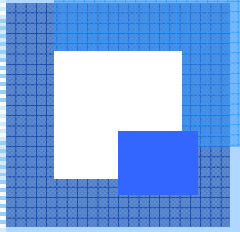


Chapter 13

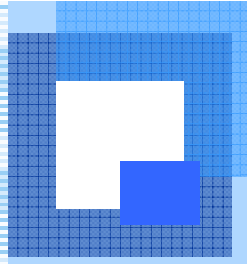
Capital Budgeting

*Managerial Economics: Economic
Tools for Today's Decision Makers, 4/e
By Paul Keat and Philip Young*



Capital Budgeting

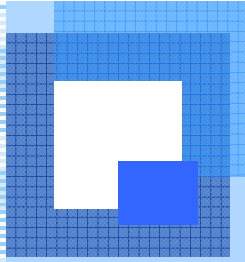
- The Capital Budgeting Decision
- Time Value of Money
- Methods of Capital Project Evaluation
- Cash Flows
- Capital Rationing
- The Value of a Corporation



The Capital Budgeting Decision

Capital budgeting describes decisions where expenditures and receipts for a particular undertaking will continue over a period of time.

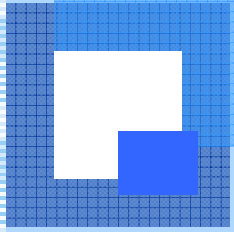
These decisions usually involve outflows of funds in the early periods while the inflows start somewhat later and continue for a significant number of periods.



The Capital Budgeting Decision

Types of capital budgeting decisions

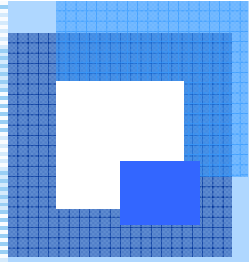
- Expansion of facilities
- New or improved products
- Replacement
- Lease or buy
- Make or buy
- Safety or environmental protection equipment



Time Value of Money

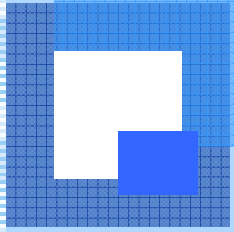
Time value of money: a dollar today is worth more than a dollar tomorrow because today's dollar will earn interest and increase in value.

To put cash flows originating at different times on an equal basis, we must apply an interest rate to each of the flows so that they are expressed in terms of the same point in time.



Methods of Capital Project Evaluation

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



Methods of Capital Project Evaluation

$$NPV = \sum_{t=1}^n \frac{R_t}{(1+k)^t} - \sum_{t=0}^n \frac{O_t}{(1+k)^t}$$

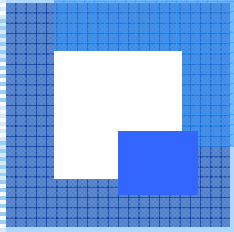
t = time period

n = last period of project

R_t = Cash inflow in period t

O_t = Cash outflow in period t

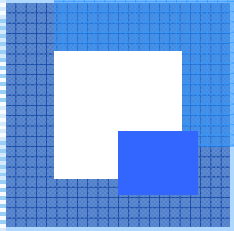
k = discount rate (cost of capital)



Methods of Capital Project Evaluation

Discount rate / cost of capital:

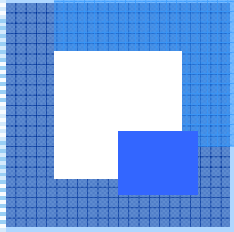
- The rate of return a company must earn on its assets to justify the using and acquiring of funds
- The rate at which cash flows are discounted
- Also called the minimum required rate of return, the hurdle rate or the cutoff rate



Methods of Capital Project Evaluation

Example

<i>Inflows</i>		
Year 1	25×0.8772	\$21.93
2	35×0.7695	26.93
3	40×0.6750	27.00
4	40×0.5921	23.68
5	30×0.5194	<u>15.58</u>
		\$115.12
<i>Outflow, year 0</i>		<u>100.00</u>
Net present value		\$15.12



Methods of Capital Project Evaluation

If NPV is positive, the project is financially acceptable.

