Information Technology

Year 2020/2021

Excel

Financial Functions

Financial Functions

Are used to **perform financial calculations** such as, for example, determining the value of regular terms of a loan or the final value of a deposit

On financial functions in Excel we should use **negative values for payments and deposits** (as it is money "going out") and **positive values for earnings and withdrawals** (received money)

http://office.microsoft.com/en-us/excel-help/list-of-worksheet-functions-by-category-HP010079186.aspx#BMfinancial_functions

Financial Functions

The **parameters for financial functions** can be:

- **pmt - payment** (regular value of the term)
- **nper - nr of periods** (number of periodic terms)
- **rate - interest rate** (interest rate on a loan or investment)
- **fv - future value** (capital value in the last period)
- **pv - present value** (capital value at baseline)
- **type** (0 - rent due at the end of the period, 1 - rent due at the beginning of the period)
- **value 1; value n** (payment, when periodic values differ)

pmt / nper / rate / fv / pv → Functions that use the others as parameters

1. INCOME

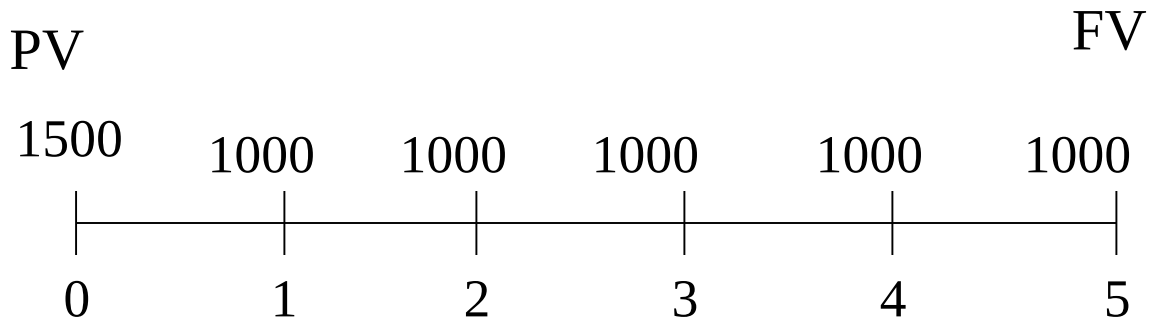
"In order for a **set of capital values** to be considered a **Rent**, it has only to be guaranteed the **equidistance between the maturity dates** although **values can be constant or variable"**

(Barroso, Couto and Crespo, 2009)

Future Value

FV(rate; nper; pmt; pv; type**)**

We want to calculate **the final value of a 5 year financial application,** with an annual interest rate of 2,5%, for which a €1.500 deposit was made at the beginning and there was a €1.000 yearly rent payed at the end of each year during five years



=FV (2,5%; 5; -1000€; -1500€)

Type has by default value 0 (rent due at the end of the period)
Final value is € 6.953,44

Future Value

FV(rate; nper; pmt; pv; type)

We want to compute **the final value of a deposit** of € 10,000 for a period of one year with an annual interest rate of 2,5%

	A	B	C
1			**Notes**
2	**Deposit**	-10.000,00 €	Negative value, because it is a deposit
3	**Period**	1	year
4	**Annual Interest Rate**	2,50%	
5			
6	**Final Value**	10.250,00 €	=FV(B4;B3;;B2;0)

The function FV allows you to calculate, in the last period, the Accumulated Value of a periodical income of constant terms.

Present Value

PV(rate; nper; pmt; fv; type**)**

Manuel bought a car, paying in monthly instalments of €500, during two years at an annual interest rate of 8%. If Manuel wanted to pay for the car in full at time of purchase, how much would have he paid?

=PV (8%/12; 24; -500€;; 1)

The same car paid at once would have cost around € 11,129

The PV function allows the calculation of the Present Value of an annuity of constant terms, normal or anticipated.

2. LOANS

NPER (Number of Periods)

NPER (rate; pmt; present value; future value; type**)**

How many monthly payments of 250 € will be required to pay a loan of € 10,000, with the annual nominal rate of 10%?

=NPER (10%/12;-250;10000)

It will be necessary **48,86** monthly payments = 49 payments

RATE (Tax)

RATE (nper; payment; actual value; future value; type**)**

At which interest rate was a loan of €100,000 contracted if it was paid in 10 annual installments of € 15,000 each?

=RATE (10;-15000;100000)

The interest rate was **8.14%**

PMT (Payments)
PMT (rate; nper; pv; fv; type)

Suppose you want to buy an apartment valued at €150,000, and you want to settle it in 50 years at an effective annual rate of 5%. **What is the value of the monthly payment?**

=PMT (5%/12; 50*12; 150000)

The monthly payment will be -681.21€ (negative because it is a down payment)

PPMT (Payment on Principal)

PPMT (rate; per; nper; pv; fv; type**)**

In the former case, what will be the value of **amortization contained in the 1st month of 20th year** (229th payment)?

