Peter J Wilcoxen
Economics for Public Decisions

Dept of Public Admin and Int'l Affairs
The Maxwell School, Syracuse University

Fuel Cell Research
Solution

Part 1: Present Value of the Bond

Present Value of Each Payment
at Various Interest Rates

Year	Pmt	4%	5%	6%	
0	100	100.00	100.00	100.00	<-- Each cell is pmt/(1+R)^year
1	-7	-6.73	-6.67	-6.60	
2	-7	-6.47	-6.35	-6.23	
3	-7	-6.22	-6.05	-5.88	
4	-7	-5.98	-5.76	-5.54	
5	-7	-5.75	-5.48	-5.23	
6	-7	-5.53	-5.22	-4.93	
7	-7	-5.32	-4.97	-4.66	
8	-7	-5.11	-4.74	-4.39	
9	-7	-4.92	-4.51	-4.14	
10	-107	-72.29	-65.69	-59.75	
Bond Subtotal:		-24.33	-15.44	-7.36	<-- Total PV for each R

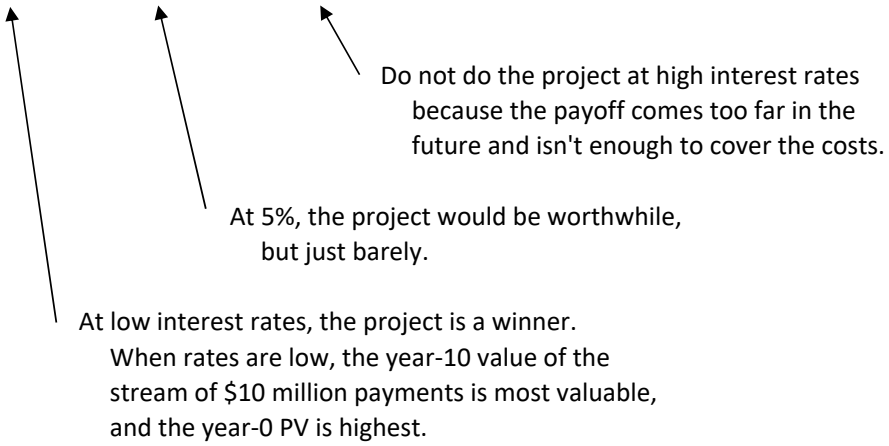
Continued …

Part 2: Present Value of the Research Project

	4%	5%	6%	
PV of payoff in year 10:	250.00	200.00	166.67	<-- Each cell is $10/R
PV of payoff in year 0:	168.89	122.78	93.07	<-- Year 10 payment discounted to year 0
Cost at year 0	-100.00	-100.00	-100.00	<-- Year 0 costs
Research Subtotal:	68.89	22.78	-6.93	<-- Total PV for each R

Part 3: Overall Value of the Combined Project

Bond plus Research:	44.56	7.34	-14.29	<-- Total PV of the project for each R



Note

You may have been tempted to cancel out the $100M flows in period 0. Since they are equal and occur in the same period, doing that doesn't affect the final NPV. However, it's better not to do it because it muddles up the internal details of the analysis. It makes the bond look worse than it is (in the 5% case, negative 115M rather than negative 15M), and makes the research project look better than it really is (123M rather than 23M).