CHAPTER 7: CAPITAL BUDGETING DECISION RULES

7-1

The average book value of total investment in project = $500,000/2 = $250,000
ROC = EBIT * (1-t) / average book value of total investment in project
= 120,000 (1-34%) / 250,000 = 31.68%

7-2

a: We have to assume for the purpose of calculating ROC that the asset will be depreciated down to its estimated market value of $ 400,000

Year	EBIT(1-t)	Depreciation	Net Book Value	Average Investment	ROC
0	0	0	$1,200,000		
1	$132,000	$160,000	$1,040,000	$1,120,000	11.79%
2	$132,000	$160,000	$880,000	$960,000	13.75%
3	$132,000	$160,000	$720,000	$800,000	16.5%
4	$132,000	$160,000	$560,000	$640,000	20.63%
5	$132,000	$160,000	$400,000	$480,000	27.5%

If the asset is depreciated down to zero by year 3, the average operating income over the period would have been divided by the average investment over the period to arrive at the return on capital.

b: The geometrical mean return =

$$[(1+11.79\%)(1+13.75\%)(1+16.5\%)(1+20.63\%)(1+27.5\%)]^{1/5} - 1$$
$$= 17.90\%$$

c: The project should be rejected since the cost of capital is higher than the return.

7-3

The net income = $50,000
The initial investment by equity = $1,000,000 * 60% = $600,000
The average book value of equity = $600,000/2 = $300,000
So the Return on Equity = 50,000/300,000 = 16.67%

7-4

Return on Equity = Net Income / Average Book Value of Equity in the Project
= (EBIT - I) (1-t) / (Average Book Value of Investment (1 - Debt Ratio)
= [EBIT (1-t) - I(1-t)] / (Average Book Value of Investment (1 - Debt Ratio)

If the average book value of investment = $100, then EBIT (1-t) = $12
Average Book Value of Debt = Average Book Value of Equity = $50
After-tax interest expense = 5% * 50 = $2.5
The minimum return on equity = (12 - 2.5) / 50 = 19%

7-5:
When the earning growth rate = 0 and the dividend payout ratio = 100%, then a stock's P/E ratio would be the payback period for the stock investor.

7-6:
There are a number of factors that would affect the mximimum acceptable payback period for a project. The most important would be the availability and access to capital that the firm has. To the extent that firms have capital rationing, they will impose tighter constraints. It would also be affected by the level of interest rates. As interest rates go up, maximum acceptable acceptable payback period will decrease.

7-7:
a: the payback period = 5 years.

b: the discounted payback period = 8 years.

7-8
(1) Since the initial cost = $1 million and
the annual after-tax cash inflow = $300,000 * (1-34%) + 34% * 1,000,000/10 = $232,000
then the payback period for the project = 1,000,000 / 232,000 = 4.31 years

(2) The project should be rejected.

7-9
(1) If the cost of capital is 10%,
the net present value = -2,000,000 + 100,000/1.1 + 300,000 (PVA,10%,9) /1.1
= $-338,438

(1) (2) If the cost of capital is 15%,
the net present value = -2,000,000 + 100,000/1.15 + 300,000 (PVA,15%,9)/1.15
= $ -668.225

The project should be rejected.

7-10
The PV cash flows to equity = 50,000 (PVA,14%,10) = $260,805.78
This would be the maximum initial investment on the project so that the NPV would be greater than zero.

7-11

The NPV of $2 million would increase the total market value of stocks by the same amount. The price per share should show an increase of $2/share (= $2 million / 1 millions shares outstanding). This is based upon the assumption that markets were not expecting the firm to have any positive net present value projects. If this assumption is relaxed, it is far more difficult to tell what would happen to stock prices.

7-12
The NPV = 350,000/(1.12)(1.10) + 300,000/(1.10) - 500,000 = $56,818.18

7-13
a: The IRR = 7.10%

b: The project should be rejected since IRR < the cost of capital (10%).

c: Then NPV = - $27,109.

7-14
a: The IRR for Project A = 8.04%

b: The IRR for Project B = 7.32%

c: Project A is accepted based on the IRR rule since it has higher IRR.

d: Since the NPV of Project A = $141.95 and the NPV of Project B = $424.35 when the cost of capital is 5%, Project B should be accepted.

e: Since the NPV of Project A = $21.50 and the NPV of Project B = -$27.73 when the cost of capital is 7.5%, then the Project A should be accepted.

f: In this example, the IRR rule finds the Project A superior to the Project B. However, the NPV rule may give different conclusions when the cost of capital changes.. This is because of differences in reinvestment rate assumptions and in the project scales. The NPV rule is more consistent with the objective of financial management to maximize the shareholders' wealth.

7-15
In the bond equation, the yield to maturity equates the present value of interest payments and principal payment to the bond price. So the YTM plays the same role in bond pricing as IRR does in capital budgeting and they share the same interpretations and problems.