Capital Budgeting Decisions

Chapter 12 – Part I

Capital Budgeting Decisions

Capital budgeting is used to describe how managers plan *significant investments* in projects that have *long-term implications* (realize future net cash inflows)

Typical Capital Budgeting Decisions

- Plant expansion
- Equipment selection
- Lease or buy
- Equipment replacement
- Cost reduction

Types of Capital Budgeting Decisions

Capital budgeting tends to fall into two broad categories.

1. **Screening decisions**. Does a proposed project meet some preset standard of acceptance?
2. **Preference decisions**. Selecting from among several competing courses of action.

Cash Flows versus Operating Income

- Payback Method
- Net Present Value
- Internal Rate of Return
  - These methods focus on analyzing the ***cash flows*** associated with capital investment projects.
- The simple rate of return method focuses on ***incremental net operating income***.

Typical Cash Outflows

- Repairs and maintenance
- Initial investment
- Incremental operating costs
- Working capital *(difference between current assets–cash, account receivable, inventory- and current liabilities)*

Typical Cash Inflows

- Salvage value
- Reduction of costs
- Incremental revenues *(from a cash flow standpoint)*
- Release of working capital

Time Value of Money

- A dollar today is worth more than a dollar a year from now.
- Therefore, **projects that promise earlier returns are preferable to those that promise later returns**.

- The capital budgeting techniques that best recognize the time value of money are those that involve ***discounted cash flows -> translating the value of future cash flows to their present value***.

Learning Objective 1

Determine the payback period for an investment.

The Payback Method

The payback method focuses on the **payback period**, which is the length of time that it takes for a project to recoup its initial cost out of the cash receipts (inflows) that it generates.

This period is sometimes referred to as *"the time that it takes for an investment to pay for itself"*

The Payback Method – Key Concepts

- The payback method *analyzes cash flows;* however, it *does not consider the time value of money*.
- When the annual net cash inflow is the same each year, this formula can be used to compute the payback period:

$$\text{Payback period} = \frac{\text{Investment required}}{\text{Annual net cash inflow}}$$

The Payback Method – An Example

- Management at the Daily Grind wants to install an espresso bar in its restaurant that
  1. Costs $140,000 and has a 10-year life.
  2. Will generate annual net cash inflows of $35,000.
- Management requires a payback period of 5 years or less on all investments.
- What is the payback period for the espresso bar?

The Payback Method

$$\text{Payback period} = \frac{\text{Investment required}}{\text{Annual net cash inflow}}$$

$$\text{Payback period} = \frac{\$140{,}000}{\$35{,}000}$$

$$\text{Payback period} = 4.0 \text{ years}$$

According to the company's criterion, management would invest in the espresso bar because its payback period is less than 5 years.

Concept Check 1

Consider the following two investments:

	Project X	Project Y
Initial investment	$100,000	$100,000
Year 1 cash inflow	$60,000	$60,000
Year 2 cash inflow	$40,000	$35,000
Year 3 cash inflow	$0	$25,000

Which project has the shortest payback period?

A. Project X
B. Project Y
C. Cannot be determined

Concept Check 1a (1 of 2)

Consider the following two investments:

	Project X	Project Y
Initial investment	$100,000	$100,000
Year 1 cash inflow	$60,000	$60,000
Year 2 cash inflow	$40,000	$35,000
Year 3 cash inflow	$0	$25,000

Which project has the shortest payback period?

A. Project X

B. Project Y

C. Cannot be determined

Answer: A

Concept Check 1a (2 of 2)

- Project X has a payback period of 2 years.
- Project Y has a payback period of slightly more than 2 years.
- Which project do you think is better?

Evaluation of the Payback Method: Criticisms

- Ignores the time value of money (it treats a dollar received today as being of equal value to a dollar received at any point in the future)
- Ignores cash flows after the payback period
- Shorter payback period does not always mean a more desirable investment

Evaluation of the Payback Method: Strengths

- Serves as screening tool
- Identifies investments that recoup cash investments quickly
- Identifies products that recoup initial investment quickly

Payback and Uneven Cash (in)Flows – Part 1

- When the cash flows associated with an investment project change from year to year, the payback formula introduced earlier cannot be used.
- Instead, the unrecovered investment must be tracked year by year.

Year 1	Year 2	Year 3	Year 4	Year 5
$1,000	$0	$2,000	$1,000	$500

Payback and Uneven Cash (in)Flows – Part 2

For example, if a project requires an initial investment of $4,000 and provides uneven net cash inflows in Years 1–5 as shown, the investment would be fully recovered in Year 4.

