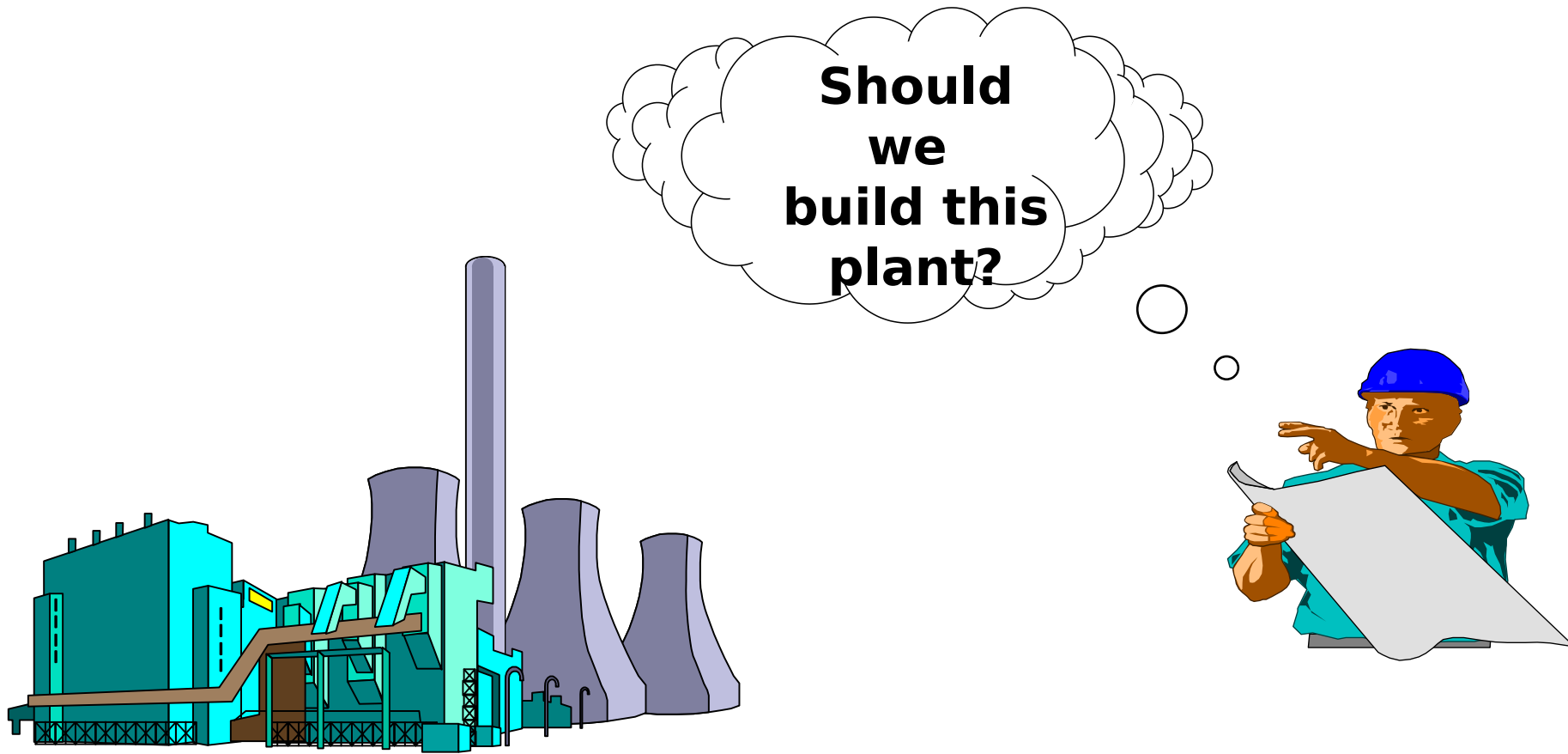


FINANCIAL ACCOUNTING



CAPITAL BUDGETING

Learning Outcomes

1. Understand capital budgeting decisions.
2. Understand how to use different methods of capital budgeting.
3. Understand the importance of capital budgeting decisions in managerial accounting.
4. Calculate and interpret decisions using capital budgeting methods.

