Exercise 13.4

Question

13.4. *Venture Banking*
A venture banking firm is comparing two ventures that are competing for an available $1 million in start-up cash. After this initial investment, the following operating costs and revenues (in $\$ \times 10^3$) are expected during the next eight years.

	A Operating		B Operating	
Year	**Cost**	**Revenue**	**Cost**	**Revenue**
1	100	370	300	0
2	100	370	300	0
3	100	370	300	0
4	100	370	300	1170
5	100	370	300	1170
6	100	370	300	1170
7	100	370	300	1170
8	100	370	300	1170

(*a*) Using a discount rate of 15%, calculate net present value, benefit-cost ratio, and net benefit-cost ratio for both A and B. Which venture should be undertaken?
(*b*) Same as (*a*), but with 20% discount rate.

Solution from Manual

13.4 Venture Banking

a) Discount Rate 15% :

Venture	NPV($10)	B/C	Net B/C
A	212	1.146	1.211
B	233	1.099	1.233
Choice	B	A	B

Choose B by NPV.

NPV should be used as criterion, since it is not distorted by annual operating costs as benefit-cost ratios are. Note that the benefit-cost and net benefit-cost ratios lead to different choices in this case.

Calculation of NPV for B:
NPV = - 1000 - 300(SPWF 8 yrs) + 1170(SPWF 5 yrs)(PWF 3 yrs)
= - 1000 - 300(4.4873) + 1170(3.3522)(.6575)
= - 1000 - 1346 + 2579
= $233K

b) Discount Rate 20%:

Venture	NPV($10)	B/C	Net B/C
A	36	1.026	1.036
B	-126	.941	.874
Choice	A	A	A

Choose A by NPV.

Additional Notes

a) Calculations done in Excel with a discount rate of 15%, see file 13.4.xls. The formulas used in this spreadsheet are as follows:

$$NPV = \sum_{i=0}^{N} \frac{CF_i}{(1+r)^i}$$

$$\frac{Benefit}{Cost} = \frac{PV all\ benefits}{PV all\ costs} = \frac{PV\ B}{PV\ C_k + C_r}$$

$$\frac{Net\ Benefit}{Cost} = \frac{PV net\ benefits}{PV\ investments} = \frac{PV\ B - C_r}{PV\ C_k}$$

Project A

year	0	1	2	3	4	5	6	7	8
revenue	0	370	370	370	370	370	370	370	370
cost	0	100	100	100	100	100	100	100	100
investment	1000	0	0	0	0	0	0	0	0
net value	-1000	270	270	270	270	270	270	270	270
discount factor	1.00	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33
present value	-1000.00	234.78	204.16	177.53	154.37	134.24	116.73	101.50	88.26
NPV	**211.58**								
present value annual benefits	0.00	321.74	279.77	243.28	211.55	183.96	159.96	139.10	120.95
present value annual costs	0.00	86.96	75.61	65.75	57.18	49.72	43.23	37.59	32.69
present value investment	1000	0	0	0	0	0	0	0	0
PV total benefits (*B*)	**1660.31**								
PV total annual costs (C_r)	**448.73**								
PV total costs ($C_k + C_r$)	**1448.73**								
PV benefit/cost ratio $B/(C_k + C_r)$	**1.15**								
PV net benefit/cost ratio $(B - C_r)/C_k$	**1.21**								

Project B

year	0	1	2	3	4	5	6	7	8
revenue		0	0	0	1170	1170	1170	1170	1170
cost		300	300	300	300	300	300	300	300
investment	1000	0	0	0	0	0	0	0	0
net value	-1000	-300	-300	-300	870	870	870	870	870
discount factor	1.00	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33
present value	-1000.00	-260.87	-226.84	-197.25	497.43	432.54	376.13	327.07	284.40
NPV	**232.60**								
present value annual benefits	0.00	0.00	0.00	0.00	668.95	581.70	505.82	439.85	382.48
present value annual costs	0.00	260.87	226.84	197.25	171.53	149.15	129.70	112.78	98.07
present value investment	1000	0	0	0	0	0	0	0	0
PV total benefits (*B*)	**2578.79**								
PV total annual costs (C_r)	**1346.20**								
PV total costs ($C_k + C_r$)	**2346.20**								
PV benefit/cost ratio $B/(C_k + C_r)$	**1.10**								
PV net benefit/cost ratio $(B - C_r)/C_k$	**1.23**								

Since we are in the academic world, and because of other reasons mentioned above, NPV should be chosen as the selection criterion. The point is that it is never clear which criterion one should select; it depends on the business (e.g. capital-intensive vs. recurring-cost) and environment (e.g. corporate vs. government). Here, given the choice of NPV as the criteria, we choose Project B.

b) Doing the same calculations with a discount rate of 20%:

Project A

year	0	1	2	3	4	5	6	7	8
revenue	0	370	370	370	370	370	370	370	370
cost	0	100	100	100	100	100	100	100	100
investment	1000	0	0	0	0	0	0	0	0
net value	-1000	270	270	270	270	270	270	270	270
discount factor	1.00	0.83	0.69	0.58	0.48	0.40	0.33	0.28	0.23
present value	-1000.00	225.00	187.50	156.25	130.21	108.51	90.42	75.35	62.79
NPV	**36.03**								
present value annual benefits	0.00	308.33	256.94	214.12	178.43	148.69	123.91	103.26	86.05
present value annual costs	0.00	83.33	69.44	57.87	48.23	40.19	33.49	27.91	23.26
present value investment	1000	0	0	0	0	0	0	0	0
PV total benefits (*B*)	**1419.75**								
PV total annual costs (C_r)	**383.72**								
PV total costs ($C_k + C_r$)	**1383.72**								
PV benefit/cost ratio $B/(C_k + C_r)$	**1.03**								
PV net benefit/cost ratio $(B - C_r)/C_k$	**1.04**								

Project B

year	0	1	2	3	4	5	6	7	8
revenue		0	0	0	1170	1170	1170	1170	1170
cost		300	300	300	300	300	300	300	300
investment	1000	0	0	0	0	0	0	0	0
net value	-1000	-300	-300	-300	870	870	870	870	870
discount factor	1.00	0.83	0.69	0.58	0.48	0.40	0.33	0.28	0.23
present value	-1000.00	-250.00	-208.33	-173.61	419.56	349.63	291.36	242.80	202.33
NPV	**-126.25**								
present value annual benefits	0.00	0.00	0.00	0.00	564.24	470.20	391.83	326.53	272.10
present value annual costs	0.00	250.00	208.33	173.61	144.68	120.56	100.47	83.72	69.77
present value investment	1000	0	0	0	0	0	0	0	0
PV total benefits (*B*)	**2024.89**								
PV total annual costs (C_r)	**1151.15**								
PV total costs ($C_k + C_r$)	**2151.15**								
PV benefit/cost ratio $B/(C_k + C_r)$	**0.94**								
PV net benefit/cost ratio $(B - C_r)/C_k$	**0.87**								