**CAPITAL BUDGETING UNDER CONDITIONS OF INFLATION**

Inflation refers to an increase in price levels or a decline in purchasing power of money. During periods of inflation, nominal revenues and costs increase but debt obligations and the cost of capital may remain unchanged. When evaluating investment proposals under conditions of inflation, we adjust the future cash flows using the prevailing inflation rates. An alternative and simpler approach is to adjust the discount rate/ hurdle rate using the inflation rate. To make these adjustments, we use the Fischer equation.

**Illustration**

Assume an investor lends Ksh. 100 and expects to receive Ksh. 115.50 at the end of the year which includes principal and interest. Assume that the prevailing inflation rate is 5%. Determine the equivalent value of the cash flow at the end of one year from now. Determine the real rate of interest.

**Solution**

To get real rate of interest, we adjust the interest in the Ksh. 115.50 (i.e. the Ksh. 15.50) for inflation.

FV= PV (1+r) n

=100(1+5%)= Ksh. 105.00thus you would need an equivalent of Ksh. 105 in one year to purchase a basket of goods worth Ksh. 100 today. Thus the real interest rate (the nominal rate adjusted for inflation) will be:

= 115.5-105= Ksh. 10.50

=10%.

Using the Fischer equation, the adjusted discount rate to use for evaluating projects is calculated as follows:

M is the cost of capital.

J is the inflation rate.

**Example 1**

You plan to purchase a heavy commercial vehicle that goes for Ksh. 10,500,000.00. You expect that the vehicle will generate a cash flow of Ksh. 2,500,000.00 per annum for 6 years after which you expect to dispose the vehicle off for Ksh. 1,500,000.00. Given that your cost of capital is 15%, and the prevailing inflation rate is 6%, is it wise to invest in this project.

**Solution**

We have 2 options

1. Adjust the cost of capital/ discount rate.
2. Adjust the cash flow.

Adjusting the discount rate is by far the easiest.

= 8.5%. We then use this adjusted cost of capital to evaluate the project. Do this!

Option 2 is to adjust cash flows, the approach is as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | cash flow (Ksh. 000) | Inflation Adjusted cash flow | PVIFn,15% | TOTAL |
| 0 | (10,500) | 1 |  |  |
| 1 | 2500 | 2500(1+10%) 1 |  |  |
| 2 | 2500 | 2500(1+10%) 2 |  |  |
| 3 | 2500 | 2500(1+10%) 3 |  |  |
| 4 | 2500 | 2500(1+10%) 4 |  |  |
| 5 | 4000 (2500+1500) | 4000(1+10%) 5 |  |  |

**CAPITAL BUDGETING UNDER CONDITIONS OF RISK**

Risk arises when the future is uncertain and where a range of possible future outcomes is expected. Risk can also arise when there is a possibility of the actual outcome deviating from the expected outcome. Uncertainty may vary with the time period such that the variables that occur much later into the future (e.g. salvage value) may be more uncertain than those that occur much sooner, (e.g. initial cost). The following assumptions are made when making capital budgeting decisions under conditions of risk.

1. The set of possible net investment values for an investment alternative are known with certainty.
2. Each set of possible cash flows is known with certainty.
3. The required rate of return is a function of the risk return characteristics of a project.
4. Decision makers/ managers are risk averse.

The tools of analysis applied are

1. Simple tools of analysis;
   1. Expected monetary value (EMV).
   2. The standard deviation.
   3. The coefficient of variation.
   4. The Beta coefficient.
2. Complex tools of analysis
   1. Sensitivity analysis.
   2. Utility theory.
   3. Simulation analysis.

**Simulation analysis**

Consider the following scenario:

A project is expected to generate the following cash flows

|  |  |
| --- | --- |
| Probability | Cash flow (Ksh. Millions) |
| 0.2 | 2 |
| 0.3 | 1.5 |
| 0.4 | 3 |
| 0.1 | 4 |

Run a simulation analysis on the cash flows on the project. Use the following random numbers 20, 25, 19, 50, 60, 90, 95.

Simulation is a statistically based behavioral approach that applies predetermined probability distribution and random numbers to estimate the outcome of variables of risky investments. By using different values the decision maker can develop a probability distribution. This analysis helps the decision maker to let all decision factors change simultaneously or at the same time and the effects of such simultaneous change analyzed.

In the illustration above, we shall approach in the following way:

|  |  |  |  |
| --- | --- | --- | --- |
| Probability | Cum probability | Random numbers (\*) | Cf (Millions) |
| 0.2 | 0.2 (20) | 00-19 | 2 |
| 0.3 | 0.5 (50) | 20-49 | 1.5 |
| 0.4 | 0.9 (90) | 50-89 | 3 |
| 0.1 | 1 (100) | 90-99 | 4 |

From this analysis, the rate is:

|  |  |
| --- | --- |
| Random numbers | CF(Millions) |
| 20 | 1.5 |
| 25 | 1.5 |
| 19 | 2 |
| 50 | 3 |
| 60 | 3 |
| 90 | 4 |
| 95 | 4 |

**Sensitivity analysis**

This is also called the ‘what if’ analysis. This is a behavioral approach that uses a number of possible values for a given variable. It is a way of analyzing changes in projects NPV, IRR for a given change in one decision variable.