BASIC CONCEPTS IN CAPITAL BUDGETING

Capital Budgeting

- **Capital Budgeting** is the process of identifying, evaluating, and implementing a firm's investment opportunities.
- It seeks to identify investments that will enhance a firm's competitive advantage and increase shareholder wealth.
- The typical capital budgeting decision involves a large up-front investment followed by a series of smaller cash inflows.
- Poor capital budgeting decisions can ultimately result in company bankruptcy.

Key Motives for Capital Expenditures

TABLE 8.1

Key Motives for Making Capital Expenditures

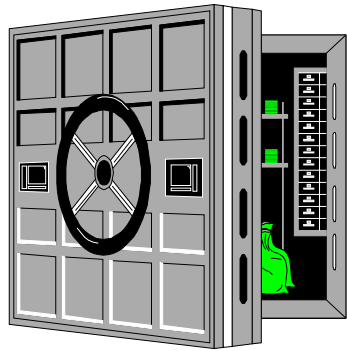
Motive	Description
Expansion	The most common motive for a capital expenditure is to expand the level of operations—usually through acquisition of fixed assets. A growing firm often needs to acquire new fixed assets rapidly, as in the purchase of property and plant facilities.
Replacement	As a firm's growth slows and it reaches maturity, most capital expenditures will be made to replace or renew obsolete or worn-out assets. Each time a machine requires a major repair, the outlay for the repair should be compared to the outlay to replace the machine and the benefits of replacement.
Renewal	Renewal, an alternative to replacement, may involve rebuilding, overhauling, or retrofitting an existing fixed asset. For example, an existing drill press could be renewed by replacing its motor and adding a numeric control system, or a physical facility could be renewed by rewiring and adding air conditioning. To improve efficiency, both replacement and renewal of existing machinery may be suitable solutions.
Other purposes	Some capital expenditures do not result in the acquisition or transformation of tangible fixed assets. Instead, they involve a long-term commitment of funds in expectation of a future return. These expenditures include outlays for advertising, research and development, management consulting, and new products. Other capital expenditure proposals—such as the installation of pollution-control and safety devices mandated by the government—are difficult to evaluate because they provide intangible returns rather than clearly measurable cash flows.

Steps in the Capital Budgeting Process

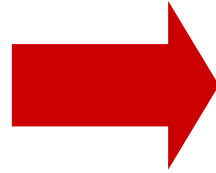
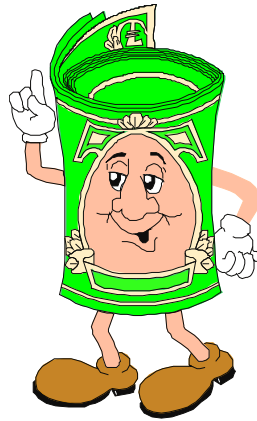


- Proposal Generation
- Review and Analysis
- Decision Making
- Implementation
- Follow-up

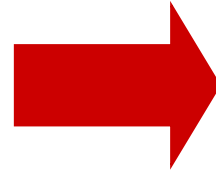
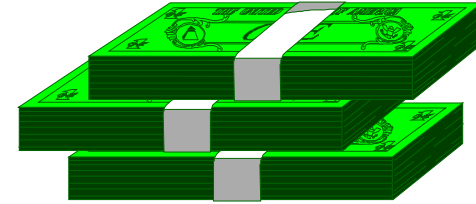
What are Cash Inflows?



