Computer Notes on Creating a Project's Cash Flow Statement

As you have learned in the previous sections, creating an after-tax cash flow table can be tedious and time-consuming. An electronic spreadsheet is a perfect choice to automate much of the computation. Alternatively, EzCash can automate the entire analysis with its built-in computational tools for calculating depreciation and loan interest. To illustrate, we will use Example 12.4.

The most popular spreadsheet applications used in engineering economic analysis are those that help in after-tax cash flow analysis. Exhibit 1 shows how to prepare a cash flow statement for Example 12.4 with Excel. First you create cell blocks for input as well as output data. In our example, we treated the income tax rate and the required rate of return (MARR) as the varying inputs, and the NPW and IRR as varying outputs that need to be measured. Then, in column B, you create the list of elements required to calculate the net income as well as the net cash flow. You enter the cell values for Revenue, Labor, Material, Overhead, Depreciation, and Debt Interest. Then you let Excel calculate the cell values for Taxable Income, Income Taxes, and Net Income. Here the income tax will be a function of the tax rate in cell D3. On the cash flow statement side, you enter the cell values for Investment, Salvage, Borrowed Funds, and Principal Repayment. Then Excel will calculate the cell values for Gains Tax and Net Cash Flow. The amount of the gains tax in cell H31 may be calculated based on the following cell formula:

\[
\text{Cell H31} = (\text{Taxable gains})(\text{tax rate}) \\
= (\text{Salvage value} - \text{book value})(\text{tax rate}) \\
= (\text{Salvage value} - (\text{cost basis} - \text{total depreciation}))(\text{tax rate}) \\
= (\text{H30} - (\text{C29} - \text{SUM(D15:H15)})\times\text{D3}).
\]

Only the cell formula is entered into the box. Of course, you can automate the loan interest and principal calculations using the worksheet developed in Chapter 5. Similarly, you can also automate the depreciation calculations using the worksheet developed in Chapter 10.

Once we obtain the net cash flow of the investment, the next step is to measure the investment worth. Using the NPV and IRR functions, we can calculate the NPW as well as the IRR of the investment. These calculations are also shown as outputs in Exhibit 1. This financial calculation is only the beginning of our spreadsheet utility. If we are unsatisfied with the projections for any of the income statement items, we can change the cell values. The changes will carry over to adjust net income, net cash flow, which will yield the revised NPW and IRR figures. Obviously, the potential for “what-if” analysis is almost unlimited. For this purpose, we normally group the input parameters at the beginning of the worksheet and express the cell formulas as functions of these input parameters. As you change one or more of these parameters, any changes in the net cash flows are immediately posted in the worksheet. For example, what will happen to the profitability of the project if the firm’s MARR changes from 18% to

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1 EzCash has an Excel-like spreadsheet utility with many built-in financial functions to facilitate after-tax cash flow analysis. For example, EzCash can automate the entire analysis with built-in computational tools for calculating depreciation and loan interest.
Exhibit 1 Automating the process of developing a cash flow statement with Excel for data in Example 12.4