

Microsoft Excel

Module 33 - Use of NPV Net Present Value and PMT Function in Excel

 CBSE

NPV Function

Net Present Value (NPV) is a way to figure out if an investment is worth it. It compares the money you expect to make in the future to the money you're spending now.

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NPV in Simple Terms

Think of NPV as a tool that helps you decide if spending money today will pay off later. It adds up all the future cash you expect to earn from an investment, but it adjusts for the fact that money today is worth more than money in the future. If the result (the NPV) is positive, the investment is likely a good idea. If it's negative, you might lose money.

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Purpose of NPV

NPV helps determine if an investment's future cash flows justify its initial cost. It tells you if the money you'll make in the future is enough to cover what you're spending now, plus give you a profit.

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Positive NPV (If $NPV > 0$): The investment is profitable.

Negative NPV (If $NPV < 0$) : The investment may lead to a loss.

=NPV(rate, value1, [value2], ...)

Arguments:

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rate: The discount rate per period (e.g., interest rate or required rate of return).

value1, value2, ...: The series of future cash flows. These can be entered as individual values, cell references, or a range.

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Note: The NPV function assumes that all cash flows occur at the end of each period and excludes the initial investment. You'll need to subtract the initial investment manually from the result.

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Step 1: Organize Your Data

Create a table with the following columns:

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Periods (Years)

Cash Flows (both inflows and outflows)

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Include the initial investment in the first row (Year 0) and subsequent cash flows in the following rows.

	A	B	C	D
1	Year	Cash Flow		
2	0	-10,000		
3	1	3,000		
4	2	4,000		
5	3	5,000		
6	4	6,000		
7	5	7,000		

Step 2: Identify the Discount Rate

Determine the discount rate (e.g., 10% = 0.10) to reflect the time value of money.

Step 3: Use the NPV Function

Click on a blank cell where you want the NPV result.

Enter the formula:

=NPV(rate, cash_flows_range) + initial_investment

Replace rate with the discount rate (e.g., 10% = 0.10).

Replace cash_flows_range with the range of future cash flows (e.g., B3:B7).

Add the initial investment (e.g., B2) separately since the NPV function excludes it.

Step 4: Preview Results

Press Enter and Preview the results

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C
1	Year	Cash Flow	
2	0	-10,000	
3	1	3,000	
4	2	4,000	
5	3	5,000	
6	4	6,000	
7	5	7,000	
8	Discount	10.00%	
9		8234.16	

The formula bar shows: **=NPV(B8, B3:B7) + B2**

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PMT Function

The Excel PMT function is a financial function that calculates the payment for a loan based on a constant interest rate, the number of periods and the loan amount.

"PMT" stands for "payment", hence the function's name.

For the PMT function to work correctly in your worksheets, please keep in mind these facts:

To be in line with the general cash flow model, the payment amount is output as a negative number because it's a cash outflow.

The value returned by the PMT function includes principal and interest but does not include any fees, taxes, or reserve payments that may be associated with a loan. A PMT formula in Excel can compute a loan payment for different payment frequencies such as weekly, monthly, quarterly, or annually. This example shows how to do it correctly.

The PMT function has the following arguments:

PMT(rate, nper, pv, [fv], [type])

Where:

Rate (required) - the constant interest rate per period. Can be supplied as percentage or decimal number.

For example, if you make annual payments on a loan at an annual interest rate of 10 percent, use 10% or 0.1 for rate. If you make monthly payments on the same loan, then use 10%/12 or 0.00833 for rate.

Nper (required) - the number of payments for the loan, i.e. the total number of periods over which the loan should be paid.

For example, if you make annual payments on a 5-year loan, supply 5 for nper. If you make monthly payments on the same loan, then multiply the number of years by 12, and use 5*12 or 60 for nper.

Pv (required) - the present value, i.e. the total amount that all future payments are worth now. In case of a loan, it's simply the original amount borrowed.

Fv (optional) - the future value, or the cash balance you wish to have after the last payment is made. If omitted, the future value of the loan is assumed to be zero (0).

Type (optional) - specifies when the payments are due:

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0 or omitted - payments are due at the end of each period.
1 - payments are due at the beginning of each period.

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For example, if you borrow \$100,000 for 5 years with an annual interest rate of 7%, the following formula will calculate the annual payment:

`=PMT(7%, 5, 100000)`

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To find the monthly payment for the same loan, use this formula:

`=PMT(7%/12, 5*12, 100000)`

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Or, you can enter the known components of a loan in separate cells and reference those cells in your PMT formula. With the interest rate in B1, no. of years in B2, and loan amount in B3, the formula is as simple as this:

`=PMT(B1, B2, B3)`

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Please remember that the payment is returned as a negative number because this amount will be debited (subtracted) from your bank account.

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By default, Excel display the result in the Currency format, rounded to 2 decimal places, highlighted in red and enclosed in parenthesis, as shown in the left part of the image below. The image on the right shows the same result in the General format.

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Currency		General	
B5	<code>=PMT(B1,B2,B3)</code>	B5	<code>=PMT(B1,B2,B3)</code>
1	Annual interest rate	1	Annual interest rate
2	Loan term in years	2	Loan term in years
3	Loan amount	3	Loan amount
4		4	
5	Annual payment	5	Annual payment
	(\$24,389.07)		-24389.0694

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If you'd like to have the payment as a positive number, put a minus sign before either the entire PMT formula or the pv argument (loan amount):

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`=-PMT(B1, B2, B3)`

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=PMT(B1, B2, -B3)

The below table provides the details:

B5		=-PMT(B1,B2,B3)
	A	B
1	Annual interest rate	7%
2	Loan term in years	5
3	Loan amount	\$100,000
4		
5	Annual payment	\$24,389.07

For instance, to find the amount of a periodic payment on a \$5,000 loan with an 8% annual interest rate and a duration of 3 years, use one of the below formulas.

Weekly payment:
=PMT(8%/52, 3*52, 5000)

Monthly payment:
=PMT(8%/12, 3*12, 5000)

Quarterly payment:
=PMT(8%/4, 3*4, 5000)

Semi-annual payment:
=PMT(8%/2, 3*2, 5000)

In all cases, the balance after the last payment is assumed to be \$0, and the payments are due at the end of each period.

	A	B	C	D
1	Annual interest rate	8%		
2	Loan term in years	3		
3	Loan amount	\$5,000		
4				
5	Weekly payment	(\$36.08)	=PMT(B1/52,B2*52,B3)	
6	Monthly payment	(\$156.68)	=PMT(B1/12,B2*12,B3)	
7	Quarterly payment	(\$472.80)	=PMT(B1/4,B2*4,B3)	
8	Semi-annual payment	(\$953.81)	=PMT(B1/2,B2*2,B3)	