus deriving the asset beta as a measure of the overall risk of the companies in this industry. For this procedure, the aggregate capital structure in the industry (in market values) is used. In the second step, the "re-levering the individual capital structure of the company is set to transpose the asset - beta of the industry into the equity beta of the firm. Fig. 1 highlights the adjustment procedure.

Cost of Capital Q1 2017

Prime All Share Industries, DAX 30, TecDAX 30, MDAX 50

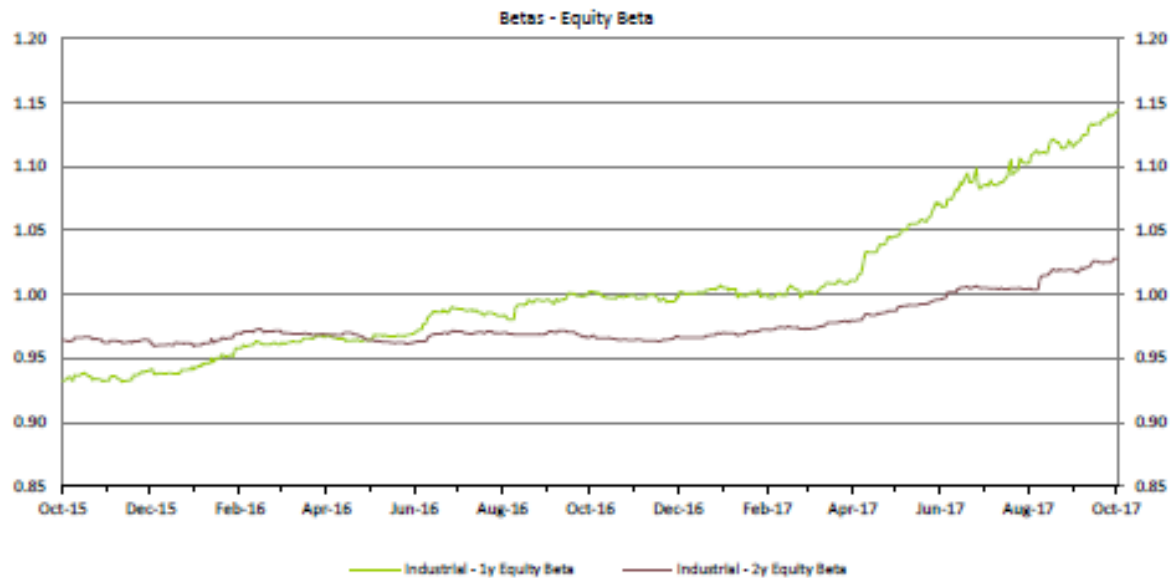
as of 13.01.2017

	1 year Equity Beta	R ²	2 year Equity Beta	R ²	5 year Equity Beta	R ²	n	Cost of Equity (based on 1y beta)	Debt - Equity ratio (market values)	Asset beta	Asset Beta Miles Ezzell debt beta = 0.3	Net Debt - Equity ratio (market values)	Operating Asset beta	Operating Asset beta Miles Ezzell debt beta=0.3
Automobiles	1,27	0,79	1,24	0,80	1,43	0,76	15	7,2%	1,71	0,60	0,61	1,35	0,68	0,67
Banks	1,78	0,55	1,37	0,54	1,36	0,44	6	10,0%						
Basic Resources	1,07	0,39	0,95	0,40	0,89	0,38	4	6,1%	0,78	0,71	0,70	0,47	0,82	0,81
Chemicals	0,97	0,82	1,06	0,89	1,01	0,83	15	5,5%	0,32	0,80	0,79	0,28	0,82	0,81
Construction	1,09	0,69	1,01	0,69	1,11	0,62	4	6,2%	0,44	0,85	0,83	0,25	0,94	0,92
Consumer	0,70	0,62	0,78	0,71	0,81	0,58	21	4,0%	0,03	0,68	0,68	0,01	0,69	0,69
Financial Services	0,68	0,52	0,75	0,64	0,68	0,54	27	3,9%						
Food & Beverages	0,66	0,20	0,48	0,07	0,33	0,02	1	3,8%	0,55	0,48	0,50	0,42	0,52	0,53
Industrial	1,01	0,85	0,97	0,88	0,97	0,84	69	5,7%	0,42	0,79	0,78	0,26	0,86	0,85
Insurance	1,08	0,77	0,94	0,79	0,95	0,70	4	6,1%						
Media	0,79	0,57	0,77	0,64	0,77	0,46	12	4,5%	0,22	0,69	0,69	0,14	0,72	0,72
Pharma & Healthcare	0,87	0,62	0,92	0,70	0,65	0,53	32	4,9%	0,33	0,72	0,71	0,29	0,73	0,73
Retail	0,85	0,58	0,74	0,60	0,87	0,57	23	4,8%	0,29	0,71	0,71	0,10	0,79	0,79
Software	0,85	0,70	0,84	0,74	0,86	0,57	33	4,9%	0,12	0,79	0,78	0,03	0,84	0,83
