8. Investment Projects. Criteria for Capital Budgeting.

1.1 Criteria for Capital Budgeting

1.1.1 An Overview

In making capital budgeting decisions, managers must use both strategic qualitative evaluation and quantitative analysis to determine whether the project is wealth increasing. The process of determining exactly which assets to invest in and how much to invest is called **capital budgeting**. The cash outlays, called **capital expenditures**, are usually incurred to obtain **capital assets**.

The capital budgeting is a complex process that includes several activities:

- the search for new profitable investment,
- marketing and production analyses,
- financial forecasts (cash flow estimation),
- economic analysis,
- evaluation of proposals,
- control and monitoring of past projects.

Cash Flows Relevant to Capital Budgeting

Not all cash flows are relevant to capital budgeting.

- Capital budgeting does not focus on all of the firm's operating cash flows, but only on the **incremental cash flows after taxes**, denoted as CFATs, which occur if and only if an investment project is accepted.
- **Only future cash flows are relevant**. A common mistake is to include historical or sunk costs in the analysis.

Classification of Cash Flows After Tax (CFAT)

- Initial CFAT
- Operating CFAT
- Terminal CFAT

Initial cash flows

Direct cash flows	Indirect cash flows
Capital expenditures	After-tax proceeds of old assets sold
Operating expenditures	Change in net working capital

Operating cash flows

(1) $\Delta CFAT = (\Delta S - \Delta C - \Delta D)(1-T) + \Delta D$

T is tax rate.

Terminal cash flows

- Salvage (scrap) value of the assets.
- Recovery of net working capital.

1.1.2 Basic Criteria

A criterion or rule is needed as the basis for deciding whether a particular project should be adopted. The conceptually sound criteria are following:

- net present value (NPV)
- internal rate of return (IRR)
- profitability index (PI).

Net Present Value Criterion

Formally,

(2) $NPV = PV_{inflows} - Pv_{outflows}$

It is implicitly assumed that the intermediate cash flows from a project are reinvested at the opportunity cost of capital. If the NPV is positive, it earns more than RRR and produces excess returns. NPV measures the economic profit created by accepting the project. Accepting a project with a positive NPV increases the company's market value by that amount. The NPV is superior to all other criteria for making correct capital budgeting decisions.

Internal Rate of Return Criterion

The IRR is the discount rate that makes the excess market value (NPV) of a project 0. Alternatively, the IRR is the discount rate that makes the present value of an investment's cash inflows equal to the present value of its cash outflows. **The IRR rule is accept a project if IRR > RRR and to reject the project if IRR < RRR.**

Profitability Index Criterion

The profitability index (PI) is simply a different way of presenting the same information that the NPV provides. The PI is the ratio of these two values:

(3) $$PI = \frac{PV_{inflows}}{PV_{outflows}}$$

The PI rule accepts projects if PI > 1 and rejects projects if PI < 1.

Payback Period Criterion

The payback period for a project measures the number of years required to recover the initial investment.

(4) $$\text{Payback period} = \frac{\text{initial investment outlay}}{\text{annual cash inflows}}$$

The discounted payback period is the number of years it takes for the discounted cash flows to yield the initial investment. It still ignores all cash flows beyond the discounted payback period.

Accounting Rate of Return Criterion

The **accounting rate of return criterion** (AROR) relates the profits provided by a project to its average investment:

(5) $$AROR = \frac{\text{annual profit}}{\text{average investment}}$$