

LO 1: Cash Flow

Terms

Cash payback technique

Capital budgeting:

- The process of planning significant investments in projects that have long lives and affect more than one future period, such as the purchase of new equipment.

Cash Flows:

Outflows	Inflows
Initial investment	Sale of old equipment
Repairs and maintenance	Increased cash received
Increased operating costs	Reduced cash outflows related to costs
Overhaul of equipment	Salvage value of equipment

Capital Budgeting Decisions depend on:

- Availability of funds
- Relationships among proposed projects
- Company's basic decision making approach
- Risk associated with the project

Cash Payback Technique

- Ignores the time value of money.
- Calculates the time period to recover the initial net investment through future cash flows.
- The method for determining the payback period differs whether the future cash flows are even (the same each period) or uneven (differ in one or more future periods.)

Equal Annual Cash Flows:

Cost of Capital Investment	/	Net Annual Cash Flow	=	Cash Payback Period
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Uneven Annual Cash Flows:

- Find when the cumulative net cash flows from the investment equal the cost of the investment

Practice #1

T Company is considering two investments: first, a low-quality blueprint printer with at cost of \$20,000 and annual savings of \$3,000 for 8 years and second, a high-quality blueprint printer with the following cash flows:

<u>Year</u>	<u>Investment</u>	<u>Cash Inflow</u>
1	(\$38,000)	\$2,000
2	(6,000)	4,000
3		8,000
4		9,000
5		12,000
6		10,000
7		8,000
8		6,000
9		5,000

Required: a) Determine the payback period of each investment.

LO 2: Net Present Value Method

Terms

Discounted cash flow technique

Discount rate

Net present value method

Required rate of return

Net present value

Cost of capital

- Net Present Value method computes the difference between the present value of an investment project's future net cash flows and net initial cash outflows using a known discount rate.
- The net present value method always uses cash flows, not operating income.
- The higher the positive net present value the more attractive the investment is

Equal Annual Cash Flows

- Uses the present value of an annuity of 1 table
 - Step 1: Find the Present Value of an Annuity of 1 table
 - Step 2: Find the given Discount Rate on the table
 - Step 3: Follow the Discount Rate Column down until you find the corresponding number of payments presented
 - Step 4: Where the Discount Rate and number of payments meet is the discount factor. Multiply this factor times the equal annual cash flow to determine the present value of net cash flows
 - Step 5: present value of net cash flows determined in step 4 minus the initial investment = net present value
 - If net present value is positive, accept the project, if it is negative, reject the project

Unequal Annual Cash Flows

- Uses the present value of 1 table to determine factor

- Step 1: Find the Present Value of 1 table
- Step 2: Find the given Discount Rate on the table
- Step 3: Follow the Discount Rate Column down. For each year, multiply the annual cash flow for that year times the discount factor that corresponds with that year
- Step 4: Add up each of the present values determined for each year. This equals the present value of net cash flows
- Step 5: present value of net cash flows determined in step 4 minus the initial investment = net present value
- If net present value is positive, accept the project, if it is negative, reject the project

Practice #2

M Company has \$15,000 to invest. Management is trying to decide between two alternative uses for the funds as follows. The company's discount rate is 12%. Project A is shown below. Project B has the same investment required, but earns \$1,000 in year 1, and \$500 more every year for the life of the project

	Project A	Project B
Investment required	\$15,000	\$15,000
Single cash inflow at the end of 10 years	\$0	\$60,000
Annual cash inflows	\$4,000	\$0
Life of the project	10 years	10 years

Required: Which alternative would the company choose if it could only pick one?

LO 3: Capital Budgeting Challenges

Terms

Profitability Index

Post-audit

Challenges:

- Intangible benefits are ignored using net present value methods. Projects rejected should be evaluated for intangible benefits
- Multiple projects having positive NPV need additional consideration when there are limited resources for investment
- Sensitivity analysis should be used to evaluate variability among potential returns
- Post-audit evaluations should be done to ensure actual performance matches expectations

Present Value or Profitability Index

- Method for ranking the net present values of projects when capital is scarce
- Computed as
$$\frac{\text{Net present value of net cash flows}}{\text{Initial Investment}}$$
 - Value greater than 1 equates to a net present value of greater than 0. The higher the value the better

Practice #3

Information on four investment proposals at T Company is given below:

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Investment required	\$85,000	\$200,000	\$90,000	\$170,000
Present value of cash flows	<u>119,000</u>	<u>250,000</u>	<u>135,000</u>	<u>221,000</u>
Net present value	34,000	50,000	45,000	51,000
Life of the project	5 years	7 years	6 years	6 years

Required: Compute the profitability index for each proposal and rank the proposals in terms of preference.