Technology	1,13	0,63	1,08	0,59	0,97	0,42	21	6,4%	0,19	1,01	0,99	0,04	1,10	1,09
Telecommunication	0,91	0,67	1,02	0,74	0,81	0,46	8	5,2%	0,72	0,62	0,62	0,63	0,64	0,64
Transport. & Logistics	1,00	0,77	0,91	0,73	0,93	0,68	12	5,6%	0,55	0,73	0,72	0,39	0,79	0,78
Utilities	1,24	0,43	1,13	0,41	1,04	0,30	8	7,0%	1,73	0,58	0,60	1,05	0,73	0,72
Prime All Share	1,00	1,00	1,00	1,00	1,00	1,00	315	5,7%	0,54	0,74	0,73	0,41	0,79	0,78
DAX 30	1,04	0,99	1,04	0,99	1,05	0,99	30	5,9%	0,66	0,73	0,72	0,53	0,77	0,76
TecDAX 30	0,91	0,73	0,89	0,77	0,69	0,60	30	5,2%	0,13	0,84	0,83	0,05	0,88	0,88
MDAX 50	0,90	0,89	0,87	0,90	0,84	0,85	50	5,1%	0,15	0,83	0,82	0,08	0,86	0,86

	Median ROE (Return on Equity)	Median Non-cash ROE (Return on Equity)	Median ROC (Return on Capital)	Median Non-cash ROC (Return on Capital)	Median Capex / Depr.	Median Dividend payout
Automobiles	0,22	0,11	0,09	0,09	1,02	0,36
Banks					0,82	0,00
Basic Resources	0,05	0,05	0,05	0,05	1,13	0,51
Chemicals	0,20	0,09	0,10	0,11	0,92	0,41
Construction	0,07	0,05	0,06	0,06	1,01	0,18
Consumer	0,07	0,05	0,06	0,06	1,00	0,35
Financial Services	0,04		0,04		2,67	0,28
Food & Beverages	0,05	0,02	0,03	0,03	1,34	1,19
Industrial	0,14	0,08	0,09	0,10	0,84	0,34
Insurance					2,37	0,50
Media	0,15	0,11	0,11	0,12	0,48	0,59
Pharma & Healthcare	0,04	0,04	-0,01	0,05	0,68	0,28
Retail	0,01	0,05	0,03	0,02	0,91	0,28
Software	0,19	0,11	0,14	0,16	0,52	0,29
Technology	0,10	0,03	0,06	0,08	0,69	0,30
Telecommunication	0,09	0,06	0,07	0,07	0,48	0,63
Transport. & Logistics	0,19	0,10	0,08	0,09	0,85	0,48
Utilities	0,05	0,05	0,04	0,05	1,20	0,40
Prime All Share	0,11	0,07	0,08	0,09	0,85	0,34
DAX 30	0,21	0,11	0,08	0,12	0,97	0,38
TecDAX 30	0,16	0,10	0,13	0,17	0,52	0,28
MDAX 50	0,18	0,10	0,09	0,12	1,12	0,35

Development of CAPM Beta Factors - Industrial

1 year vs. 2 year CAPM Equity Beta



1 year vs. 2 year CAPM R²

