

Net Present Value

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Accounting; an assessment of the long-term profitability of a project made by adding together all the revenue it can be expected to achieve over its whole life and deducting all the costs involved, discounting both future costs and revenue at an appropriate rate.

Abbreviation: NPV

<https://www.dictionary.com/browse/net-present-value>

What is 'Net Present Value - NPV'.

- Generally, an investment with a positive NPV will be profitable, and an investment with a negative NPV will result in a **net** loss. This concept is the basis for the **Net Present Value Rule**, which dictates that the only investments that should be made are those with positive NPV **values**.
- <https://www.investopedia.com/terms/n/npv.asp>

NPV Formula

NPV Formula

The formula for Net Present Value is:

$$NPV_{XYZ} = \frac{Z_1}{1+r} + \frac{Z_2}{(1+r)^2} - X_0$$

Where:

Z_1 = Cash flow in time 1

Z_2 = Cash flow in time 2

r = Discount range

X_0 = Cash outflow in time 0 (i.e. the purchase price / initial investment)

NPV Calculation by Hand

- $r =$ Discount rate assumed is 10%
- $Z_1 = \$1$
- $Z_2 = \$1$
- $X_0 = - \$1$
- $NPV = \$1/(1+0.1) + \$1/((1+0.1)^*(1+0.1)) - \$1$
- $NPV = \$1/1.1 + \$1/(1.1)^2 - \$1$
- $NPV = \$0.91 + \$0.83 - \$1$
- $NPV = \$0.74$

Example of Net Present Value (NPV)

- Let's look at an example of how to calculate the net present value of a series of [cash flows](#). As you can see in the screenshot below, the assumption is that an investment will return \$10,000 per year over a period of 10 years, and discount rate required is 10%.

Discount Rate	10.0%									
Year	1	2	3	4	5	6	7	8	9	10
Discount Factor	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47	0.42	0.39
Undiscounted Cash Flow	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Present Value	9,091	8,264	7,513	6,830	6,209	5,645	5,132	4,665	4,241	3,855
Net Present Value	61,446									

- The final result is that the value of this investment is worth \$61,446 today. It means a rational investor would be willing to pay up to \$61,466 today to receive \$10,000 every year over 10 years.
- By paying this price, the investor would receive an Internal Rate of Return (IRR) of 10%. The Internal Rate of Return (IRR) is the discount rate that sets the net present value of an investment equal to zero.
- If IRR is greater than cost of capital, (IRR) of 10%, one could make a wise investment.
- If one paid anything less than \$61,000, the investor would earn an internal rate of return that's greater than 10%.
- <https://corporatefinanceinstitute.com/resources/knowledge/valuation/net-present-value-npv/>

What is My Timber Worth?

- First, even though statewide or regional prices can provide a taste of the level and trends of prices, what your timber is worth is somewhat dependent on local market conditions. If your timber grows near a lot of mills, your timber might command a higher price than if the timber were far from mills or close to only one or two mills.
- Second, a timber stand's value is dependent on the species, sizes, and qualities of the trees growing in it. A large, top quality black cherry, for example, would command a significant price premium as a veneer log, while limby and crooked sweetgum might be priced as pulpwood.
- Third, the value of timber depends heavily on how much timber is sold in one timber sale and what kind of harvesting is done. Often, the larger the sale, the higher the price per unit of wood that can be offered. It can be more costly per unit of wood removed to cut only a few, selected trees, rather than cut most or all trees in the stand. The greater the harvest expense per tree, the less the harvester may be willing to pay for the trees.

What is My Timber Worth?

- Fourth, what a timber buyer will pay for your trees depends on the conditions of the site in which they are growing, which affects how expensive it is to remove them and haul them to a mill. Variables such as distance from the stand to the nearest road, slope, soil wetness, and whether temporary bridges need to be built across streams all can affect operational costs of harvesters and hence what they might be willing to pay to harvest a stand of trees.
- Fifth and finally, state and local timber harvesting and management practices laws can affect what kind of harvesting equipment can be used, how close harvests can come to streams, and what contingencies must be made if there are local populations of vulnerable or legally protected plant or animal species in your area. All of those things can affect how much wood can be removed and the operational costs of harvesting. Higher costs translate into lower prices offered.
- <https://srs.fs.usda.gov/econ/timberprices/answers/>

Washington State Department of Revenue Stumpage Value Table

January 1 – June 30, 2018

Stumpage Values per Thousand Board Feet Net Scribner Log Scale C Western & Eastern Washington

Species Name	Species Code	Stumpage Value Area	Haul Zone				
			1	2	3	4	5
Western Hemlock and Other Confer (Includes Spruce & Lodgepole Pine)	WH	1	\$296	\$289	\$282	\$275	\$268
		2	\$374	\$367	\$360	\$353	\$346
		3	\$362	\$355	\$348	\$341	\$334
		4	\$358	\$351	\$344	\$337	\$330
		5	\$331	\$324	\$317	\$310	\$303
		6	\$256	\$249	\$242	\$235	\$228

Present Value

- The value in the present of a sum of money, in contrast to some future value it will have when it has been invested at compound interest.
- "\$110 due in 12 months' time has a present value of \$100 today, if invested at an annual rate of 10 percent."

Why Are Cash Flows Discounted?

- The cash flows in net present value analysis are discounted for two main reasons, (1) to adjust for the risk of an investment opportunity, and (2) to account for the [time value of money \(TVM\)](#).
- The first point (to adjust for risk) is necessary because not all businesses, projects, or investment opportunities have the same level of risk. Put another way, the probability of receiving cash flow, a US Treasury bill is much higher than the probability of receiving cash flow from a young technology startup.
- <https://corporatefinanceinstitute.com/resources/knowledge/valuation/net-present-value-npv/>

Why Are Cash Flows Discounted?

- To account for the risk, the discount rate is higher for riskier investments and lower for safer one. The US treasury example is considered to be the risk-free rate, and all other investments are measured by how much more risk they bear relative to that.
- The second point (to account for the time value of money) is required because due to inflation, interest rates, and opportunity costs, money is more valuable the sooner it's received. For example, receiving \$1 million today is much better than \$1 million received five years from now. If the money is received today, it can be invested and earn interest, so it will be worth more than \$1 million in five years' time.