=PPMT (5%/12; 229; 50*12; 150000)

The amortization is -145.05€

IPMT (Interest Payment)

IPMT (rate; per; nper; pv; fv; type**)**

In the former case, what is the **interest contained in the 1st month of 20th year** (229th payment)?

=IPMT (5%/12; 229; 50*12; 150000)

The **value of the interest rate** is -536.16€, ie is = **PMT-PPMT**

3. EVALUATION OF INVESTMENT PROJECTS

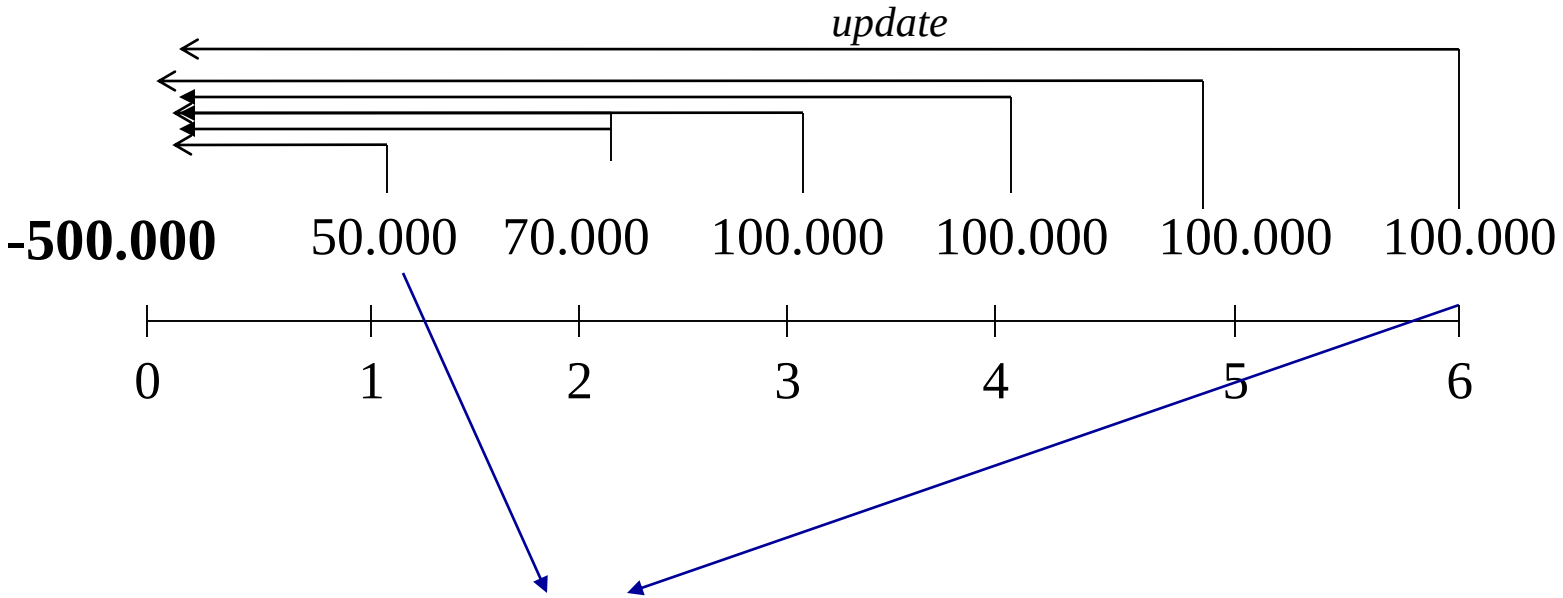
Calculation of Net Present Value (NPV) and **Internal Rate of Return (IRR)**

Net Present Value

NPV(rate; value1; value2;…)+value0

The company NOVAERA is planning an **investment in a new assembly line**, requiring a total investment of €500,000 and having an estimated duration of 6 years. This investment generates a cash flow of € 50,000 at the end of the 1st year, € 70,000 at the end of 2 and € 100,000 per year between the 3rd and 6th year of operation. Considering the annual effective interest rate of 2.5%, calculate the **net present value (NPV) of the investment project**