LO 4: Internal Rate of Return**Terms**

Internal rate of return method

Internal rate of return

- Internal Rate of Return method computes the discount rate at which the difference between the present value of an investment project's future net cash flows and net initial cash outflows is 0, i.e., the IRR is the discount rate that sets the NPV to 0.
- The internal rate of return method always uses cash flows, not operating income.

Step 1: Calculate the Internal Rate of Return Factor

Capital Investment	/	Net Annual Cash Flow	=	Internal Rate of Return Factor
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Step 2: In the payments column, find the number of payments, and look across the column until you find the factor calculated in step 1

Step 3: Locate the percentage by following is column up. This is your internal rate of return

Practice #4

N Company is considering the purchase of new equipment that will cost \$168,457. The equipment will save the company \$38,000 per year in cash operating costs. The equipment has an estimated useful life of five years and a zero expected salvage value. The company's cost of capital is 10%.

Required: a) Compute internal rate of return.

LO 5: Annual Rate of Return Method**Terms**

Annual Rate of Return Method

Annual Rate of Return:

- Indicates the profitability of a capital expenditure

- A project is accepted if the rate of return is greater than management's required rate of return
- The higher the rate of return for a given risk, the more attractive the investment

(Original Investment + Value at the end of the useful life)	/	2	=	Average Investment
Expected Annual Net Income	/	Average Investment	=	Annual Rate of Return

Practice #5

The M Company purchased a piece of new equipment in January for \$120,000. The equipment has no salvage value. Marcus estimates net income from the new equipment of \$20,000.

Required: Compute the annual rate of return.

Solution #1

a) The payback periods are determined as follows:

$$\text{First Investment} \quad \frac{\text{Investment}}{\text{Annual cash Flow}} \quad \frac{\$20,000}{\$3,000} = 6.67 \text{ years}$$

Second Investment

<u>Year</u>	<u>Investment</u>	<u>Cash Inflow</u>	<u>Unrecovered Investment</u>
1	(\$38,000)	\$2,000	\$36,000
2	(6,000)	4,000	38,000
3		8,000	30,000
4		9,000	21,000
5		12,000	9,000
6		10,000	0
7		8,000	
8		6,000	
9		5,000	

The first investment is fully recovered in 6.67 years. The second investment is fully recovered in the 6th year; the payback period is approximately 5.9 years.

Solution #2

	Years	Amount	PV Factor	Present Value
<u>Project A</u>				
Annual cash inflows	1 – 10	4,000	5.65022	22,600.88
Cost of equipment				(\$15,000)
Net present value				<u>\$7,600.88</u>

<u>Project B</u>			
<u>Year</u>	<u>Cash Flow</u>	<u>Factor</u>	<u>Present Value</u>
1	1,000	0.89286	892.86
2	1,500	0.79719	1,195.79
3	2,000	0.71178	1,423.56
4	2,500	0.63552	1,588.80
5	3,000	0.56743	1,702.29
6	3,500	0.50663	1,773.21
7	4,000	0.45235	1,809.40
8	4,500	0.40388	1,817.46
9	5,000	0.36061	1,803.05
10	5,500	0.32197	1,770.84
Present Value			15,777.25
Initial Investment			-15,000
Net Present Value			777.24

Project A should be selected as it has a higher net present value

Solution #3

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Net present value	\$34,000	\$50,000	\$45,000	\$51,000
Investment required	\$85,000	\$200,000	\$90,000	\$170,000
Profitability index	.40	.25	.50	.30
Ranking	2	4	1	3

Note that proposal D has the highest net present value, but it ranks third in terms of the profitability value index.

Solution #4

IRR	$\frac{\$168,457}{\$38,000}$	3.43308	Searching the 5 period row in the PV annuity table, find the value of 3.43308. It is in the 14% column.
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Solution #5

$$\frac{20,000}{(120,000+0)/2} = \quad = 33\%$$