Year 1	Year 2	Year 3	Year 4	Year 5
$1,000	$0	$2,000	$1,000	$500

Learning Objective 2

Evaluate the acceptability of an investment project using the net present value method.

The Net Present Value Method – Part 1

- The net present value method compares the present value of a project's cash inflows with the present value of its cash outflows.
- The difference between these two streams of cash flows is called the **net present value.**

The Net Present Value Method – Part 2

Two Simplifying Assumptions

- All cash flows other than the initial investment occur at the **end of periods**.
- All cash flows generated by an investment project are immediately reinvested at a rate of return equal to the **discount rate**. If this condition is not met, the NPV computations will not be accurate.

The Net Present Value Method – Part 3

Lester Company has been offered a five-year contract to provide component parts for a large manufacturer.

Cost and revenue information:

Cost of special equipment	$ 160,000
Working capital required	100,000
Relining equipment in 3 years	30,000
Salvage value of equipment in 5 years	5,000
Annual cash revenue and costs:	
Sales revenue from parts	750,000
Cost of parts sold	400,000
Salaries, shipping, etc.	270,000

The Net Present Value Method – Part 4

- At the end of five years, the working capital will be released and may be used elsewhere by Lester.
- Lester Company uses a discount rate of 11%.
- Should the contract be accepted?

The Net Present Value Method – Part 5

Annual net cash inflow from operations

Sales revenue	$ 750,000
Costs of parts sold	(400,000)
Salaries, shipping, etc.	(270,000)
Annual net cash Inflows	$ 80,000

The Net Present Value Method – Part 6

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Net present value				

The Net Present Value Method – Part 7 (1 of 2)

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash Inflows	1–5	80,000	3.696	295,680

Present value of an annuity of $1 factor for 5 years at 11%: 3.696.

The Net Present Value Method – Part 7 (2 of 2)

- Alternatively, the individual annual net cash inflows could be discounted using the related five separate "present value of a single payment of $1" factors. That method would produce the same present value of $295,680.

The Net Present Value Method – Part 8

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash Inflows	1–5	80,000	3.696	295,680
Relining of equipment	3	(30,000)	0.731	(21,930)

Present value of $1 factor for 3 years at 11%: 0.731.

The Net Present Value Method – Part 9

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash Inflows	1–5	80,000	3.696	295,680
Relining of equipment	3	(30,000)	0.731	(21,930)
Salvage value of equipment	5	5,000	0.593	2,965
Working capital released	5	100,000	0.593	59,300

- Present value of $1 factor for 5 years at 11% (0.593).
- Total present value of the release of the working capital and the salvage value of the equipment is $62,265.

The Net Present Value Method – Part 10

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash Inflows	1–5	80,000	3.696	295,680
Relining of equipment	3	(30,000)	0.731	(21,930)
Salvage value of equipment	5	5,000	0.593	2,965
Working capital released	5	100,000	0.593	59,300
Net present value				$ 76,015

Accept the contract because the project has a **positive** net present value.

Concept Check 2 (1 of 2)

Denny Associates has been offered a four-year contract to supply the computing requirements for a local bank.

Cash flow information:

Cost of computer equipment	$ 250,000
Working capital required	20,000
Upgrading of equipment in 2 years	90,000
Salvage value of equipment in 4 years	10,000
Annual net cash inflow	120,000

- The working capital would be released at the end of the contract.
- Denny Associates requires a 14% return.

Concept Check 2 (2 of 2)

What is the net present value of the contract with the local bank?

A. $150,000
B. $28,230
C. $92,340
D. $132,916

Concept Check 2a (1 of 2)

What is the net present value of the contract with the local bank?