Net Present Value
NPV(rate; value1; value2;…)+value0

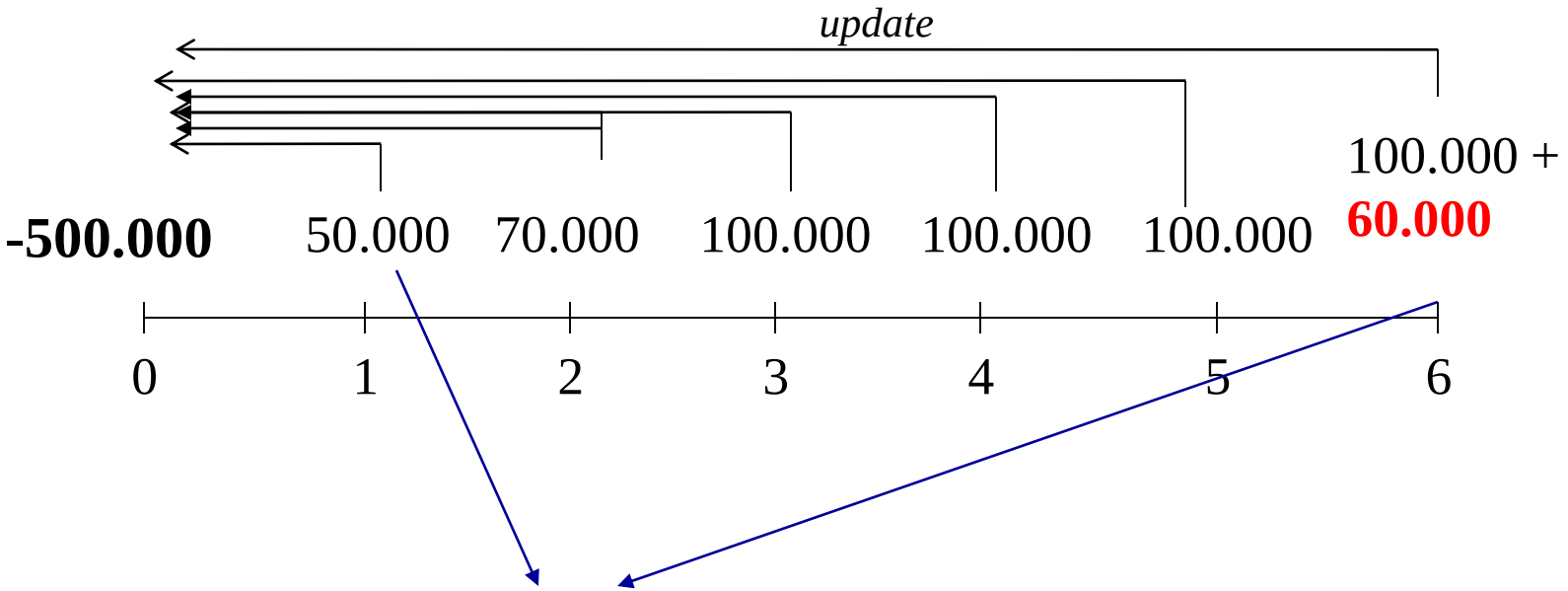


=NPV (2,5%; 50.000€;70.000€; 100.000€; 100.000€; 100.000€; 100.000€)- 500.000€

The NPV is **€ -26,522.38**, which means that the investment will **cause a loss**, and **should not be made**

Net Present Value
NPV(rate; value1; value2;…)+value0

Now consider the residual value of the investment is €60,000.



=NPV (2,5%; 50.000€;70.000€; 100.000€; 100.000€; 100.000€; 160.000€)- 500.000€

The NPV becomes of **€ 25,215.43**

IRR (Internal Rate of Return)
IRR (values, guess)

Now calculate the Internal Rate of Return (IRR) of that investment

=IRR (-500.000€; 50.000€;70.000€; 100.000€; 100.000€; 100.000€; 160.000€)

IRR is **3,78%**

The **estimate (guess)** is a forecast to the IRR. If omitted, Excel assumes a value of 10%

The values correspond to cash flows equidistant in time

Analysis of Investment Projects

Exercise - Barroso, Couto e Crespo (2009)

The ABCork company is considering making an investment in a new assembly line. The total investment amounts to €207,500, and will have an estimated life of 8 years. Considering the predictions made about the revenues and operating costs and a discount rate of 6%, perform the financial analysis of this investment project by calculating the IRR and NPV

	A	B	C	D	E	F
1	Year	Investment	Operating Income	Operating Costs	residual value	Cash Flow
2	0	207.500,00 €				
3	1		35.000,00 €	12.500,00 €		22.500,00 €
4	2		49.000,00 €	15.600,00 €		33.400,00 €
5	3		52.000,00 €	16.400,00 €		35.600,00 €
6	4		56.000,00 €	17.500,00 €		38.500,00 €
7	5		64.000,00 €	19.000,00 €		45.000,00 €
8	6		65.000,00 €	19.300,00 €		45.700,00 €
9	7		67.000,00 €	19.800,00 €		47.200,00 €
10	8		69.000,00 €	20.500,00 €	77.500,00 €	126.000,00 €

=NPV (6%; 22.500 €; 33.400 €; 35.600 €; 38.500 €; 45.000 €; 45.700 €;47.200 €; 126.000) – 207.500 € = 80.126 €

=IRR (– 207.500 €; 22.500 €;33.400 €; 35.600 €; 38.500 €; 45.000 €; 45.700 €;47.200 €; 126.000) = 13,08%