CAPITAL INVESTMENT ANALYSIS

Phar 125 AY 2020-2021
Kristine Eves S. Garcia, RPh

LEARNING OBJECTIVES

At the end of the session, students should be able to:

- Explain the importance of capital investment analysis
- Evaluate capital investment proposals

INVESTMENT OF TIME & MONEY IN HIGHER EDUCATION

HIGHER FUTURE EARNING ABILITY

CAPITAL INVESTMENT ANALYSIS

Capital Budgeting

- The process by which the management **plans, evaluates, and controls investments** in fixed assets
- Choosing among various capital projects to find the one(s) that will **maximize a company's return** on its financial investment

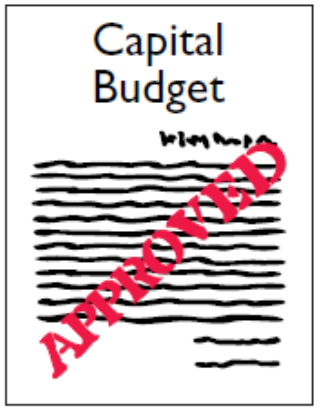
Capital investments

- Involve the long-term commitment of funds and affect operations for many years

1. Project proposals are requested from departments, plants, and authorized personnel.

2. Proposals are screened by a capital budget committee.

3. Officers determine which projects are worthy of funding.



4. Board of directors approves capital budget.

METHODS OF EVALUATING CAPITAL INVESTMENT PROPOSALS

DO NOT USE PRESENT VALUES	USE PRESENT VALUES
1. Average rate of return	1. Net present value
2. Cash payback	2. Internal rate of return

Time Value of Money

- Recognizes that an amount of cash invested today will earn income and therefore has value over time

METHODS THAT DO NOT USE PRESENT VALUE

- Often initially used to **screen** proposals
- Management sets **minimum standards** for accepting proposals
- Often useful in evaluating capital investment proposals that have **relatively short useful lives**

AVERAGE RATE OF RETURN METHOD

Accounting Rate of Return

- Measure of the average income as a percent of the average investment in fixed assets

$$Average\ Rate\ of\ Return = \frac{Estimated\ average\ annual\ income}{Average\ investment}$$

AVERAGE RATE OF RETURN METHOD

Estimated average annual income

- Obtained from the projected income statement

Average investment

$$= \frac{Original\ investment + Value\ at\ end\ of\ useful\ life}{2}$$

- Value at the end of useful life is the asset's salvage value

AVERAGE RATE OF RETURN METHOD

Decision

- A project is acceptable if its rate of return **equals or is greater than management's required rate of return**.
- It is unacceptable when the reverse is true.
- The higher the average rate of return, the more desirable the proposal.

The management is considering the purchase of a machine at a cost of $500,000. The machine is expected to have a useful life of 4 years, with no residual value, and to yield total income of $200,000. Management has a required rate of return of 9%.

CASH PAYBACK METHOD

Net Cash Flow

- The excess of the cash flowing in from revenue over the cash flowing out for expenses

Cash Payback Period

- The expected period of time that will pass between the date of an investment and the complete recovery in cash (or equivalent) of the amount invested
- The time required for the net cash flow to equal the initial outlay for the fixed asset

CASH PAYBACK METHOD

$$Cash\ Payback\ Period = \frac{Cost\ of\ capital\ investment}{Net\ annual\ cash\ flow}$$

Decision

- The shorter the payback period, the more attractive the investment

The proposed investment in a fixed asset with an 8-year life is $200,000. The annual cash revenues from the investment are $50,000, and the annual cash expenses are $10,000. The company considers a project unacceptable if the payback period is longer than 60% of the asset's expected useful life.

