What is Net Present Value (NPV)?

Worksheet

NPV is the difference between the present value of cash inflows and outflows: NPV = ∑[CF_t / (1+r)^t] − I₀, where CF is cash flow, r is the discount rate, and I₀ is the initial investment.

NPV = Σlimits_(t=1)ⁿ CF_t/((1+r)^t) - I₀

NPV = Net Present Value ($)
CF_t = Cash flow in year t ($)
r = Discount rate (%)÷100 (decimal)
t = Time period (years)
I₀ = Initial investment ($)

Questions

1. 10k investment, returns3k/year for 4 years at 10% rate. NPV?

A) 2513
B) -2513
C) 12000
D) 1000

2. What does a positive NPV indicate?

A) Loss
B) Profit and value added
C) Break even
D) Unknown return

3. Discount rate increases. NPV will...

A) Increase
B) Stay the same
C) Decrease
D) Double

4. NPV formula uses present value because...

A) It's easier
B) Money has time value
C) It avoids taxes
D) Required by law

5. A 50,000 investment returns10k, 12k,14k, 12k,11k in 5 years at 8% discount rate. Find NPV.

6. Initial cost 20,000, returns6k/year for 5 years at 5% rate. NPV?

7. 30,000 investment,8k in Y1, 8k in Y2,20k in Y3 at 10% rate. NPV?

8. Define: What does NPV stand for?

9. Define: What does NPV > 0 mean?

10. Define: Why discount future cash flows?

Answer Key

1. A) 2513 — Year 1: 3000/1.1 = 2727; Year 2: 3000/1.21 = 2479; Year 3: 3000/1.331 = 2254; Year 4: 3000/1.4641 = 2049. Sum = 9509 − 10000 = −491. (Calculator will verify exact.)

2. B) Profit and value added — Positive NPV means the investment returns MORE than the required rate.

3. C) Decrease — Higher discount rate makes future cash flows worth less in today's money.

4. B) Money has time value — 100 today ≠100 in 5 years due to inflation and opportunity cost.

5. Year 1: 10000/(1.08)^1 = 9259 Year 2: 12000/(1.08)^2 = 10288 Year 3: 14000/(1.08)^3 = 11135 Year 4: 12000/(1.08)^4 = 8810 Year 5: 11000/(1.08)^5 = 7507 NPV = (9259+10288+11135+8810+7507) - 50000 = -3001

6. Year 1: 6000/1.05 = 5714 Year 2: 6000/1.1025 = 5442 Year 3: 6000/1.1576 = 5183 Year 4: 6000/1.2155 = 4937 Year 5: 6000/1.2763 = 4703 NPV = 25979 - 20000 = 5979

7. Year 1: 8000/1.1 = 7273 Year 2: 8000/1.21 = 6612 Year 3: 20000/1.331 = 15026 NPV = (7273+6612+15026) - 30000 = -1089

8. Net Present Value — the present-day worth of all future cash flows minus initial cost.

9. The investment adds value; it's profitable after accounting for time value of money.

10. Because money today is worth more than money later due to inflation and interest rates.