**Cash
inflows**



**Investment
opportunity**



**Cash
outflows**

Example: Cash Inflows

	Cash Inflows	PV Factor	PV of Cash Inflows
Revenues	\$ 3,000	7.7160	\$ 23,148
Salvage value	5,000	0.3855	1,928
<hr/>			
Total present value of cash inflows.			\$ 25,076

Forecasting Cash Flows

Depreciation is not a cash flow, but it

Revenue affects taxation

- **Cost of Goods Sold**

- **Depreciation**

- **Selling, General & Admin.**

= Operating Profit

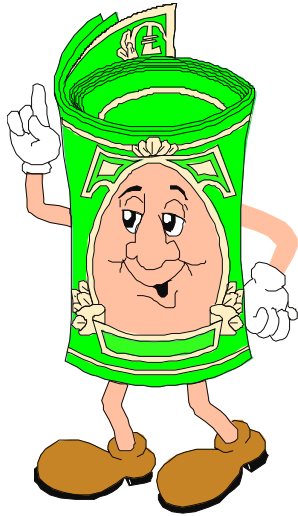
- **Taxes on Operating Profit**

= Net Operating Profit After Tax

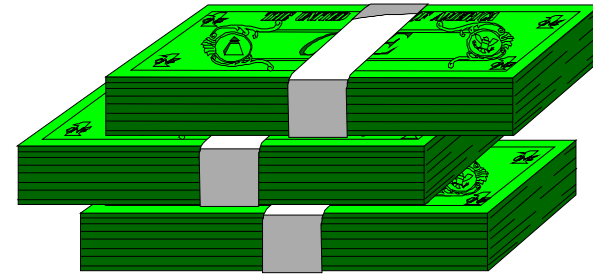
± Depreciation

= Cash Flow from Operations

What are Cash Outflows?