A proposed investment of $400,000, the annual net cash flows and the cumulative net cash flows over the proposal's 6-year life are as follows:

Year	Net Cash Flow	Cumulative Net Cash Flow
1	$ 60,000	$60,000
2	80,000	140,000
3	105,000	245,000
4	155,000	400,000
5	100,000	500,000
6	90,000	590,000

METHODS THAT USE PRESENT VALUE

Present Value

- Value now of a given amount to be paid or received in the future, assuming compound interest

Present Value of an Amount

- Value of $1 today is not the same as the value of $1 one year from now

$$Present\ Value\ (PV) = \frac{Future\ Value\ (FV)}{(1+i)^n}$$

METHODS THAT USE PRESENT VALUE

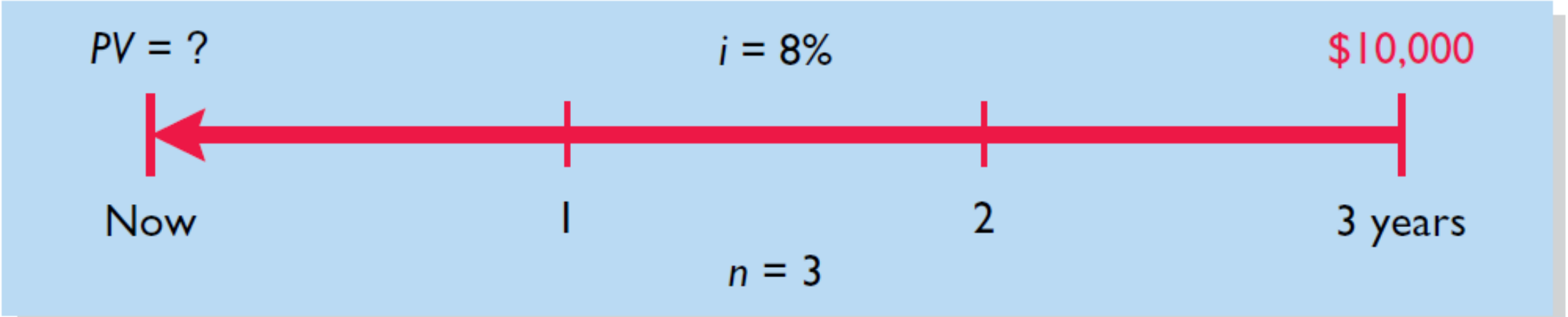
Present Value of an Amount

- You want to invest a sum of money today that will provide $1,000 at the end of one year. What amount would you need to invest today to have $1,000 one year from now?

TABLE 3 Present Value of 1

(*n*) Periods	4%	5%	6%	7%	8%	9%	10%	11%	12%	15%
1	.96154	.95238	.94340	.93458	.92593	.91743	.90909	.90090	.89286	.86957
2	.92456	.90703	.89000	.87344	.85734	.84168	.82645	.81162	.79719	.75614
3	.88900	.86384	.83962	.81630	.79383	.77218	.75132	.73119	.71178	.65752
4	.85480	.82270	.79209	.76290	.73503	.70843	.68301	.65873	.63552	.57175
5	.82193	.78353	.74726	.71299	.68058	.64993	.62092	.59345	.56743	.49718
6	.79031	.74622	.70496	.66634	.63017	.59627	.56447	.53464	.50663	.43233
7	.75992	.71068	.66506	.62275	.58349	.54703	.51316	.48166	.45235	.37594
8	.73069	.67684	.62741	.58201	.54027	.50187	.46651	.43393	.40388	.32690
9	.70259	.64461	.59190	.54393	.50025	.46043	.42410	.39092	.36061	.28426
10	.67556	.61391	.55839	.50835	.46319	.42241	.38554	.35218	.32197	.24719
11	.64958	.58468	.52679	.47509	.42888	.38753	.35049	.31728	.28748	.21494
12	.62460	.55684	.49697	.44401	.39711	.35554	.31863	.28584	.25668	.18691
13	.60057	.53032	.46884	.41496	.36770	.32618	.28966	.25751	.22917	.16253
14	.57748	.50507	.44230	.38782	.34046	.29925	.26333	.23199	.20462	.14133
15	.55526	.48102	.41727	.36245	.31524	.27454	.23939	.20900	.18270	.12289
16	.53391	.45811	.39365	.33873	.29189	.25187	.21763	.18829	.16312	.10687
17	.51337	.43630	.37136	.31657	.27027	.23107	.19785	.16963	.14564	.09293
18	.49363	.41552	.35034	.29586	.25025	.21199	.17986	.15282	.13004	.08081
19	.47464	.39573	.33051	.27615	.23171	.19449	.16351	.13768	.11611	.07027
20	.45639	.37689	.31180	.25842	.21455	.17843	.14864	.12403	.10367	.06110

Suppose you have a winning lottery ticket and the state gives you the option of taking $10,000 3 years from now or taking the present value of $10,000 now. The state uses an 8% rate in discounting. How much will you receive if you accept your winnings now?



