Engineering Economics and Problem Solving, 4N4, 2012

Tutorial/Assignment 2

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This tutorial (your second assignment) has one main goal: to get even more comfortable with the time value of many. You may also choose to use the time during the tutorial to have your group norms discussion.

Question 1

A small 10 MW power plant is operating at 7,000 hours utilization per year, producing power sold to the grid at flat rate of \$0.04 per kWh. What is the present value (at time zero) of all revenues over a 10 year time frame? Assume a time value of money of 10%.

In our calculations we use that revenue is all accrued at the end of the period. In this example that is clearly not the case. What alternative(s) might be used?

Question 2

Company X owns a patent with 12 full years of remaining life. Company B pays royalties to company X to license the patent, in proportion to production levels at company B. Based on their forecasts, they expect to make payments of \$6,000 per year for the next 5 years, then payments of \$9,000 for 4 years after that, followed by \$13,000 for the last 3 years of that patent license. Company B is offering to prepay a license of \$70,000 since they have money available right now. If company X's minimum internal rate of return is 10%, should they accept the lump sum, or keep to the royalty payment schedule?

Question 3

1. A Chinese manufacturer is considering two options: System A with cost of ¥ 600,000, a service life of 7 years and savings of ¥100,000 per year starting immediately at the time of installation. Or system B with cost of ¥ 115,000, a service life of 15 years and savings of ¥15,000 per year, also starting immediately. Which system has the fastest payback? (¥ is pronounced *yuán*)
2. Calculate the present value of all cash flows, using a TVM of 5%. Add up the present values to calculate the net present value (NPV). Make a judgement based on this value on purchasing system A or B. Explain why the decision is different, and why this highlights the problem with payback period as a profitability measure.

Question 4

The following 3 unequal-life capital projects exist. The alternatives are not dependent on each other; cash flows are in the thousands of dollars.

- A: Revenues of \$150 for 5 years, and a salvage value of \$50. Upfront capital expenditure at $n = 0$ is \$160.
- B: Revenues of \$275 for 4 years, and a salvage value of \$70. Upfront capital expenditure at $n = 0$ is \$320.
- C: Revenues of \$500 for 3 years, and a salvage value of \$100. Upfront capital expenditure at $n = 0$ is \$480.

Your company has \$500 to spend on capital projects this year. Use an NPV analysis to decide how to proceed; your internal discount rate for time value of money is 20%. Assume revenues only start the year after capital expenditure (i.e. one year to purchase and install the capital items).

Question 5

Please make reasonable assumptions, and avoid trying to bias the outcome of this question. You can assume 4 or 5 years of study, depending on your group's preference.

1. Prepare the cash flow values and a cash flow diagram for your income and expenses for four/five years of university as well as your income and expenses for 10 years after graduation.
2. Prepare the cash flow values and a cash flow diagram for your income and expenses for four/five years after high school, as if you did not attend university, and also your income and expenses for 10 further years.
3. Calculate the present values for all cash flows from both situations. Calculate the net present value in both cases.
4. What is your conclusion so far in this study? You do not need to answer this question in these 4 sub-parts, however you should be present a logical and clear discussion on this topic.

You will continue with this question in a future assignment, so please save your spreadsheets and calculations.

END