Computer Notes on Incorporating Inflation In Economic Analysis

Many of the examples in this chapter were presented in tabular format—for example, Table 13.2. This same tabular format lends itself very easily to electronic spreadsheet analysis. The effects of inflation can be easily taken into account by using an electronic spreadsheet. We will seek an Excel solution to the following example:

Excel spreadsheet analysis including differential inflation

Problem Statement:

A construction firm is offered a fixed-price contract for a 5-year period. The firm will be paid $23,500 per year over the contract period. In order to accept the contract, the firm must purchase equipment costing $15,000 and requiring $13,000 (constant dollars) per year to operate. The equipment qualifies for 5-year MACRS depreciation and is expected to have a salvage value of $1000 (constant dollars) at the end of 5 years. Use a tax rate of 40% and an inflation-free interest rate of 20%. If the general inflation rate (\(f\)) is expected to average 5% over the next 5 years, salvage value at an annual rate of 5%, and operating expenses at 8% per year for the project duration, should the contractor accept the contract?

(a) Constructing an after-tax cash table with Excel

The analysis of this situation should explicitly consider inflation because the contractor is being offered a fixed-price contract and cannot increase the fee to compensate for increased costs. In this problem, as is common practice, we assume that all estimated costs will be expressed in today’s dollars, and actual costs will be increased due to inflation.

The Excel spreadsheet analysis is shown in Exhibit 1, where the first four rows are designated as input fields. Column C in both the income statement and the cash flow statement is reserved for entering the specific inflation rate for the item listed in that row. In row 12, operating expenses are increased at 8% due to inflation. We can automate the O&M cell entries by using the following cell formulas:

\[
\begin{align*}
\text{Cell E12} & = D2 \times (1 + C12) \\
\text{Cell D12} & = E12 \times (1 + C12) \\
\text{Cell I12} & = H12 \times (1 + C12)
\end{align*}
\]

Note that the salvage value in cell I27 is also increased at 5%. (When no inflation rate is given for a specific cost category, it is assumed that the general inflation rate holds.) Gains taxes on disposal are based on the difference between book value and salvage value, in this case, $1276 – $1728 = ($452), or a loss of $452. This results in a tax savings of ($452)(0.40) = $181, as shown in cell I28.

As explained in this chapter, actual-dollar cash flows are converted to constant-dollar flows by “deflating” at the general inflation rate. The IRR is calculated at 22.03%,
based on constant-dollar cash flows. This amount is compared to a MARR of 20%, the inflation-free interest rate, indicating the contract is acceptable as long as the 5% and 8% inflation rates are correct.

Exhibit 1 Excel example of an-after-tax cash flow analysis including differential Inflation rates

(b) Break-even analysis with Excel’s Goal Seek command

Since it is impossible to predict inflation rates in any precise manner, it is always wise to investigate the effects of changes in these rates. This is very easy to do with a spreadsheet. For example, we can easily determine the value of the general inflation rate at which this project exactly earns 20%. The value of \( f \) could be adjusted manually until the IRR' was exactly 20% or the NPW becomes zero.

A more efficient way to solve such a break-even problem is to use the Goal Seek command on the Tools menu.
adjusting the values of one or more cells or to apply specific limitations to one or more values involved in the calculation, you can use Microsoft Excel Solver.)

To illustrate the steps to be taken to use the Goal Seek command, consider the Goal Seek menu screen in Exhibit 2.

![Exhibit 2: Excel's “Goal Seek” command](image)

Step 1: Select the target cell containing the formula. In our example, cell C36 contains the NPW formula, so enter $C$36 in the Set cell box.

Step 2: Enter 0 in the To value box, because we are seeking the NPW to be zero.

Step 3: Enter $H$2 in the By changing cell box, because the value of the general inflation rate is stored in cell H2. Note that H2 is the reference or name of the cell containing the variable that you want adjusted until the goal is reached.

Step 4: Press the OK button to seek the solution. From Exhibit 3, we see that this would not be a good project if \( f \) were greater than 6.77% (cell H2). (Note that at the exact value of \( f \) (6.771%), the NPW in cell C36 will be zero, or its rate of return will be 20%.) Similarly, you can vary the O&M cost and salvage value to see how the project’s profitability changes.
Exhibit 3 Excel application to “what if” questions - at what general inflation rate does the project break even?