Lesson 8-2 – Unequal Lives and Infinite Lives

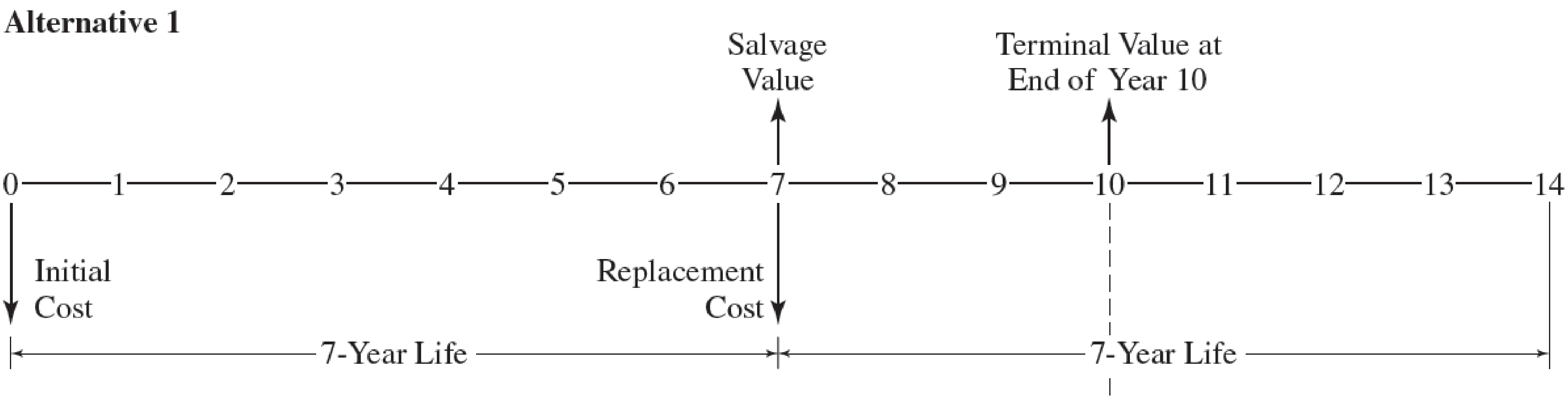
Analysis Periods

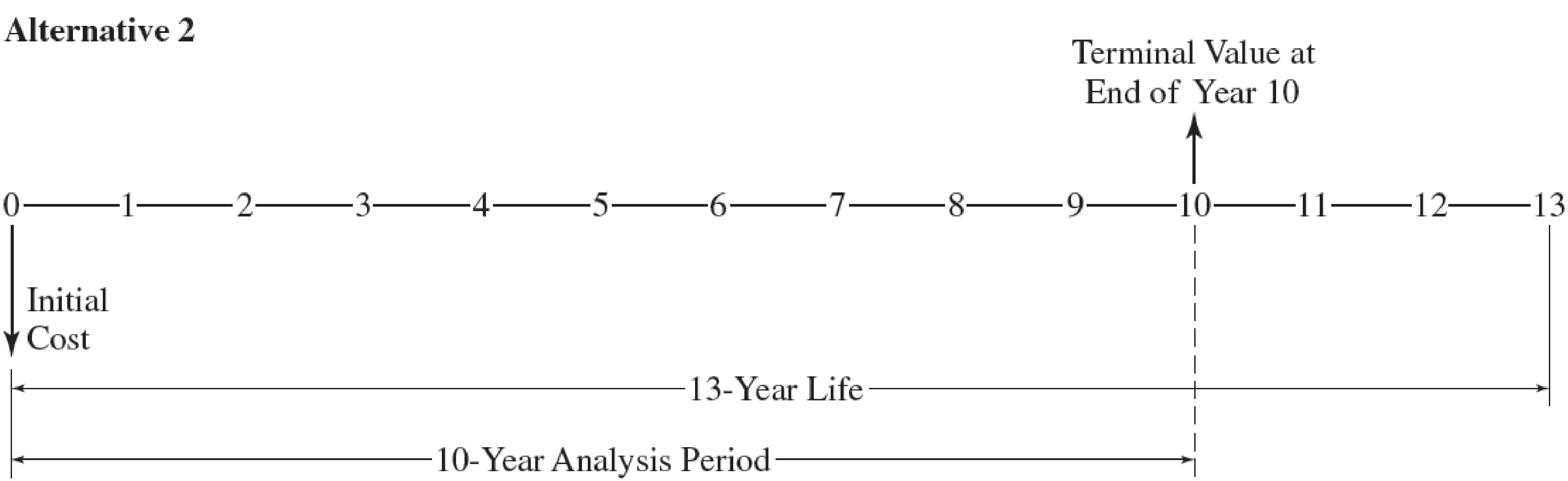
- Initial Assumption – analysis periods for all alternatives were the same – what if they're not?