**Investment
opportunity**



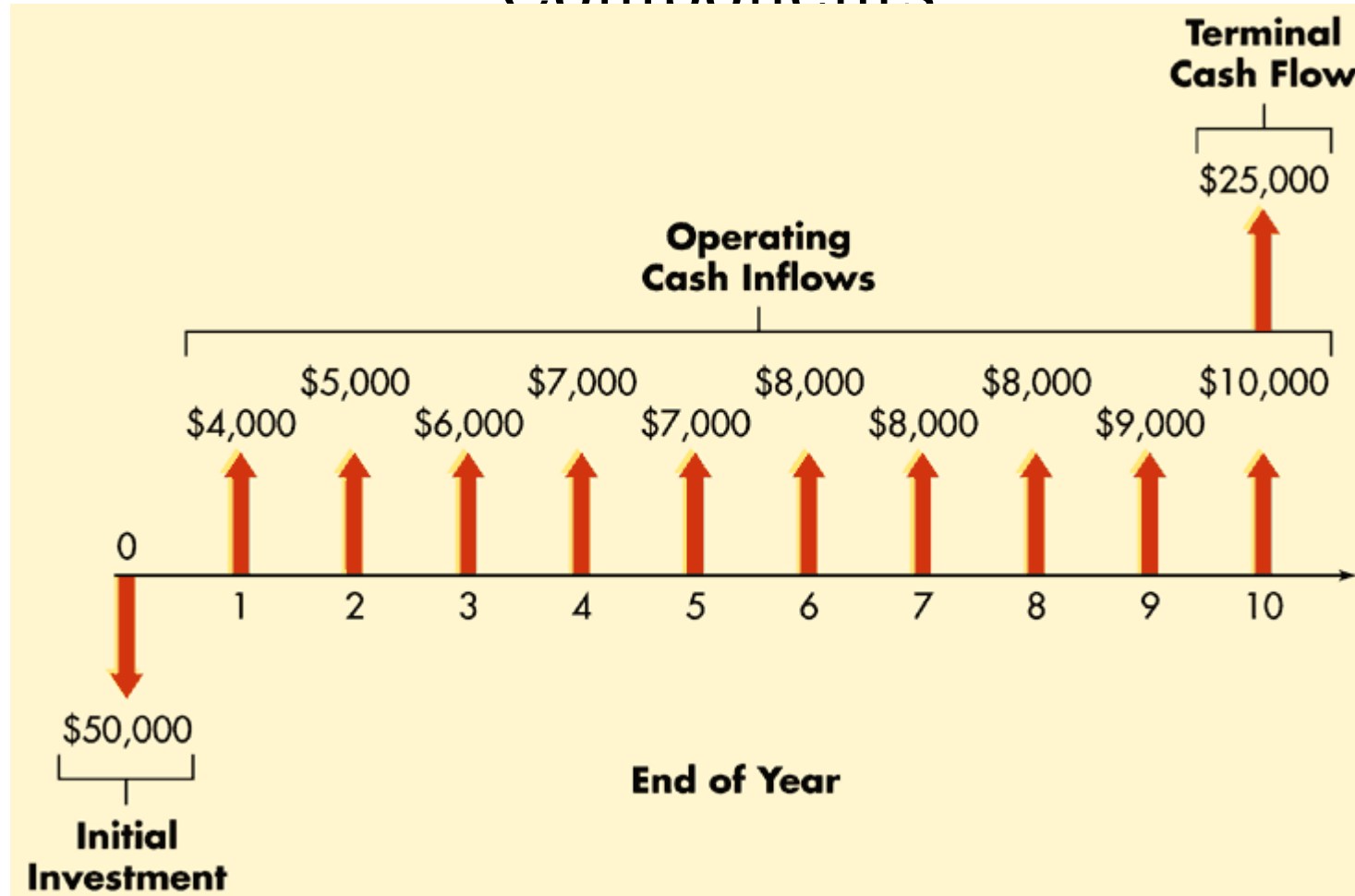
**Cash
outflows**

Example: Cash Outflows

	Cash Outflows	PV Factor	PV of Cash Outflows
Initial cash outlay.	\$ 20,000	1.0000	\$ 20,000
Future cash outlay.		5,0000.6302	<u>3,151</u>
Total present value of cash outflows.			<u>\$ 23,151</u>

Relevant Cash Flows

Major Cash Flow Components



NON-DISCOUNTED CAPITAL BUDGETING TECHNIQUES

Capital Budgeting Techniques

Non-discounted capital budgeting techniques do not take into account the time value of money. What are two common techniques?

Accounting Rate of Return

payback *Period*

Capital Budgeting Techniques

Discounted capital budgeting techniques take into account the time value of money. What are two common techniques?

Net Present Value

Internal Rate of Return

Accounting Rate Of Return (ARR)

Can be computed from available accounting data

$$ARR = \frac{\text{Average profits after tax}}{\text{Average investment}}$$

**ARR uses accounting numbers, not cash flows;
no time value of money.**

ILLUSTRATION

Determine the average rate of return from the following:

(Estimated life is 5 years)

	Machine A	
Machine B		
Cost	\$ 56,125	\$
56,125		
Annual Income		
Year 1	3,375	
11,375		
2	5,375	
9,375		
3	7,375	
7,375		

Payback Period

The payback period is the amount of time required for the firm to recover its initial investment.

- If the project's payback period is *less than* the maximum acceptable payback period, *accept* the project.
- If the project's payback period is *greater than* the maximum acceptable payback period, *reject* the project.

Management determines maximum acceptable payback period.

Pros and Cons of Payback Method

Advantages of payback method:

- **Computational simplicity**
 - **Easy to understand**
 - **Focus on cash flow**

Disadvantages of payback method:

- **Does not account properly for time value of money**
 - **Does not account properly for risk**
 - **Cutoff period is arbitrary**
- **Does not lead to value maximizing decisions**

ILLUSTRATION

- (1) An investment of \$ 40,000 in a machine is expected to produce CFAT of \$ 8,000 for 10 years. What is the **payback period**?
- (2) The Initial investment for both the machines is \$56,125.

Annual CFAT

A

B

Year 1	\$ 14,000	\$ 22,000
2	16,000	20,000
3	18,000	18,000
4	20,000	16,000
5	25,000	17,000

Calculate the **payback period**?

