

Making Investment Decisions with the Net Present Value Rule

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Introduction

Investment Decision

How does a company decide to make an investment or leave it? Most companies calculate the Net Present Value (NPV) which means forecasting the cash flows of a project and discounting them by a discount rate which covers opportunity costs of capital. If this results in a positive NPV, the project will create wealth.

$$\text{Net Present Value (NPV)} = C_0 + C_1 / (1+r)$$

C_0 is the cash flow at time 0 (that is, today)

C_1 is the cash flow at time 1

$1 / (1+r)$ is the discount factor

Using this formula is not very difficult if all cash flows and a discount rate are provided. If you need to answer what the cash flow is by yourself, some basic questions need to be answered regarding completeness and accuracy. How much will the cash flow be in upcoming years? How many units will I sell? How much do I need to invest? What will the life span of my product be?

We will place the focus on “what” to discount (assuming you know “how” to discount) using the above-mentioned formula. The main task will be to find out what the relevant cash flows are for applying the NPV rule. Three general rules will be described for doing so.

Later on we will examine the question on how to use the NPV rule when in a situation where you can choose between two projects with varying economic outlooks.

Applying the NPV rule

Cash flow is what's relevant

Using the formula for calculating the NPV you need to estimate the relevant cash flow. But what is cash flow? Cash flow can be described as the difference between the cash you receive and cash you pay out. Nothing more, nothing less. Be aware that there is a big difference between cash flow and accounting income.

Two more aspects need to be considered when estimating cash flow. First, estimate cash flows on after-tax basis. Second, be sure to consider the cash flow *when* it occurs. For example, if you receive a bill today for goods and the payment date is in one month. To determine the relevant cash flows, consider the payment in one month and the month when you received the bill.

Estimate Cash Flow on an Incremental Basis

When using the NPV rule, consider future cash flows only. These are those that follow after you have a project accepted. This is because the NPV depends on future cash flows only. You consider your investment in t_0 , of course (ie, today).

A point to keep in mind when estimating the cash flow is to not be reluctant to invest money in a project that is going poorly when there will be a turnaround opportunity with a positive NPV. Some decision makers hesitate to throw good money after bad money without first considering the NPV and a potential turnaround opportunity.

Furthermore, be sure to include all incidental effects. One example is the cannibalism effect. When you launch a new version of your product and it cuts your sales from the older version, include it in your cash flow estimate. One other example is “downstream” activities. Selling an engine and generating cash flow by offering service contracts should also be considered as incremental cash inflow.

Working capital can be described as the difference between short term assets (such as accounts receivable or inventories) and liabilities (such as unpaid bills). During the life span of a project you may need to invest in working capital. Therefore, be sure you do not forget to include working capital requirements when estimating cash flows.

Some other relevant facts when estimating cash flow are as follows: opportunity costs, sunk costs and the allocation of overhead costs. A piece of land can be used for a new building

or it can be sold. When a decision to sell is made, you could earn a specific amount of money. This amount is considered cost when you build a building on this piece of land instead of selling the land. Opportunity costs are in most cases the market price and should be considered by estimating the cash flow. Sunk costs are past – ie, over and done with. There are no further opportunities for influencing them anymore. Due to the fact that they are irreversible they cannot affect your decision via the NPV rule. Do not include sunk costs when estimating your cash flow.

Treat Inflation Consistently

Be aware that nominal cash flows are discounted at a nominal discount rate and discount real cash flows at a real rate. Do not mix them. Both approaches will result in the same NPV result.

Equivalent Annual Costs

When calculating the NPV you are determining today's value of your future cash flows – expressed in dollars or euros. A reverse of this calculation could be a transfer of your present value in constant cash flows for upcoming years. When talking about equivalent costs, we are calculating annuity.

Consider a situation where you can choose between two machines with varying life spans. Simply calculating the NPV could lead you to make the wrong decision. Different life spans and the fact you can replace one before the other machine are not taken into consideration when calculating NPV. You need to look at which one has the lower equivalent annual cost to determine the better investment. To make things even clearer, you can ask what the regular rental payment is that you would need to charge for using the machine. Do the calculation and select the machine with the lower equivalent costs.

Summary

One important aspect is that the NPV will only lead to the right decision if there is a well-functioning market. Every cash flow estimate is unique and is project dependent. The above-mentioned points can serve as a tool to help forecast cash flow.

While the principles of applying the NPV rule are the same worldwide, remember that there may be different assumptions and inputs from country to country.