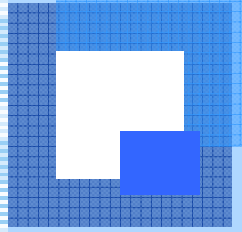
If NPV is negative, rejection is indicated.



Methods of Capital Project Evaluation

The internal rate of return of a project is the discount rate that causes NPV to equal zero.

$$\sum_{t=1}^n \frac{R_t}{(1+r)^t} = \sum_{t=0}^n \frac{O_t}{(1+r)^t}$$

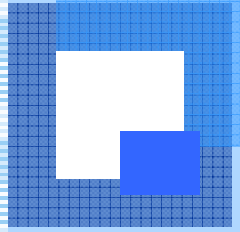


Methods of Capital Project Evaluation

The IRR for the previous example is approximately 19.8 percent.

IRR can be obtained by:

- Trial and error with interpolation
- Calculation using a business calculator
- Calculation using a spreadsheet program



Methods of Capital Project Evaluation

If the IRR is larger than the cost of capital it signals acceptance.

$$(IRR > k)$$

If the IRR is less than the cost of capital the proposed project should be rejected.

$$(IRR < k)$$



Methods of Capital Project Evaluation

For single projects IRR and NPV will give the same results.

$$\text{NPV} > 0$$

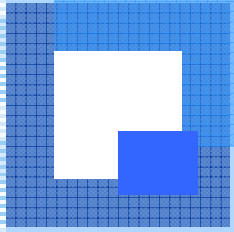
$$\text{IRR} > k$$

$$\text{NPV} = 0$$

$$\text{IRR} = k$$

$$\text{NPV} < 0$$

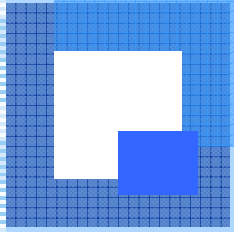
$$\text{IRR} < k$$



Methods of Capital Project Evaluation

If multiple projects are being considered, IRR and NPV will give the same results if the projects are **independent**.

- Projects can be implemented simultaneously.
- Available funds are not limited.
- One project will not affect the cash flow of another.

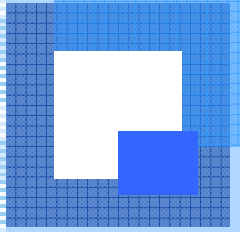


Methods of Capital Project Evaluation

IRR and NPV methods may yield different results if **mutually exclusive** projects are analyzed.

This disparity may occur if:

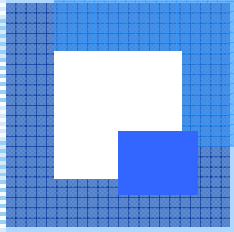
- The initial costs of the proposals differ.
- The shapes of the cash inflow streams differ.



Cash Flows

The analyst's most difficult task is to enter the best estimates of cash flows into the analysis.

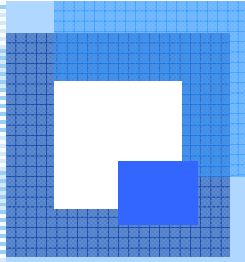
- Future annual benefits and costs are uncertain.
- Market forecasts may be biased upward.
- Costs are often underestimated.



Cash Flows

The analyst should remember:

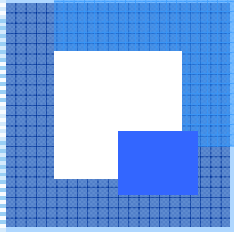
1. All revenue and costs must be stated in terms of cash flows.
2. All cash flows should be incremental.
3. Sunk costs do not count.
4. Any effect on other parts of the operation must be considered.
5. Interest paid on debt is not considered.



Cash Flows

Types of cash flows:

- Initial cash outflows
- Operating cash flows
- Additional working capital
- Salvage or resale values
- Noncash Investment



Cost of Capital

To invest in capital projects a company must obtain financing.

