06 - The Levelized Annual Cost (LAC) Method

Econ 331: Environmental Economics

Fall 2025

Learning Outcomes/Goals

1. Use the LAC Method to evaluate if a project makes economic sense or not.
2. Compare and contrast the numerical answers between NPV and LAC.
3. Predict how changes in discount rate, time horizon, timing, and amounts of costs and benefits might change whether a project makes economic sense or not.
4. Apply the Levelized Cost Factor (LCF) correctly depending on the situation.

Where We Are

- We have the formulas to calculate NPV based on a given problem.
- That is taking all future benefits and costs, and calculating their present value.
- We could also take an initial cost and break that cost up into even payments in each year, and then compare the net-benefit in each year.
- We still need to account for the fact that monetary amounts in different periods are not worth the same!

Reminder: NPV Formula

$$PV = \sum_{t=0}^{\infty} \frac{FV}{(1+r)^t} = \frac{1}{1+r} \cdot \frac{FV}{1 - \frac{1}{1+r}} = \frac{FV}{r}$$

$$PV = \sum_{t=0}^{T} \frac{FV}{(1+r)^t} = FV \frac{(1+r)^T - 1}{r(1+r)^T}$$

Simple Example Problem

- Suppose we want to figure out how much we want to pay to have cleaner air every year for the infinite future.
- The benefit of this cleaner air is $100 per year.
- The cost of cleaning up the air is $5000.
- The discount rate is 3%.

Simple Example Problem

- We could calculate the present-value of these benefits is $\frac{100}{0.03} = \$3,333$.
- So we know the benefits are not worth the cost.
- OR we could figure out the annual amount that is equivalent to that $5,000 up-front payment.
- This amount is the $FV = PV \cdot 0.03 = \$150$.
- So on average, in each year the levelized annual cost of that $5,000 is $150, and the benefit is $100.
- Therefore our problem is equivalent to a -$50 net-benefit in each year, so the project is not worth it!

Levelized Cost Factor (LCF)

- What we did is we multiplied our PV (\$5,000) by the inverse of $\frac{1}{r}$.
- Instead of finding the present value as $PV = \frac{1}{r}FV$, we said $FV = PV \cdot r$.
- This r is what we call our Levelized Cost Factor, because it tells use the equivalent value of a present amount split equally across all future periods.
- We can do the same thing to derive formulas for the finite case too.

LCF (finite case)

$$PV = \sum_{t=0}^{T} \frac{FV}{(1+r)^t} = FV \frac{(1+r)^T - 1}{r(1+r)^T}$$

$$\implies FV = PV \cdot \frac{r(1+r)^T}{1+r)^T - 1}$$

- where $\frac{r(1+r)^T}{1+r)^T-1}$ is the LCF.

LAC vs NPV

- From our simple example, you can see that we got different numerical answers (-$1,667 for NPV, -$150 for LAC).

- The conclusion, however, in both cases is the same. The project does not make economic sense.

- This will always be true, and is a good way to check your answer and make sure you did not make a math mistake!