Computer Notes on Comparing Mutually Exclusive Alternatives – Present Worth Approach

In this section, we will demonstrate how to create a NPW table and NPW plot as a function of interest rate by using Excel. We will use the cash flow data described in Example 7.10.

Creating a NPW Table

Using Exhibit 1 as a model, enter the known time periods and their cash flows (the figures in parentheses represent negative amounts) for each option (columns A through D). The interest rate (MARR) is specified in cell C1. The cash flows in the 5th year include the salvage value for each option. To calculate the NPW of the cash flows at a specified interest rate, you can use the NPV(rate, range) function. The NPV(rate, range) function assumes that cash flows occur at the ends of periods. To find the NPW of an investment where you make an initial cash outflow immediately, or at period 0, and follow it by a series of future cash flows, you must factor the initial flow separately because it is not affected by the interest.

Exhibit 1: Excel’s output - Comparison of the three alternatives in Example 7.10

1 EzCash has a built-in command to generate a NPW table as well as the NPW plot when the interest range is specified.
For option 1, cell B6 is your initial flow (at period 0), cells from B7 to B11 contain a range of future cash flows, and 12%, which is stored in cell C1, is the periodic interest rate. The total NPW is calculated by

\[ \text{NPV}(C1\%, B7:B11) + B6. \]

The result in the amount of $76,379 is displayed in cell B13. Similarly, we can calculate the net present values for options 2 and 3, which are displayed in cells C13 and D13, respectively.

To create a net present profile, you may enter the range of interest rates in column F (say 0% through 20%). The $ sign in front of each cell number indicates that Excel must use the data stored in these absolute locations. For example, to obtain the net present values at varying interest rates for option 1, you may follow the following two steps:

1. **Step 1:** Enter the NPW cell formula at 0% interest in cell G6:
   \[ \text{NPV}($F6\%,$B7:$B11) + $B6 \]

2. **Step 2:** To copy to adjacent cells, make a selection at cell G6 and then position the mouse pointer over the fill handle. The pointer changes to a black cross. Drag the fill handle in the direction you want to copy (downward to cell G25). When you release the mouse button, the cell formula is copied into the range.

You repeat the process for options 2 and 3.

**Creating an Embedded Present Worth Chart**

You can now easily build a NPW graph using the ChartWizard command in Excel, which appears in the main menu. ChartWizard is a series of dialog boxes that simplifies creating a chart. Additionally, ChartWizard guides you through the process step by step: You verify your data selection, select a chart type, and decide whether to add items such as titles and a legend. You can create an embedded chart as an object on a worksheet when you want to display a chart along with its associated data, or you can create a chart sheet as a separate sheet in a workbook when you want to display a chart apart from its associated data. You might do this when you want to show overhead projections of your charts as part of a presentation. Whether you create an embedded chart or a chart sheet, your chart data is automatically linked to the worksheet from which you created it. When you change the data on your worksheet, the chart is updated to reflect these changes.

For example, to create a line graph of this present worth data, you may follow the following three steps:

1. **Step 1:** Select the worksheet data you want to display in the chart as shown in Figure 3.
2. **Step 2:** Click the ChartWizard button. The mouse pointer changes to a cross hair with a chart symbol. You can either click anywhere on the worksheet to have the chart placed automatically, or place the cross hair and drag to where you want the chart to appear. Follow the five steps of instructions in ChartWizard to add the chart to the worksheet:
   1. Confirm the range of the selected cells.
   2. Select a line chart type. (You have 15 different types of chart from which to choose.)
   3. Select a format for the selected line chart.
4. Review the sample chart created.
5. Add a legend, chart title, and axis titles.

After pressing the FINISH button, the line chart is added to the worksheet as shown in Exhibit 2.

Exhibit 2: Net present worth plots obtained by Excel for the three alternatives in Example 7.10

**Printing the Worksheet and Chart**

Before you can print, you must select a printer. From the File menu, choose Print. Click the Printer button, and then select the printer you want to use. Once you select the printer, you can control the appearance of the printed sheets by changing the options, such as margins, page orientation, headers, and footnotes in the Page Setup dialog box. By previewing your sheet, you can see each page exactly as it will print, with the correct margins, page breaks, and headers and footers in place.