DISCOUNTED CAPITAL BUDGETING TECHNIQUES

Net Present Value

The net present value (NPV) method is the classic economic method of evaluating the investment proposals

It is a DCF technique that recognises the time value of money

The exercise involved in calculating the present value is known as discounting and the factors by which the cash flows are multiplied are known as discount factors

Discounted Cash Flows



The capital budgeting techniques that best recognize the time value of money are those that involve discounted cash flows.

The Net Present Value Method

To determine net present value we . . .

- ① Calculate the present value of cash inflows,
- ② Calculate the present value of cash outflows,
- ③ Subtract the present value of the outflows from the present value of the inflows.



The Net Present Value Method

**If the Net Present
Value is . . .**

Positive . . .

Zero . . .

Negative . . .

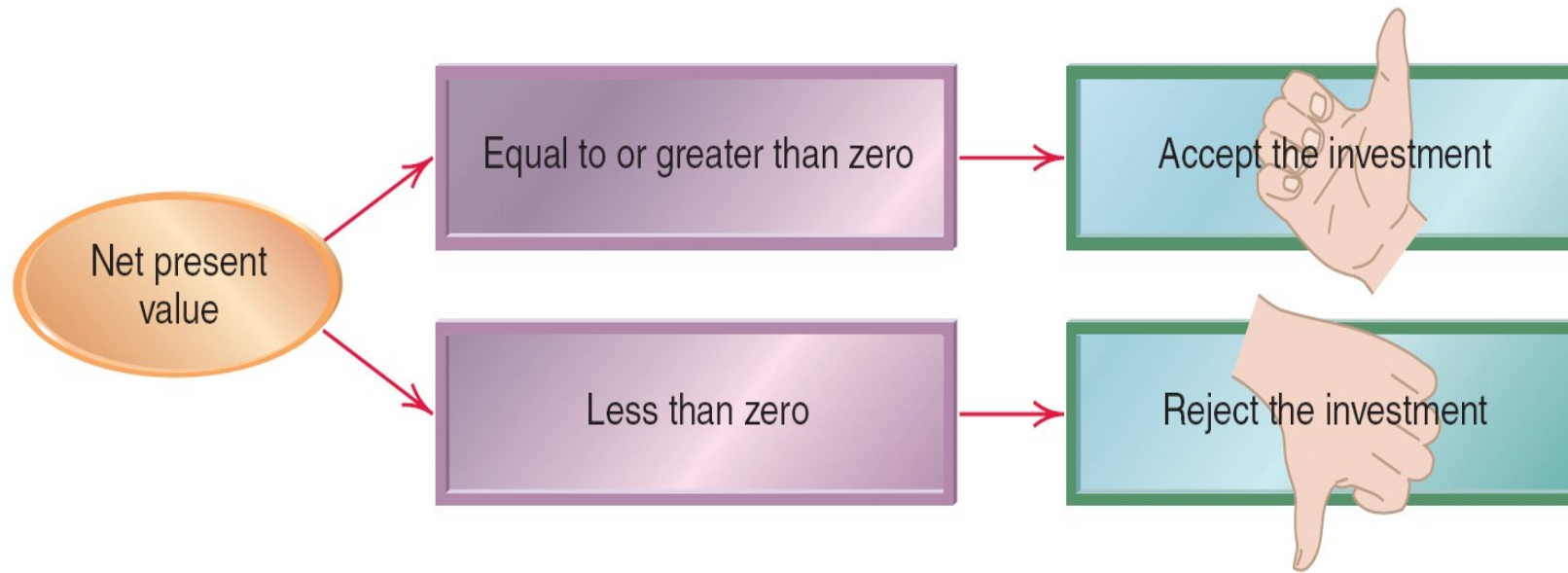
Then the Project is . . .

