Climate Risks

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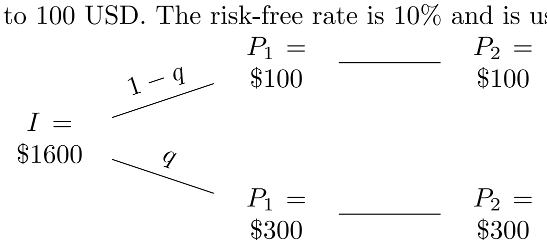
Abstract

1 Investment Under Uncertainty

1.1 Two-Period Model

A firm is considering investing in a widget factory. The investment cost I is 1600 USD. Currently, price of a widget is 200 USD, but next year the price will change. With probability q, it rises to 300 USD and with probability $1 - q$ it falls to 100 USD. The risk-free rate is 10% and is used as the discount rate.



The Net Present Value (NPV) of the investment is given by:

$$NPV = -I + \sum_{t=0}^{\infty} {\frac{E[P]}{1+r}}^{t} \tag{1}$$

where $E[P]$ is the expected price of a widget in the future and r is the discount rate. The expected price of a widget in the future is given by:

$$E[P] = q \cdot 300 + (1 - q) \cdot 100 \tag{2}$$

We obtain a value of $E[P] = 200$ USD. $\sum_{t=0}^{\infty} \frac{200}{1.1^t}$ is a geometric series that converges to 2200 Replacing with our numerical values, we get:

$$\sum_{t=0}^{\infty} \frac{200}{1.1^t} = \frac{200}{1 - \frac{1}{1.1}} \approx 2200 \tag{3}$$

Plugging this into the NPV formula, we get:

$$NPV = -1600 + \sum_{t=0}^{\infty} \frac{200}{1.1^t} = -1600 + 2200 = 600 \tag{4}$$

It seems that the investment is profitable, as the current value of the investment, V_0, is equal to 2200 USD and exceeds the initial cost I of 1600 USD.

2 Adaptation in Face of Climate Change

3 Green Investment in Face of Transition