

## 8.9: Problems

### ? Problem 8.9.1

Calculate the PP, NPV, and IRR of the following projects (assuming a 14% required return and critical acceptance level  $<T>$  of 3 years)

Cash Flow	Project A	Project B	Project C	Project D
CF <sub>0</sub>	-\$1,000,000	-\$1,000,000	-\$500,000	-\$500,000
CF <sub>1</sub>	400,000	150,000	200,000	75,000
CF <sub>2</sub>	400,000	100,000	250,000	50,000
CF <sub>3</sub>	225,000	550,000	150,000	225,000
CF <sub>4</sub>	200,000	775,000	100,000	387,500

Which project(s) should we accept if they are independent? Mutually Exclusive?

#### Answer

$$PP_A = 2.89 \text{ years}$$

$$PP_B = 3.26 \text{ years}$$

$$PP_C = 2.33 \text{ years}$$

$$PP_D = 3.39 \text{ years}$$

$$IRR_A = 9.99\%$$

$$IRR_B = 15.40\%$$

$$IRR_C = 17.07\%$$

$$IRR_D = 12.94\%$$

$$NPV_A = -\$71,051$$

$$NPV_B = \$38,622$$

$$NPV_C = \$28,259$$

$$NPV_D = -\$14,437$$

#### If Independent

Choose Projects B and C as both have positive NPVs. While the PP exceeds T for project B, unless the company has significant financial problems and/or is severely concerned about the project lasting the four years. NPV is the best decision rule, so when the decision rules give conflicting results, go with NPV.

#### If Mutually Exclusive

Choose Project B as it has the highest NPV. The higher IRR for project C is irrelevant and is caused by the different sizes of the projects. Again, when there are conflicts among the rules always follow NPV.

### ? Problem 8.9.2

In the problem above, identify a pair of projects that could suffer from the size problem, but not a reinvestment rate problem. Next, identify a pair of projects that could suffer from the reinvestment rate problem, but not the size problem.

#### Answer

We identify the size problem by looking for different initial investments. Projects AC, AD, BC, and BD all are pairs with different initial investments. However, we also want to find a pair of projects without the reinvestment rate problem. Since A and C are both frontloaded while B and D are both backloaded, they should not suffer from the reinvestment rate

problem. Therefore, you could select either AC or BD as an answer for a pair of projects that could suffer from the size problem, but not the reinvestment rate problem.

When looking for pairs of projects that might suffer from the reinvestment rate problem, we have AB, AD, BC, and CD. However, we also want to find a pair of projects without the size problem. Since both AB and CD have the same initial investments, they will not suffer from the size problem. Therefore, you could select either AB or CD as an answer for a pair of projects that could suffer from the reinvestment rate problem, but not the size problem.

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