A. $150,000
B. $28,230
C. $92,340
D. $132,916

Answer: B

Concept Check 2a (2 of 2)

	Years	Cash Flows	14% Factor	Present Value
Investment in equipment	NOW	$ (250,000)	1.000	$ (250,000)
Working capital needed	NOW	(20,000)	1.000	(20,000)
Annual net cash inflows	1–4	120,000	2.914	349,680
Upgrading of equipment	2	(90,000)	0.769	(69,210)
Salvage value of equipment	4	10,000	0.592	5,920
Working capital released	4	20,000	0.592	11,840
Net present value				$ 28,230

The Net Present Value Method – Part 11

- Let's look at another way to calculate the NPV.
- Lester Company has been offered a five-year contract to provide component parts for a large manufacturer.
- Cost and revenue information:

Cost of special equipment	$ 160,000
Working capital required	100,000
Relining equipment in 3 years	30,000
Salvage value of equipment in 5 years	5,000
Annual cash revenue and costs:	
Sales revenue from parts	750,000
Cost of parts sold	400,000
Salaries, shipping, etc.	270,000

The Net Present Value Method – Part 12

- At the end of five years, the working capital will be released and may be used elsewhere by Lester.
- Lester Company uses a discount rate of 11%.
- Should the contract be accepted?

The Net Present Value Method – Part 13

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)

Since the investments in equipment (**$160,000**) and working capital (**$100,000**) occur immediately, the discounting factor used is **1.000.**

The Net Present Value Method – Part 14

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash inflows	1	80,000	0.901	72,080
Annual net cash inflows	2	80,000	0.812	64,960
Annual net cash inflows	3	50,000	0.731	36,550
Annual net cash inflows	4	80,000	0.659	52,720
Annual net cash inflows	5	80,000	0.593	47,440
Salvage value of equipment	5	5,000	0.593	2,965
Working capital released	5	100,000	0.593	59,300

The total cash flows for years 1–5 are discounted to their present values using the discount factors.

The Net Present Value Method – Part 15

For example, the total cash flows in Year 1 of **$80,000** are multiplied by the discount factor of **0.901** to derive this future cash flow's present value of **$72,080.**

The Net Present Value Method – Part 16

As another example, the total cash flows in Year 3 of **$50,000** are multiplied by the discount factor of **0.731** to derive this future cash flow's present value of **$36,550.**

The Net Present Value Method – Part 17

	Years	Cash Flows	11% Factor	Present Value
Investment in equipment	NOW	$ (160,000)	1.000	$ (160,000)
Working capital needed	NOW	(100,000)	1.000	(100,000)
Annual net cash inflows	1	80,000	0.901	72,080
Annual net cash inflows	2	80,000	0.812	64,960
Annual net cash inflows	3	50,000	0.731	36,550
Annual net cash inflows	4	80,000	0.659	52,720
Annual net cash inflows	5	80,000	0.593	47,440
Salvage value of equipment	5	5,000	0.593	2,965
Working capital released	5	100,000	0.593	59,300
Net Present Value				$ 76,015

The net present value of the investment opportunity is **$76,015**. Notice this amount equals the net present value from the earlier approach.

The Net Present Value Method – Part 18

Once you have computed a net present value, you should interpret the results as follows:

1. A **positive net present value** indicates that the project's return **exceeds the discount rate**.
2. A **negative net present value** indicates that the project's return is **less than the discount rate**.

The Net Present Value Method – Part 19

If the Net Present Value is…	Then the Project is…
Positive …	Acceptable because it promises a return greater than the required rate of return.
Zero …	Acceptable because it promises a return equal to the required rate of return.
Negative …	Not acceptable because it promises a return less than the required rate of return.

Choosing a Discount Rate

- The company's **cost of capital** is usually regarded as the minimum required rate of return.
- The **cost of capital** is the average return the company must pay to its long-term creditors and stockholders.

Recovery of the Original Investment – Part 1

The net present value method automatically provides for **return of the original investment**.

Recovery of the Original Investment – Part 2

Carver Hospital is considering buying an attachment for its X-ray machine.

Cost	$ 3,169
Life	4 years
Salvage value	$ -
Increase in annual cash inflows	$ 1,000

No investments are to be made unless they have an annual return of at least 10%.
Will we be allowed to invest in the attachment?

Recovery of the Original Investment – Part 3

	Year(s)	Amount of Cash Flow	10% Factor	Value of Cash Flows
Initial investment (outflows)	NOW	$ (3,169)	1.000	$ (3,169)
Annual cash inflows	1	$ 1,000	0.909	$ 909
Annual cash inflows	2	$ 1,000	0.826	$ 826
Annual cash inflows	3	$ 1,000	0.751	$ 751
Annual cash inflows	4	$ 1,000	0.683	$ 683
Net present value				-

Notice that the net present value of the investment is zero.

Recovery of the Original Investment – Part 4

This implies that the cash inflows are sufficient to recover the **$3,169 initial investment** and to provide exactly a **10% return** on the investment.