METHODS THAT USE PRESENT VALUE

Present Value of an Annuity

- The sum of the present values of each cash flow
- The amount of cash that is needed today to yield a series of equal net cash flows at fixed time intervals in the future

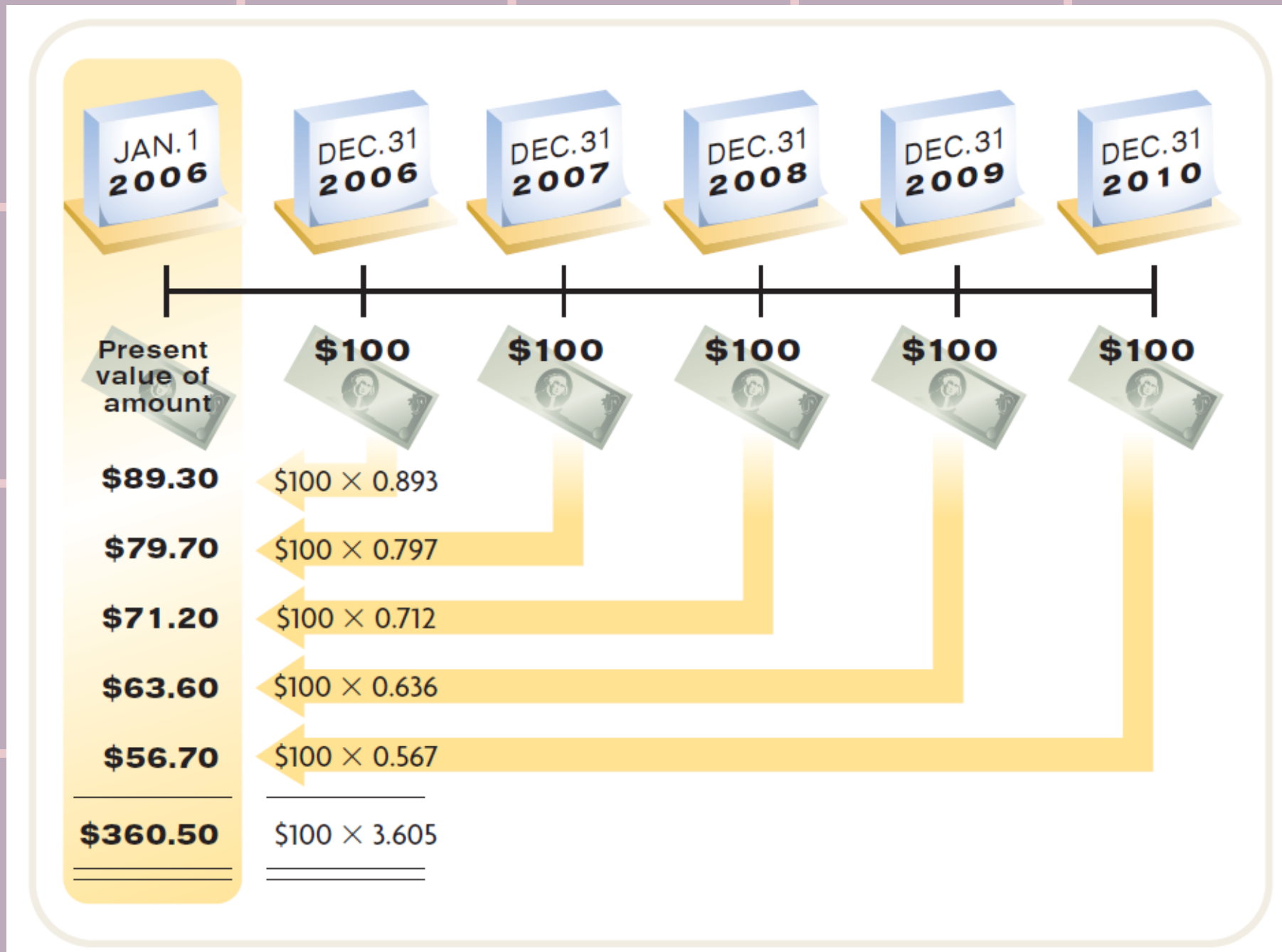

JAN. 1
2006
DEC. 31
2006
DEC. 31
2007
DEC. 31
2008
DEC. 31
2009
DEC. 31
2010
Present value of amount
$100
$100
$100
$100
$100
$89.30
$100 × 0.893
$79.70
$100 × 0.797
$71.20
$100 × 0.712
$63.60
$100 × 0.636
$56.70
$100 × 0.567
$360.50
$100 × 3.605