**Acceptable, since it promises a
return greater than the required
rate of return.**

**Acceptable, since it promises a
return equal to the required rate
of return.**

**Not acceptable, since it promises
a return less than the required
rate of return.**

Net Present Value Approach

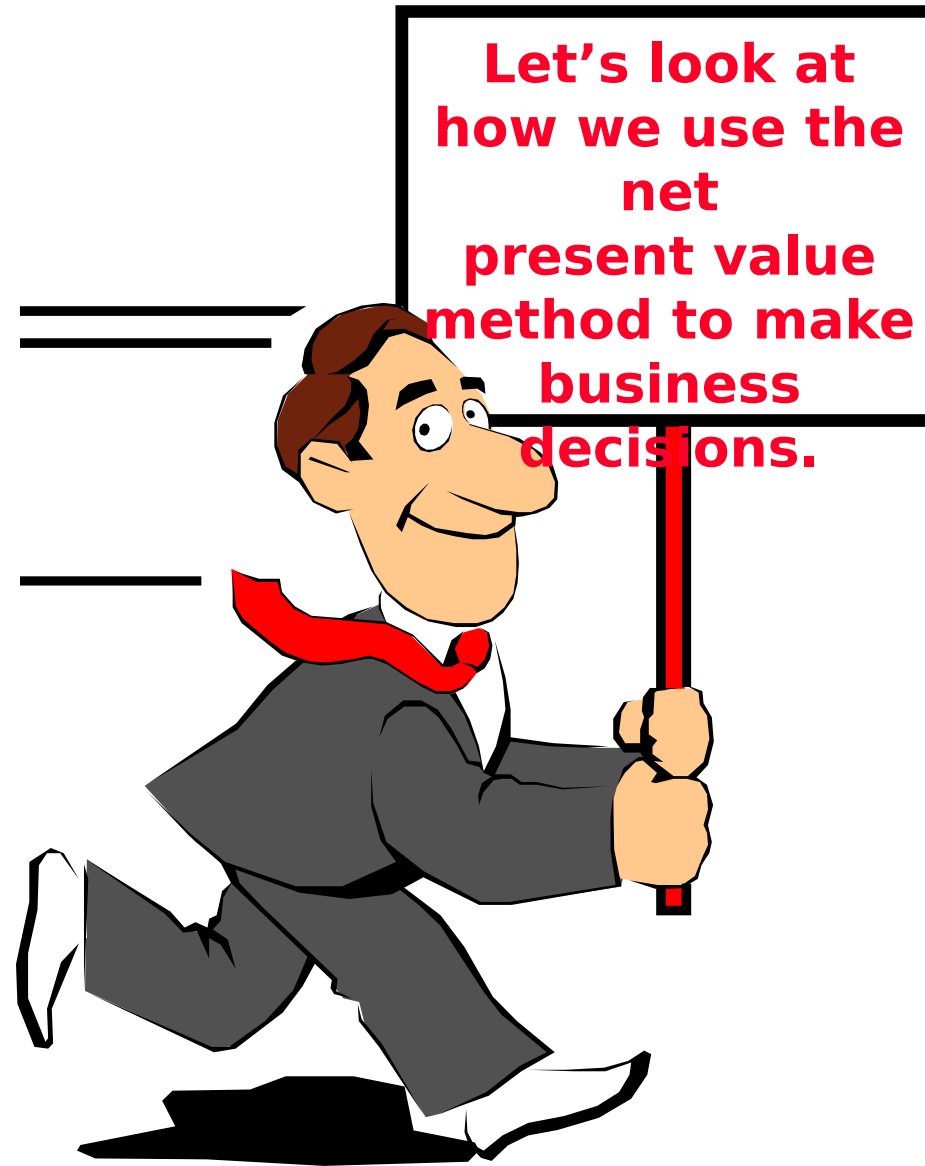


The Net Present Value Method

Net present value analysis emphasizes cash flows and not accounting net income.