Sources of financing:

Debt

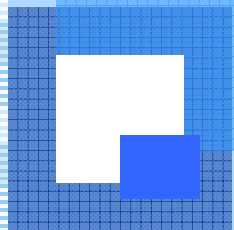
Short-term

Long-term

Equity

New equity

Retained earnings



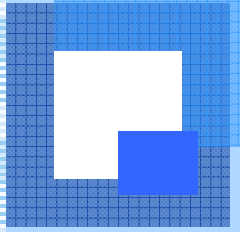
Cost of Capital

DEBT

$$\text{Cost of debt} = r \times (1-t)$$

r = present interest rate charged for the kind of debt the company would issue

t = tax rate (interest expense is tax deductible)



Cost of Capital

EQUITY: Dividend Growth Model

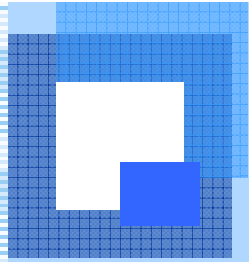
$$k_0 = \frac{D_1}{P_0(1-f)} + g$$

k_0 = cost of equity capital D_1 = dividend

P_0 = current stock price

g = rate at which dividend is expected to grow

f = flotation costs (as % of P_0)



Cost of Capital

EQUITY: Capital Asset Pricing Model

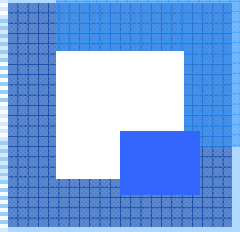
$$k_j = R_f + \textcircled{R}(k_m - R_f)$$

k_j = required rate of return on stock j

R_f = Risk-free rate

k_m = Rate of return on the market portfolio

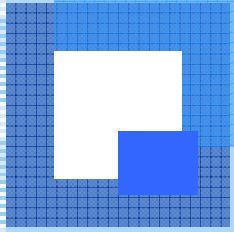
\textcircled{R} = market risk premium



Cost of Capital

The *overall cost of capital* is the average of the cost of debt financing and the cost of equity financing weighted by their proportions in the total capital structure.

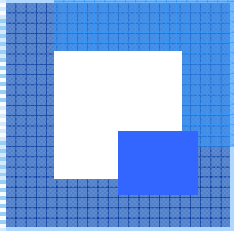
There is a point where the combination of components (debt, equity) is optimal.



Capital Rationing

Capital rationing: the practice of restricting capital expenditures to a certain amount, perhaps due to limits on external financing.

Capital rationing does not permit a company to achieve its maximum value.

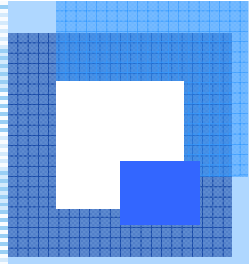


Capital Rationing

Without capital rationing:

A company should invest in every project whose:

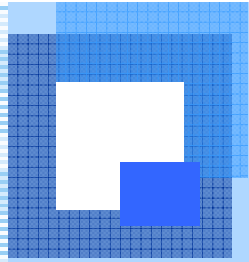
- $NPV \geq 0$.
- $IRR \geq k$.



Capital Rationing

With capital rationing:

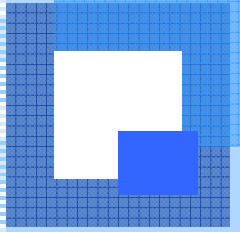
A company should choose the combination of projects that will give the highest NPV within the spending constraint.



The Value of a Corporation

How do you estimate what your company is worth?

1. Compute free cash flows
 - This step may involve assumptions about the long-term growth rate of free cash flows.
2. Calculate the present value of free cash flows



The Value of a Corporation

Free cash flow: Funds that are available for distribution to investors. Includes:

- Operating cash flow
 - Less: new investment in operating working capital
 - Less: new fixed asset investment



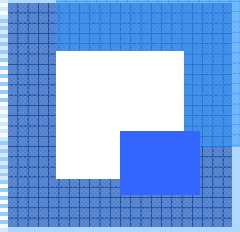
The Value of a Corporation

Operating Cash Flow

$$\text{OCF} = \text{EBIT} \times (1-T) + \text{Depreciation}$$

EBIT = earnings before interest and taxes

T = tax rate



The Value of a Corporation

New investment in operating working capital equals: increases in cash, accounts receivable and inventories minus increases in accounts payable and accrued expenses.

Fixed asset investment equals: increases in land, property and equipment before depreciation