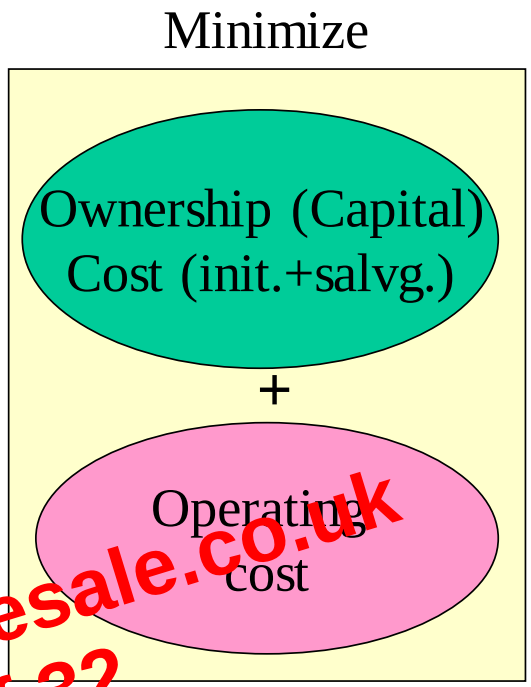
Economic Service Life

- Def:**Economic service life** is the <u>useful life</u> of a defender, *or* a challenger, that results in the minimum equivalent annual cost
- Why do we need it?: We should use the respective economic service lives of the defender and the challenger when conducting a replacement analysis.

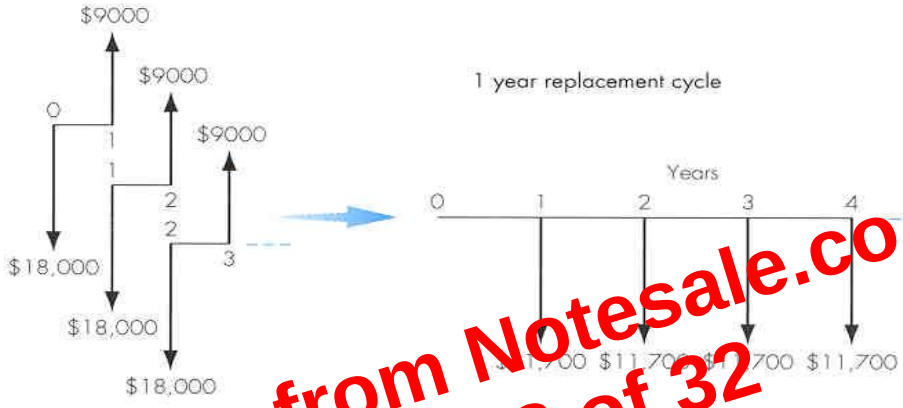


$$CR(i) = I(A/P,i,N) - S_N(A/F,i,N)$$

Economic Service Life Calculation (Example 15.4)

- $N = 1$

$$AEC_1 = \$18{,}000(A/P, 15\%, 1) + \$1{,}000 - \$10{,}000$$
$$= \$11{,}700$$



Marginal Analysis

Question: What is the additional (incremental) cost for keeping the defender one more year from the end of its economic service life, from Year 2 to Year 3?

Financial Data:

- Opportunity cost at the end of year 2: Equal to the market value of $3,000
- Operating cost for the 3rd year: $5,000
- Salvage value of the defender at the end of year 3: $2,000

Replacement Analysis under the Finite Planning Horizon

	Annual Equivalent Cost ($)	
N	Defender	Challenger
1	5,130	7,500
2	5,116	6,151
3	5,500	5,857
4	5,961	5,826
5	6,434	5,897

Some likely replacement patterns under a finite planning horizon of 8 years

Example 15.6 continued

- Option 5: $(j_0, 3), (j, 4), (j, 1)$

$$PW(15\%)_5 = \$5{,}500(P/A, 15\%, 3) + \$5{,}826(P/A, 15\%, 4)(P/F, 15\%, 3) + \$7{,}500(P/F, 15\%, 8) = \$25{,}946$$

- Option 6: $(j_0, 4), (j, 4)$

$$PW(15\%)_6 = \$5{,}826(P/A, 15\%, 4)(P/F, 15\%, 4) + \$5{,}826(P/A, 15\%, 4)(P/F, 15\%, 4) = \$26{,}529$$