Project Selection

Selection Based on the IRR

There are several circumstances that use the IRR as a measure for selection. In this lecture we select a subset of projects from an available set of alternatives.

This Lecture

Given a set of projects:
Select the subset given the MARR
Select the subset with a restriction on total investment budget

There are two cases. In the first the MARR is given and there is no limit to the investment budget, and second we consider when there is a restriction on the total of the amount invested.

Given the MARR

Suppose we can select any subset of the projects
Solution Methodology:
Compute the IRR of each alternative
Select every project that has IRR ≥ MARR

This selection procedure is simple. Compute the IRR values of the alternatives, and select all that return more than the minimum acceptable rate of return.

Example

Each year the several departments in a hospital corporation propose projects with different investment amounts, annual net incomes and lives. The corporation must choose from the proposals. The MARR is 25%.

Most organizations have capital to invest. A cash flow statement describes the capital sources. Capital sources include profits not paid out in dividends, called retained earnings, contributions from stockholders and depreciation. At some time in the year, an organization may have a capital planning session where all the alternative capital projects are listed and management must select those to be pursued during the next year. The example shows ten projects, each with different investments, annual incomes, salvage values and lives. The data is simplified for illustration, but in fact the projects may have more complicated cash flows.
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Analysis
- Compute the IRR of each alternative
- Select projects that have IRR ≥ MARR
Select: 2, 3, 4, 6, 7, 9 and 10.
This assumes an unlimited budget

The analysis on this slide was provided by the Portfolio add-in. Using the MARR of 25%, the net present worth and IRR values are computed for each alternative. The selected subsets all have nonnegative NPW values and IRR values that exceed 25%. The total investment for the selected projects is the sum of the individual investments.

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Limited Budget
- What if the budget for investments is limited to $5000?
- Rank the alternatives by IRR, highest first. Select projects in rank order until the cumulative investment for the next project is greater than the budget.
  - The selection: 2, 6, 7 and 10 comes close.

More realistic planning recognizes a limited budget. The procedure described here ranks the alternatives in order of decreasing IRR. The process adds projects to the selection until one project would violate the budget constraint. Our solution uses slightly more than the amount available because leaving out project 10 would have left over $1000 unspent.

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Capital Budgeting
- The solution shown is approximate because it uses more than $5000 budget.
  - The discrete nature of the investments makes the problem difficult.
  - Integer programming finds the optimum.

The simple procedure can only lead to an approximate solution because of the discrete nature of the projects. Integer Programming is one of the methods of Operations Research that finds the optimum solution. For the example, the optimum for the $5000 budget includes only 2, 6 and 7.
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In Reality
The Project Selection problem is more complicated.
Projects are measured with multiple criteria.
Projects will probably involve risk.
More complicated analysis methods are available.

Our treatment is only a very basic introduction to this question. In fact projects are measured with many criteria besides economic ones and most situations also involve risk. More advanced methods deal with these limitations.

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Summary
The IRR provides a measure for ranking projects.
For a given MARR select all projects with IRR \( \geq \) MARR
With an investment budget, select projects in order of decreasing IRR until the cumulative investment for the next project is greater than the budget. (or adjust the budget slightly)

The internal rate of return can be used for ranking projects in a project selection scenario. When only the MARR is given, choose all projects with rates exceeding the minimum. With a budget, an approximate method is to choose the projects with the highest rates until one more project would cause the budget to be exceeded.