The Net Present Value Method



Problem 1(a)

ABC company invests in two projects: A and B. Each project has a cost of \$50,000, and the cost of capital for each project is 10%. The project's expected net cash flows are as follows:

Problem 1(a)

Expected Net Cash Flows

Year	Project A	Project B
0	(\$50,000)	(\$50,000)
1	12,000	16,000
2	24,000	13,000
3	30,000	25,000
4	10,000	15,500

Problem 1 (a and b)

- Calculate each project's payback period and the net present value (NPV)?
- Which project or projects should be accepted if they are mutually exclusive?
- Which project should be accepted if they are independent?

Internal Rate of Return Method

- The **internal rate of return** is the rate of return promised by an investment project over its useful life. It is computed by finding the discount rate that will cause the **net present value** of a project to be **zero**.
- It works very well if a project's cash flows are identical every year. If the annual cash flows are not identical, a trial and error process must be used to find the internal rate of return.



Internal Rate of Return Method

General decision rule . . .

<u>If the Internal Rate of Return is . . .</u>	<u>Then the Project is . . .</u>
Equal to or greater than the minimum required rate of return . . .	Acceptable.
Less than the minimum required rate of return . . .	Rejected.



Advantages and Disadvantages of IRR

Advantages of IRR:

- **Properly adjusts for time value of money**
- **Uses cash flows rather than earnings**
 - **Accounts for all cash flows**

Disadvantages of IRR

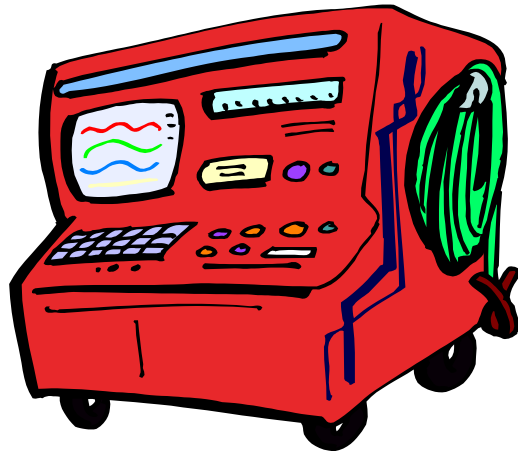
- **“Mathematical problems”: multiple IRRs, no real solutions**
 - **Problems in calculations**

NPV Vs IRR

- Unlike the NPV method, calculating the value of IRR is more difficult.
- The procedure will depend on whether the cash flows are annuity or mixed streams.

Internal Rate of Return Method

ABC Company can purchase a new machine at a cost of \$ 104,320 that will save \$ 20,000 per year in cash operating costs. The machine has a 10-year life. Find the internal rate of return



Internal Rate of Return Method

Future cash flows are the same every year in this example, so we can calculate the internal rate of return as follows:

PV factor for the internal rate of return = $\frac{\text{Investment required}}{\text{Net annual cash flows}}$

$$\text{\$ } \frac{104,320}{20,000} = 5.216$$

Internal Rate of Return Method

Using the present value of an annuity of one dollar table . . .