Useful Lifetime ≠ Analysis Period

- It is NOT correct to analyze alternatives using NPV with different lives
- Methods to handle this problem:
  - Use a “least common multiple” (LCM) of lives (pg. 163)
  - Choose an analysis period if the LCM method is too onerous or doesn’t make sense.
    - “Brute Force”
    - E.g. 7 and 13 years gives an LCM = 91 years
    - Equipment lifetimes are large relative to expected market or project lifetime

Unequal Lifetime Example





Unequal Lifetimes – Example

- A consulting firm is considering bidding on two projects. It can only take one.

		Project 1	Project 2
	Initial cost (bid prep)	$120,000.00	$ 480,000.00
Expected net annual revenues:		$810,000.00	$1,350,000.00
	Expected net annual costs:	$315,000.00	$ 715,000.00
Expected project timeframe (years):		2	5
Estimated terminal project benefits:		$ -	$20,000

Unequal Lifetimes – Example

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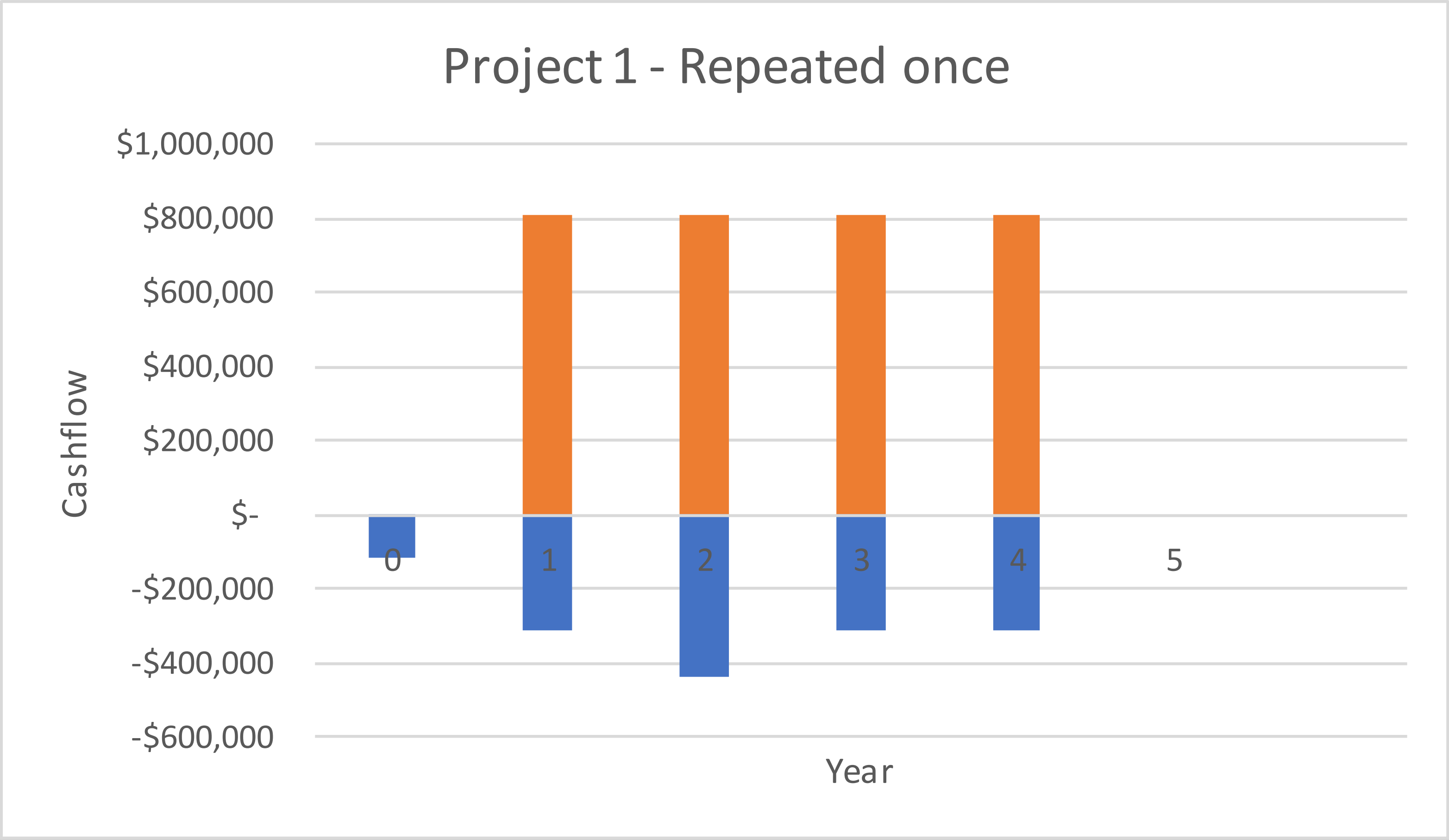