TABLE 4 Present Value of an Annuity of 1

(*n*) Payments	4%	5%	6%	7%	8%	9%	10%	11%	12%	15%
1	.96154	.95238	.94340	.93458	.92593	.91743	.90909	.90090	.89286	.86957
2	1.88609	1.85941	1.83339	1.80802	1.78326	1.75911	1.73554	1.71252	1.69005	1.62571
3	2.77509	2.72325	2.67301	2.62432	2.57710	2.53130	2.48685	2.44371	2.40183	2.28323
4	3.62990	3.54595	3.46511	3.38721	3.31213	3.23972	3.16986	3.10245	3.03735	2.85498
5	4.45182	4.32948	4.21236	4.10020	3.99271	3.88965	3.79079	3.69590	3.60478	3.35216
6	5.24214	5.07569	4.91732	4.76654	4.62288	4.48592	4.35526	4.23054	4.11141	3.78448
7	6.00205	5.78637	5.58238	5.38929	5.20637	5.03295	4.86842	4.71220	4.56376	4.16042
8	6.73274	6.46321	6.20979	5.97130	5.74664	5.53482	5.33493	5.14612	4.96764	4.48732
9	7.43533	7.10782	6.80169	6.51523	6.24689	5.99525	5.75902	5.53705	5.32825	4.77158
10	8.11090	7.72173	7.36009	7.02358	6.71008	6.41766	6.14457	5.88923	5.65022	5.01877
11	8.76048	8.30641	7.88687	7.49867	7.13896	6.80519	6.49506	6.20652	5.93770	5.23371
12	9.38507	8.86325	8.38384	7.94269	7.53608	7.16073	6.81369	6.49236	6.19437	5.42062
13	9.98565	9.39357	8.85268	8.35765	7.90378	7.48690	7.10336	6.74987	6.42355	5.58315
14	10.56312	9.89864	9.29498	8.74547	8.24424	7.78615	7.36669	6.98187	6.62817	5.72448
15	11.11839	10.37966	9.71225	9.10791	8.55948	8.06069	7.60608	7.19087	6.81086	5.84737
16	11.65230	10.83777	10.10590	9.44665	8.85137	8.31256	7.82371	7.37916	6.97399	5.95424
17	12.16567	11.27407	10.47726	9.76322	9.12164	8.54363	8.02155	7.54879	7.11963	6.04716
18	12.65930	11.68959	10.82760	10.05909	9.37189	8.75563	8.20141	7.70162	7.24967	6.12797
19	13.13394	12.08532	11.15812	10.33560	9.60360	8.95012	8.36492	7.83929	7.36578	6.19823
20	13.59033	12.46221	11.46992	10.59401	9.81815	9.12855	8.51356	7.96333	7.46944	6.25933

METHODS THAT USE PRESENT VALUE

Present Value of an Annuity

- You will receive $1,000 cash annually for three years at a time when the discount rate is 10%. What is the present value of the annuity?

Future Amount	×	Present Value of 1 Factor at 10%	=	Present Value
$1,000 (1 year away)		.90909		$ 909.09
1,000 (2 years away)		.82645		826.45
1,000 (3 years away)		.75132		751.32
		2.48686		$2,486.86

NET PRESENT VALUE METHOD

Discounted Cash Flow

- Analyzes capital investment proposals by comparing the initial cash investment with the present value of the net cash flows

Hurdle Rate

- The interest rate (return) used in net present value analysis set by management

