What is Net Present Value (NPV)?

Worksheet

NPV is the sum of the present values of all expected cash inflows from a project, minus the initial investment. For a project with equal annual cash flows, NPV = CF [1 (1+r)^n] / r C.

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t} - I_0$$

Questions

1. A project has NPV = $8,881.50. What should the company do?

A) Reject it - NPV is too small
B) Accept it - NPV is positive
C) Wait for a better project
D) NPV alone can't decide

2. What does a negative NPV indicate?

A) The project's return exceeds the discount rate
B) The project destroys value at that discount rate
C) The initial investment is zero
D) The cash flows are guaranteed

3. In the NPV formula, why do we discount future cash flows?

A) To make the math harder
B) Because future money is worth less than money today
C) To increase the project's value
D) Discounting is optional

4. If the discount rate increases, NPV typically

A) increases
B) stays constant
C) decreases
D) becomes undefined

5. A project costs $100,000 today and returns $25,000 per year for 6 years. At a 10% discount rate, what is its NPV?

6. A machine costs $50,000 and generates $8,000/year for 10 years at a 6% discount rate. Find NPV.

7. An expansion costs $200,000 and yields $30,000/year for 12 years at an 8% discount rate.

8. Define: What does NPV tell you?

9. Define: What is the decision rule for NPV?

10. Define: What does a discount rate represent in NPV?

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Answer Key

1. B) Accept it - NPV is positive - Any positive NPV means the project adds value at the given discount rate - accept it.

2. B) The project destroys value at that discount rate - Negative NPV means the discounted inflows are less than the cost.

3. B) Because future money is worth less than money today - This reflects the time value of money.

4. C) decreases - Higher discount rates reduce the present value of future cash inflows, lowering NPV.

5. Annuity factor = [1-(1.10)^-6]/0.10 = 4.3553 PV of inflows = 25,000 4.3553 = $108,881.50 NPV = 108,881.50 100,000 = $8,881.50

6. Annuity factor = [1-(1.06)^-10]/0.06 = 7.3601 PV of inflows = 8,000 7.3601 = $58,880.60 NPV = 58,880.60 50,000 = $8,880.60

7. Annuity factor = [1-(1.08)^-12]/0.08 = 7.5361 PV of inflows = 30,000 7.5361 = $226,082.40 NPV = 226,082.40 200,000 = $26,082.40

8. Whether a project's expected returns, discounted to today, exceed its cost - a positive NPV creates value.

9. Accept the project if NPV > 0; reject if NPV < 0.

10. The required rate of return, reflecting the cost of capital and risk of the project.

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