

Video 21 - NPV: Cash Outlays and Sign Conventions

The following is a supplementary transcript for tutorial videos from

<https://blogs.ubc.ca/financefundamentals/>

Hello. In this video, we will be discussing how to handle initial cash outlays and sign conventions in net present value problems. To do so, we first need to understand the different types of costs and cash flow streams we might encounter. By the end of this video, you will learn the different types of cash outlays and how to evaluate cash outlays and inflows in investment project decisions.

Video at 00:29

Incremental cash flows are the additional cash flows realized as a result of the project. *Only* incremental cash flows are relevant to a capital investment decision, which includes opportunity costs. For example, suppose the shoe line of a fashion company generates \$50,000. If the company adds a new socks line, which would increase the shoe line's sales by 10% or \$5,000, the 10% increase in shoe sales would be considered in deciding whether to accept or reject the new socks line project.

Video at 01:00

An example of a cash flow that would not be considered incremental is an inflow or outflow that would be incurred regardless of whether or not we take on an investment project. These non-incremental cash flows are not relevant to deciding whether or not we take on the investment project because, well, they would happen anyway. Let's revisit your sister who was still experiencing her quarter-life crisis. A cash flow that is incremental to her decision to go straight to university, is the tuition she must pay if and only if she decides to go straight to university. Expenses such as food or housing are not relevant to her decision, because whether she decides to go straight to university, or instead take a gap year to work, these are expenses that will be incurred anyway.

Video at 01:44

Conventional cash flow stream: this type of cash flow stream consists of an initial cash outflow followed by a series of inflows. For example, a company may invest \$30,000 into a project initially, but receives \$20,000 a year for four years, one year after the initial investment.

Video at 02:02

You may also notice sign conventions here. We can identify a cash outflow or a cost in two ways: there will be a negative sign in front of the number, or the number will be in parentheses. We can identify cash inflows by either a positive sign or no sign in front of the cash flow. It is crucial to not be sloppy with the cash flow signs. Not only do you want your work to be clear for professors or peers, but you also want to stay organized for yourself, as you will see in later videos that capital budgeting problems can quickly become complex.

Video at 02:33

Unconventional cash flow stream: an unconventional cash flow stream can involve cash inflows mixed in with cash outflows throughout the life of the project. Let's use the same example as above, but add one change: in year three, we need to make a capital expenditure of \$25,000 for the project. Thus, our cash flow for year three will be

$$\text{net cash flow in year 3} = \$20,000 \text{ cash inflow} - \$25,000 \text{ cash outflow} = -\$5,000$$

This gives us a net *outflow* of \$5,000.

Video at 03:04

Now that we know the different types of costs and cash flows, we can use our newfound knowledge to help us determine what course of action a company should take. Suppose you have a piece of equipment sitting unused in a corner of a factory. An employee comes up with a proposal that suggests if \$60,000 is invested in the machine today, it can be used for the next four years, generating profits of \$60,000 each year. The machine's salvage value at the end of the four years is \$0. The machine initially costs \$300,000. The machine today can be sold for \$110,000. There are installation costs of \$20,000, and training costs to use the machine of \$15,000. The rent paid for the factory is \$100,000 a year. The discount rate for this investment project is 8%.

Video at 03:53

What costs are not factored into the decision making process? The initial cost of \$300,000 is not factored into the decision making process, as it is a sunk cost. The \$300,000 has already been paid, cannot be recovered, and has no impact on how much money the equipment can generate in the future for the company. As well, the \$100,000 per year rent on the factory is not relevant, as it is not incremental to this decision regarding the equipment. Whether we choose to sell the

equipment or invest in it, the company will still continue to pay rent. Thus, we do not need to worry about the company's rent going forward.

Video at 04:32

What is the cost to the firm today if the project is accepted? The cost of the project if accepted would be \$95,000

$$\text{cash outflows} = -\$60,000 \text{ repair} - \$20,000 \text{ installation} - \$15,000 \text{ training} = -\$95,000$$

Does the project add value to the firm? Yes, this project would add value to the firm.

$$\text{cash inflows} = \text{four year annuity of } \$60,000 = \$60,000 \times \left[\frac{1-(1.08)^{-4}}{0.08} \right] = \$198,727.61$$

Considering the cash flows of the project, there is a positive net present value:

$$NPV = \$198,727.61 \text{ inflow} - \$95,000 \text{ outflow} = \$103,727.61$$

Video at 04:54

So, should the firm accept the project? No, the firm should not accept the project, as we need to consider the opportunity cost. When evaluating an investment, the firm must consider the value of the best alternative. The value of selling the machine now is higher than the value we will gain from accepting the project by \$6,272 (\$110,000 - \$103,728). Thus, the firm should sell the machine now. In other words, if the firm chooses to invest in the machine, rather than selling the machine now, they would be worse off in today's dollars by \$6,272.

Video at 05:29

Now, you have understood different types of cash outlays and how to evaluate cash outlays and inflows in an investment project decision. However, it is important to remember that many types of initial cash outlays have a certain level of uncertainty and are typically underestimated. Thank you for joining us this time and stay tuned for the next video!