NET PRESENT VALUE METHOD

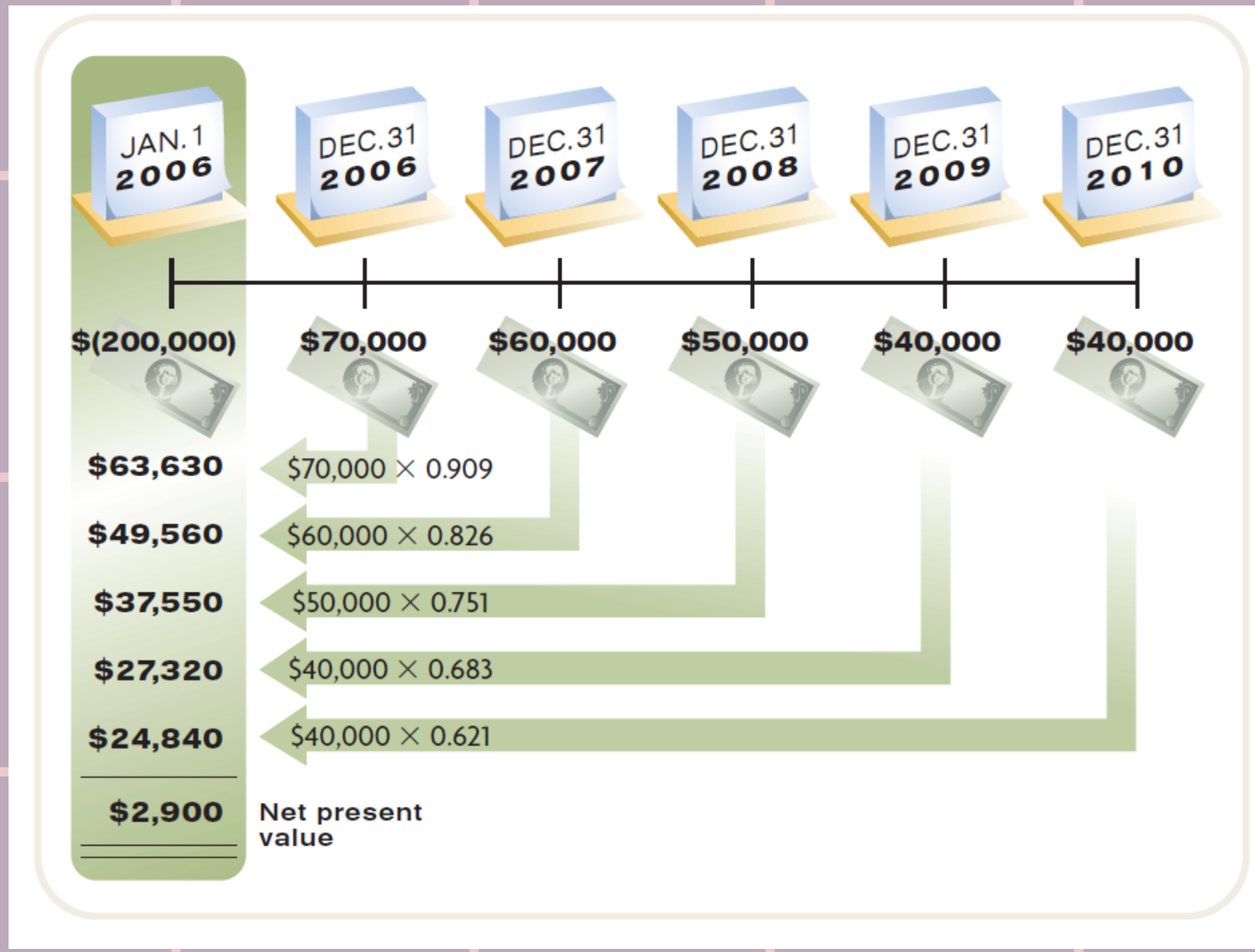
Decision

- If the net present value of the cash flows expected from a proposed investment equals or exceeds the amount of the initial investment, the proposal is desirable.
- A proposal is acceptable when net present value is zero or positive.

$$Net\ Present\ Value = Present\ Value\ of\ Net\ Cash\ Flows\ - Capital\ Investment$$

On January 1, 2006, there is a proposal to acquire $200,000 of equipment with an expected useful life of five years (no residual value) and a minimum desired rate of return of 10%. The net cash flow to be received for the next 5 years are as follows:

12/31/06	$ 70,000
12/31/07	60,000
12/31/08	50,000
12/31/09	40,000
12/31/10	40,000


JAN. 1 2006
DEC. 31 2006
DEC. 31 2007
DEC. 31 2008
DEC. 31 2009
DEC. 31 2010
$(200,000)
$70,000
$60,000
$50,000
$40,000
$40,000
$63,630
$70,000 × 0.909
$49,560
$60,000 × 0.826
$37,550
$50,000 × 0.751
$27,320
$40,000 × 0.683
$24,840
$40,000 × 0.621
$2,900
Net present value