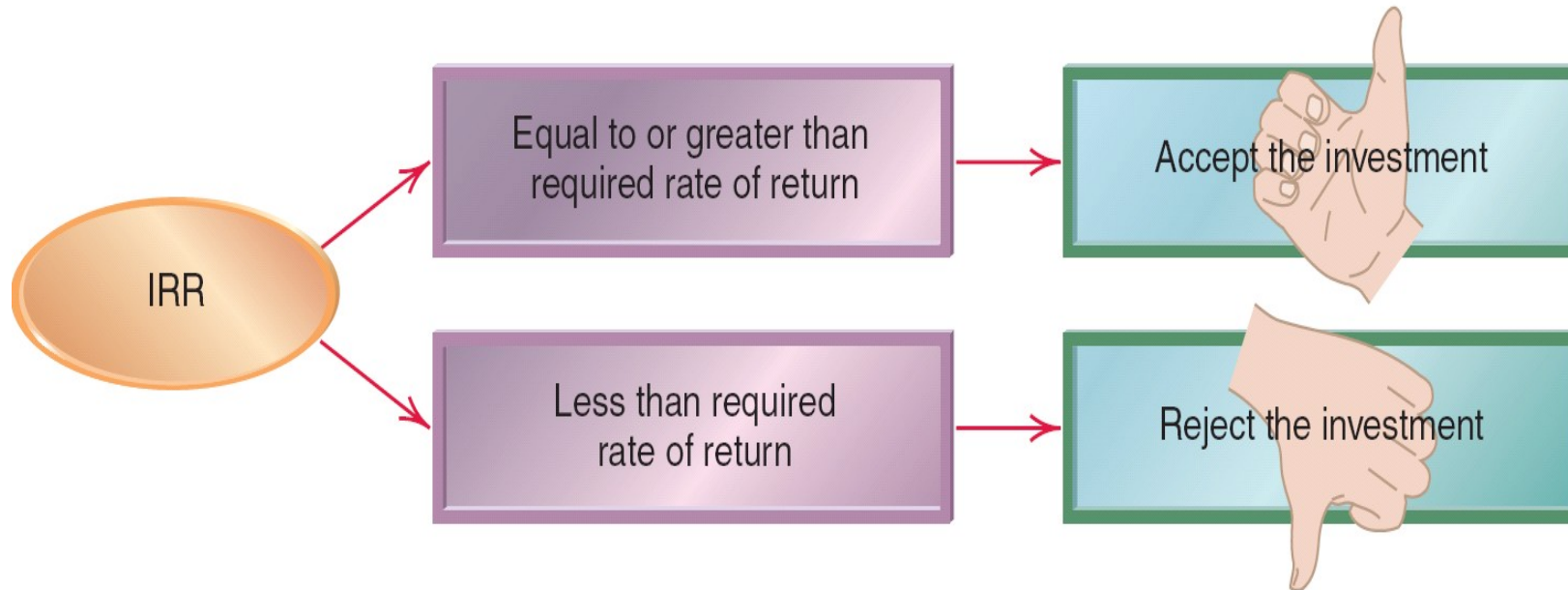
Find the 10-period row, move across until you find the factor 5.216. Look at the top of the column and you find a rate of 14%

Periods	10%	12%	14%
1	0.909	0.893	0.877
2	1.736	1.690	1.647
...	...	...	...
9	5.759	5.328	4.946
10	6.145	5.650	5.216

Internal Rate of Return Method

**The internal rate of
return on this project is
14%.**

Internal Rate of Return Method



Quick Check □

The expected annual net cash inflow from a project is \$22,000 over the next 5 years. The required investment now in the project is \$79,310. What is the internal rate of return on the project?

- a. 10%
- b. 12%
- c. 14%
- d. Cannot be determined

Quick Check □

The expected annual net cash inflow from a project is \$ 22,000 over the next 5 years. The required investment now in the project is \$79,310. What is the internal rate of return on the project?

a. 10%

☒ b. 12%

c. 14%

d. Cannot be determined

Profitability Index

- **PI or Benefit-cost ratio (B/C Ratio)** is another time-adjusted capital budgeting technique
- It is similar to NPV approach and gives the same result as NPV
- It measures the present value of returns per dollar invested, while the NPV is based on the difference between the present value of future cash inflows and the present value of cash outlays

Profitability Index

- A major shortcoming of the NPV method is that, being an absolute measure, it is not a reliable method to evaluate projects requiring different initial investments
- The PI method provides a solution to this kind of problem
- It is, in other words, a relative measure

Profitability Index

It may be defined as:

- The ratio which is obtained dividing the present value of future cash inflows by the present value of future cash outlays. Symbolically,

$$\text{PI} = \frac{\text{Present value of cash inflow}}{\text{Present value of cash outflows}}$$