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Unequal Lifetimes – Example

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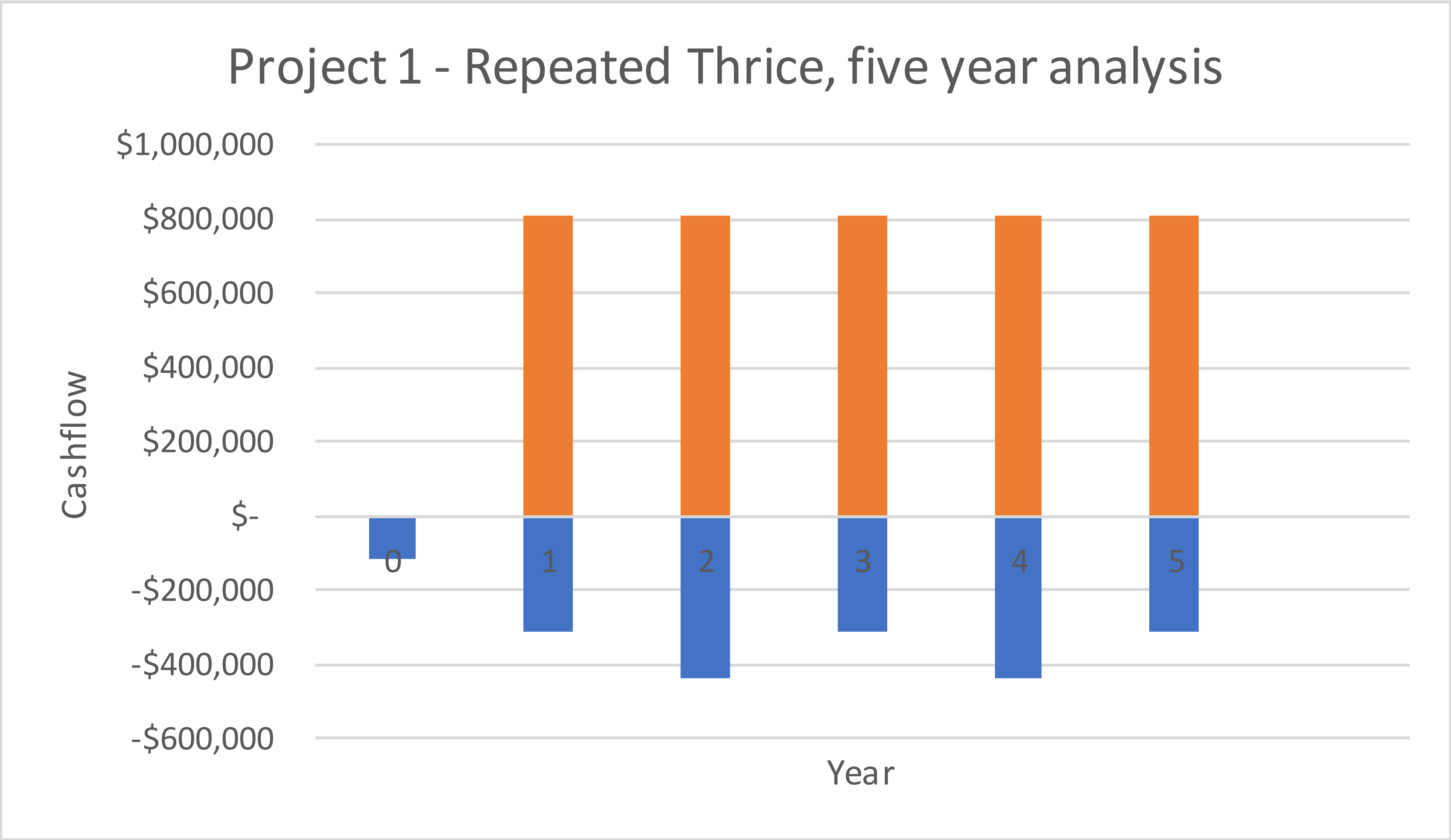