INTERNAL RATE OF RETURN METHOD

Time-Adjusted Rate of Return

- Used to compute the rate of return from the net cash flows expected from capital investment proposals
- It finds the interest yield of the potential investment

Internal Rate of Return (IRR)

- The interest rate that will cause the present value of the proposed capital expenditure to equal the present value of the expected net annual cash flows

INTERNAL RATE OF RETURN METHOD

1. Compute the internal rate of return factor

$$Internal\ Rate\ of\ Return\ Factor = \frac{Capital\ Investment}{Net\ Annual\ Cash\ Flow}$$

2. Use the internal rate of return factor and present value of an annuity of 1 table to find the IRR.
3. The internal rate of return is the discount factor that is closest to the internal rate of return factor for the time period covered by the net annual cash flows.

INTERNAL RATE OF RETURN METHOD

Decision

- Accept the project when the IRR is equal to or greater than the required rate of return.
- Reject the project when the IRR is less than the required rate of return.

The company is considering an investment of $130,000 in a new equipment. It is expected to last 5 years with no salvage value at the end of its useful life. Its net annual cash flows are $39,000 that is uniform over the equipment's useful life.

TABLE 4 Present Value of an Annuity of 1

(*n*) Payments	4%	5%	6%	7%	8%	9%	10%	11%	12%	15%
1	.96154	.95238	.94340	.93458	.92593	.91743	.90909	.90090	.89286	.86957
2	1.88609	1.85941	1.83339	1.80802	1.78326	1.75911	1.73554	1.71252	1.69005	1.62571
3	2.77509	2.72325	2.67301	2.62432	2.57710	2.53130	2.48685	2.44371	2.40183	2.28323
4	3.62990	3.54595	3.46511	3.38721	3.31213	3.23972	3.16986	3.10245	3.03735	2.85498
5	4.45182	4.32948	4.21236	4.10020	3.99271	3.88965	3.79079	3.69590	3.60478	3.35216
6	5.24214	5.07569	4.91732	4.76654	4.62288	4.48592	4.35526	4.23054	4.11141	3.78448
7	6.00205	5.78637	5.58238	5.38929	5.20637	5.03295	4.86842	4.71220	4.56376	4.16042
8	6.73274	6.46321	6.20979	5.97130	5.74664	5.53482	5.33493	5.14612	4.96764	4.48732
9	7.43533	7.10782	6.80169	6.51523	6.24689	5.99525	5.75902	5.53705	5.32825	4.77158
10	8.11090	7.72173	7.36009	7.02358	6.71008	6.41766	6.14457	5.88923	5.65022	5.01877
11	8.76048	8.30641	7.88687	7.49867	7.13896	6.80519	6.49506	6.20652	5.93770	5.23371
12	9.38507	8.86325	8.38384	7.94269	7.53608	7.16073	6.81369	6.49236	6.19437	5.42062
13	9.98565	9.39357	8.85268	8.35765	7.90378	7.48690	7.10336	6.74987	6.42355	5.58315
14	10.56312	9.89864	9.29498	8.74547	8.24424	7.78615	7.36669	6.98187	6.62817	5.72448
15	11.11839	10.37966	9.71225	9.10791	8.55948	8.06069	7.60608	7.19087	6.81086	5.84737
16	11.65230	10.83777	10.10590	9.44665	8.85137	8.31256	7.82371	7.37916	6.97399	5.95424
17	12.16567	11.27407	10.47726	9.76322	9.12164	8.54363	8.02155	7.54879	7.11963	6.04716
18	12.65930	11.68959	10.82760	10.05909	9.37189	8.75563	8.20141	7.70162	7.24967	6.12797
19	13.13394	12.08532	11.15812	10.33560	9.60360	8.95012	8.36492	7.83929	7.36578	6.19823
20	13.59033	12.46221	11.46992	10.59401	9.81815	9.12855	8.51356	7.96333	7.46944	6.25933

The company is considering an investment of $130,000 in a new equipment. It is expected to last 5 years with no salvage value at the end of its useful life. Its net annual cash flows are $39,000 that is uniform over the equipment's useful life.

Assume that the company's required rate of return is 10%