

620-362 Applied Operations Research

Net Present Value (NPV)

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Some contents of this presentation are adapted from year 2005 course notes for 620-362 Applied Operations Research, Department of Mathematics and Statistics, The University of Melbourne (compiled by Prof Natasha Boland and Dr Renata Sotirov)

Net Present Value (NPV)

Option	Outlay Year 0	Outlay Year 2	Yield Year 1	Net Cash Flow
1	\$10,000	\$14,000	\$24,000	\$0
2	\$6,000	\$1,000	\$8,000	\$1,000

Which is the better investment?

Superficially Option 2 is better.

But this assumes that the value of \$1 is the same at all times. This is not true!

\$1 invested now yields a certain return of $\$(1+r)$, where r is the annual interest rate (e.g. this might be the rate for a 1-year fixed-term deposit in a bank)

$\$1$ now = $\$(1+r)^k$ in k years

$\Rightarrow \$1/(1+r)^k$ now = \$1 in k years

$\Rightarrow \$M$ at year k = $\$ M/(1+r)^k$ now

Net Present Value (NPV)

If the interest rate $r = 0.2$ then:

Option	Outlay Year 0	Outlay Year 2	Yield Year 1	Net Cash Flow
1	\$10,000	\$9,722	\$20,000	\$278
2	\$6,000	\$694	\$6,667	\$-27

So if \$s are evaluated correctly then actually
Option 1 is the better investment.

Costs/Prices and Inflation

Note that if \$ are referring to costs, or prices, then inflation may have to be considered also.

$$\begin{aligned} & \text{(Cost of commodity in } k \text{ years)} \\ &= (1+q)^k \times \text{(Cost of commodity now)} \end{aligned}$$

where q is the inflation rate.

Thus true cost of purchase in k years, evaluated in \$ now, is

$$[(1+q)/(1+r)]^k \times \text{(Cost of commodity now)}$$