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Power and Energy Systems Engineering Economics

Applications Examples

Chapter 3 – Inflation, Interest, Cost of Capital

Notes:

1. Cells with black characters include inputs
2. Cells with red characters include formulas
3. Some examples need for calculations the installation of Add_Ins developed by the author. See installation instruction in the file introduction.

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Disclaimer

The Examples are solely and exclusively indented to provide support and assistance to the readers for practicing and better understanding of the theoretical part of this book.

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Proposals for improvements of the contents are welcome and will be considered in upcoming updates!

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EE-Ch-3_Inflation,Interest;-Cost-of-Capital_Examples.xlsx
 Ex. 3.1_CPI-Inflation

Time	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Australia	74.4	77.7	80	82.2	84.1	86.3	89.4	91.5	95.5	97.2	100	103.3	105.1	107.7	110.4
Germany	85.7	87.4	88.6	89.6	91	92.5	93.9	96.1	98.6	98.9	100	102.1	104.1	105.7	106.7
Japan	103	102	101	101	101	100	101	101	102	101	100	99.7	99.7	100	102.8
Korea	73.1	76.1	78.2	80.9	83.8	86.2	88.1	90.3	94.5	97.1	100	104	106.3	107.7	109.1
United Kingdom	81.3	82.3	83.3	84.5	85.6	87.3	89.4	91.5	94.8	96.8	100	104.5	107.4	110.2	111.8
United States	79	81.2	82.5	84.4	86.6	89.6	92.4	95.1	98.7	98.4	100	103.2	105.3	106.8	108.6
G7	83	84.7	85.8	87.3	89.1	91.3	93.5	95.6	98.7	98.6	100	102.6	104.6	106	107.6
OECD - Europe	74.4	78.4	82	84.4	86.4	88.4	90.7	93	96.6	97.7	100	103.2	106.2	108.1	109.5
OECD - Total	78.2	81	83.2	85.3	87.3	89.5	91.9	94.2	97.7	98.2	100	102.9	105.2	106.9	108.7

Data extracted on 28 Apr 2015 09:57 UTC (GMT) from OECD.Stat

CPI and Inflation				
Country	2014	2013	2014	2000
Austria	110.4	107.7	110.4	74.4
	2.5%		48.4%	
Germany	106.7	105.7	106.7	85.7
	0.9%		24.5%	
USA	111.8	110.2	111.8	81.3
	1.5%		37.5%	
Korea	109.1	107.7	109.1	73.1
	1.3%		49.2%	
Japan	102.8	100	102.8	102.7
	2.8%		0.1%	

Ex. 3.2_Effective interest rate

Given:

Annual interest rate 8 %/a

Sought:

- a) Annual compounding
- b) Quarterly compounding
- c) Monthly compounding
- d) Daily compounding

Results:

- a) $i_{eff} = (1 + 0.08/1)^1 - 1 = 0.08 \triangleq 8\% / a$
- b) $i_{eff} = (1 + 0.08/4)^4 - 1 = 0.0824 \triangleq 8.24\% / a$
- c) $i_{eff} = (1 + 0.08/12)^{12} - 1 = 0.083 \triangleq 8.3\% / a$
- d) $i_{eff} = (1 + 0.08/360)^{360} - 1 = 0.08328 \triangleq 8.328\% / a$

Note: Inserted as a picture, simple calculations

Ex. 3.3 WACC incl-tax

Item	Equity	Loan
Asset shares	30%	70%
Risk free rate of return / interest	5.0 %/a	5.0 %/a
venture risk premium	6.0 %/a	1.0 %/a
Country risk premium *)	0.0 %/a	0.0 %/a
Expected return after tax	11.0 %/a	6.0 %/a
Corporate tax **) 25%	3.7 %/a	0.0 %/a
Returns before tax, in nominal terms	14.7 %/a	6.0 %/a
WACC_n in nominal terms, incl. tax	8.60 %/a	
./. expected inflation rate	2.00 %/a	
WACC_r inflation adjusted, incl. tax	6.47 %/a	

*) Country risk premiums depend among others on the credit rating of the country.
Zero country risk premium is referred to countries with AAA rating

**) Depends on the country's tax legislation and is referred to the return on equity before tax.

The calculation is therefore: tax = return on equity before tax x tax rate / (1 - tax rate)

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Ex. 3.4_WACC_excl-tax

Item	Equity	Loan
Asset shares	30%	70%
Risk free rate of return / interest	5.0 %/a	5.0 %/a
Venture risk premium	6.0 %/a	1.0 %/a
Country risk premium *)	0.0 %/a	0.0 %/a
Expected returns, net	11.0 %/a	6.0 %/a
WACC_n in nominal terms, excl. tax	7.50 %/a	
./. expected inflation rate	2.00 %/a	
WACC_r inflation adjusted	5.39 %/a	

*) Country risk premiums depend among others on the credit rating of the country. Zero country risk is referred to countries with AAA rating