

1 Introduction



Key terms:

Capital Budgeting – it is the process of planning expenditures on assets whose cash flows are expected to extend beyond one year.

Strategic Business Plan – it is a long-run plan which outlines in broad terms the firm's basic strategy for the next 5 to 10 years.

1.1 Capital budgeting process is:

- An outline of planned investments in fixed assets.
- Long-term decisions; a process of analyzing projects and deciding which ones to include in the capital budget.

1.2 There are two types of investment decisions:

- a) **Selection decisions** concerning proposed projects (for example, investments in long-term assets such as property and plant; and
- b) **Replacement decisions** (for example, replacement of existing facilities with new facilities).

1.3 Importance of Capital Budgeting:

A firm's capital budgeting decisions define its strategic direction, because moves into new products, services, or markets must be preceded by capital expenditures.

Consequences of erroneous forecast of asset requirements:

- Over-investment results in unnecessarily high depreciation and other expenses
- Equipment may not be sufficiently modern to enable it to produce competitively
- Under-investment may result in lost in market share to competitors

2 Project Classifications

2.1 Accordingly, firms generally categorize projects and then analyze those in each category somewhat differently:

- **Replacement:** maintenance of business
- **Replacement:** cost reduction
- **Expansion** of existing products or markets
- **Expansion** into new products or markets
- **Safety** and/or **environmental** projects
- **Other**

2.2 Steps in capital budgeting process:

Step 1: Determine the cost of the project.

Step 2: Management estimates the expected cash flows from the project, including the salvage value of the asset at the end of its useful life.

Step 3: The risks associated with the projected cash flows are estimated. This requires information about the probability distribution (uncertainty) of the cash flows.

Step 4: Given the project's risks, the cost of capital at which the cash flows should be discounted is determined.

Step 5: The expected cash inflows are put on a **present value basis** to obtain an estimate of the asset's value to the firm.

Step 6: Finally, the present value of the expected cash inflows is compared with the required outlay, or cost.

2.3 The **initial investment** is *cost of the project plus installation cost minus the proceeds from sale of the old asset plus or minus taxes on the sale of old asset.*

2.4 After-tax cash inflows equal net profits after taxes plus depreciation.

3 Capital Budgeting Decision Rules:

3.1 Five key methods are used to rank projects and to decide whether or not they should be accepted for inclusion in the capital budget:

- Payback
- Discounted payback
- Net present value (NPV)
- Internal rate of return (IRR)
- Accounting rate of return (ARR)

3.2 *Payback Period*

- Definition: It is the length of the time required for an investment's net revenues to cover its cost. It is the expected number of years required to recover the original investment.
- Rules: The shorter the payback period, the less risky the project and the greater the liquidity.
- Formula: $\text{Payback} = \text{Year before full recovery} + \frac{\text{Unrecovered cost at start of year}}{\text{Cash flow during year}}$
- Strengths: (1) Provides an indication of a project's risk and liquidity (2) Easy to calculate and understand
- Limitations: (1) Ignores the TVM (2) Ignores CFs occurring after the payback period.

3.3 *Discounted Payback Period*

- Definition: The length of time required for an investment's cash flows, discounted at the investment's cost of capital, to cover its cost. **A variant of the regular payback.**
- Rules: The shorter the payback period, the less risky the project and the greater the liquidity.
- Formula: $\text{Payback} = \text{Year before full recovery} + \frac{\text{Unrecovered cost at start of year}}{\text{Discounted cash flow}}$
- Strengths: (1) Provides an indication of a project's risk and liquidity (2) Takes into the time value of money (TMV)
- Limitations: (1) Ignores CFs occurring after the payback period.

3.4 *Net Present Value*

Definition: A method of ranking investment proposals using the NPV, which is equal to the present value of future net cash flows, discounted at the marginal cost of capital.

Rules: The NPV method is also known as the **Discounted Cash Flow** method. If the NPV is **positive**, the project should be accepted, while if the NPV is negative, it should be rejected. If two projects with positive NPVs are mutually exclusive, the one with the higher NPV should be chosen.

Formula:
$$NPV = \sum_{t=0}^n \frac{CF_t}{(1+k)^t}$$

Strengths: Rationale for using the NPV method: $NPV = PV \text{ of cash inflows} - \text{Cost} = \text{Net gain in wealth}$. It recognizes the time value of money and it is easy to compute.

3.5 Internal Rate of Return

Definition: A method of ranking investment proposals using the rate of return on an investment, calculated by finding the discount rate that equates the present value of future cash inflows to the project's cost. Internal rate of return method is also known as the **Discounted Cash Flow** method.

Rules: IRR acceptance criteria = **If IRR > k, accept project.**
If IRR < k, reject project.
Where IRR = internal rate of return and
k = cost of capital

Formula: When cash inflows are **not even**, IRR is computed by the trial-and-error method.

Strengths: (1) It considers the time value of money and is more realistic than the accounting rate of return method.

Limitations: (1) It is time-consuming to compute, especially when the cash inflows are not even (2) Fails to recognize the varying size of investment in competing projects and their respective dollar probabilities.

3.6 Accounting Rate of Return

Definition: used to measure profitability from the conventional accounting standpoint by relating the required investment – or sometimes the average investment – to the future annual net income. Under the ARR method, choose the project with the *higher* rate of return.

Formula: **ARR = $\frac{\text{Net income}}{\text{Investment}}$**

Strengths: (1) Easy to understand (2) Simple to calculate, and recognizes the profitability factor.

Limitations: (1) Ignores time value of money (2) Uses accounting data instead of cash flow data.



Key terms:

Discounted Cash Flow (DCF) – methods for ranking investment proposals that employ time value of money concepts.

Mutually Exclusive Projects – A set of projects where only one can be accepted.

Independent Projects – Projects whose cash flows are not affected by the acceptance or nonacceptance of other projects.

The Internal Rate of Return (IRR) – is defined as the discount rate which equates the present value of a project's expected cash inflows to the present value of the project's costs: **PV (Inflows) = PV (Investment costs)**

4 NPV method v IRR method

Difference between the NPV method and IRR method:

- **NPV and IRR always lead to the same accept/reject decision for independent projects.**
- **NPV assumes reinvest at k (opportunity cost of capital).**
- **IRR assumes reinvest at IRR.**
- **Reinvest at opportunity cost, k, is more realistic, so NPV method is best. NPV should be used to choose between mutually exclusive projects.**

5 Small Firms v Large Firms

Small firms tend to use the payback method rather than a discounted cash flow method (DCF). This may be rational because:

- The cost of conducting a DCF analysis may outweigh the benefits received
- The firm's cost of capital cannot be estimated accurately
- The small business owner may be considering non-monetary goals

Reading/reference materials:

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- Shim J.K. and Siegel J.G. Financial Management. 2nd edition. McGraw-Hill 1998
- Mohr A. Financial Management 101. Advantage Quest Publications Edition 2004