Unequal Lifetimes - Example

- Which method to use? LCM or Brute Force?
- Assume 12% interest rate

- Project 1:
  - P of initial costs: \$120,000 + \$120,000(P/F, 12%, 2) + \$120,000(P/F, 12%, 4)
  - P of revenue: \$810,000(P/A, 12%, 5)
  - P of costs: \$315,000(P/A, 12%, 5)
  - Ptotal = -Pi + Pr – Pc = -\$291925 + \$2919869 - \$1135505 = **\$1492439**

- Project 2:
  - P of initial costs: \$480,000
  - P of revenue: \$1,350,000(P/A, 12%, 5)
  - P of costs: \$715,000(P/A, 12%, 5)
  - P of terminal benefits = \$20,000(P/F, 12%, 5)
  - Ptotal = -Pi + Pr – Pc = **\$1820381**

Infinite Analysis Period: Capitalized Cost

- The need for large-scale infrastructure projects (bridges, pipelines, etc.) is considered to be permanent.
- These types of projects are considered to have an infinite analysis period.
- Capitalized cost is the present sum that is required to provide the service indefinitely at some interest rate.

Infinite Analysis Period: Capitalized Cost Continued…

- There can be an end-of-period withdrawal of A which is equal to $P(i)$:
  - These withdrawals will never decrease the original principal.
  - $A = Pi$ for $n = \infty$

  Therefore:
  - Capitalized Cost = $P = A/i$
    - The money set-aside that can provide the funds for the project forever.

UBC Endowment Fund Example

- See the UBC IMANT 2017 Report:
- 2017 Value approximately $1.63 billion
  - Desired spend rate of 3.5% per year
  - Long term growth rate target of 6.65%
- How much funding does the endowment provide at its current spend rate?
  - A = Pi = $1,630M*3.5% = $57 million
- How much more could it provide if it spent the full return?
  - A = Pi = $1,630M*6.65% = $108 million
- The faculty of Applied Science has an annual budget of roughly $65 million. At the current spend rate, how large would the endowment fund need to be to completely fund APSC?
  - P = A/I = $65M/3.5% = $2,275 million, or $2.275 billion