

Initial settings	
K <sub>1</sub>	15.0%
K <sub>2</sub>	12.0%
re <sub>1</sub>	10.0%
re <sub>2</sub>	15.0%
K <sub>d</sub>	0.5%

## Scenario Descriptions

0	NPV Calculation regardless of FP's
1	NTV Calculation considering reinvestment and delay payments

Investment Projects flows				
YEAR	0	1	2	3
IP1	€ (5,000.00)	€ 4,800.00	€ 1,080.00	€ 432.00
FP1	€ 5,000.00	€ (750.00)	€ (750.00)	€ (5,750.00)
res	€ -	€ 4,050.00	€ 330.00	€ (5,318.00)
IP2	€ (5,000.00)	€ 33,000.00	€ (60,250.00)	€ 33,000.00
FP2	€ 5,000.00	€ (600.00)	€ (600.00)	€ (5,600.00)
res	€ -	€ 32,400.00	€ (60,850.00)	€ 27,400.00

Scenario	NPV	IRR	NTV
0	€ 274.60	20%	€ 417.63
	€ (77.90)	10%	€ (109.44)
		50%	
		300%	
1	€ (35.83)		€ (54.50)
	€ 1,276.04		€ 1,792.75

Market Value project 1	€	4,964.17
Market Value project 2	€	6,276.04

Assuming that the both projects have the same level of risk (regardless of different cost of equity, reinvestment rates, IRRs, and amount of financing needed in future years), considering that the second project has negative cash-flow in need for financing at year 2, and the possibility to reinvest/delay payment in the project 2 ( $Re_2 > K_2 + K_d$ ), it is obvious that we should use NTV to compare the projects. Assuming that we can reinvest and delay the payments as well:

**Q1) Scenario 1**

The delay in first project is not fruitful (since the reinvestment rate is less than cost of capital), however, it is profitable to delay payments in the second project.

$$NTV_1 = 4050 * (1 + 0.1)^2 + 330 * (1 + 0.1) - 5318 = -54.5$$

$$NTV_2 = 32400 * (1 + 0.15)^2 - 60850 * (1 + 0.12 + 0.005) + 27400 = 1792.75$$

In conclusion, we can have a -54.5 Euros NTV for the first project and 1792.75 Euros for the other. Therefore, she will choose the second project.

**Q2) Market Value**

Considering the Market Value of the projects, we can calculate the present values based on NTVs. Notice that we cannot calculate NPV anymore. Using this calculation:

$$PV = a_0 + \left[ \frac{NTV}{(1+k)^n} \right]$$

$$PV_1 = 5000 + \frac{-54.5}{(1+0.15)^3} = 4964.17$$

$$PV_2 = 5000 + \frac{1792.75}{(1+0.12)^3} = 6276.04$$

Therefore, the first project can be sold for 4964.17 Euros, and the second project can be sold at a minimum price of 6276.04 Euros.

**Q3) Scenario 0 (How it is and how it could have been with an example)**

If the 2<sup>nd</sup> year of the second project's investment project was positive or the project manager **didn't have the option for delay in payment and reinvestment**, we could have used NPV for project comparison. However, it is not positive. In this case, the NPV calculated as:

$$NPV_1 = -5000 + \frac{4800}{1+0.15} + \frac{1080}{(1+0.15)^2} + \frac{432}{(1+0.15)^3} = 274.60$$

$$NPV_2 = -5000 + \frac{33000}{1 + 0.12} - \frac{60250}{(1 + 0.12)^2} + \frac{33000}{(1 + 0.12)^3} = -77.90$$

Therefore, the first project gains an NPV=274.60€, and the second project shows a loss as an NPV=-77.90€. In conclusion, Mr. Williams goes on with the first project.

### Extra) A critique on using NTV and its options/assumptions:

It is understandable that we simplified everything down for educational purposes, but these are my notes on how things may be different in real world applications:

- 1- We should be clear on how we are delaying payment. Are we financing through raising capital? Are we using bank loans? Are we putting ourselves in a breach of contract situation by delaying payments? Using NTV should be posterior to answering these questions.

To illustrate, if delay of payment is in contract and can be enforced at all years (as some firms hold dividends and increase capital throughout dividends), the NTV could look like this:

Initial settings					Scenario Descriptions			
K_1	15.0%				2	NTV Calculation considering reinvestment and delay payments		
K_2	12.0%							
re_1	10.0%							
re_2	15.0%							
Kd	0.5%							

  

Investment Projects flows					Scenario	NPV	IRR	NTV
YEAR	0	1	2	3	2	€ (35.83)		€ (54.50)
IP1	€ (5,000.00)	€ 4,800.00	€ 1,080.00	€ 432.00		€ 1,300.33		€ 1,826.87
FP1	€ 5,000.00	€ (750.00)	€ (750.00)	€ (5,750.00)				
res	€ -	€ 4,050.00	€ 330.00	€ (5,318.00)				
IP2	€ (5,000.00)	€ 33,000.00	€ (60,250.00)	€ 33,000.00	Market Value project 1		€ 4,964.17	
FP2	€ 5,000.00	€ -	€ -	€ (7,034.38)	Market Value project 2		€ 6,300.33	
res	€ -	€ 33,000.00	€ (60,250.00)	€ 25,965.63				

- 2- If by some miracle, delaying payments in second year is available, it seems that we are considering a new source of funding. With the new source of funding, the investment that we made in the project is bigger than the other project. In the first project we considered 5000 Euros as initial investment, however, in the second project we had a delay in payments (equivalent to finding a new source of financing) of 60,250 Euros in addition to the initial investment. How are the NTVs valid when the size of the projects are clearly different? To clear more on this matter, just assume that the project had the following shape, adding a zero to the second, third- and fourth-year's investment flow:

IP2	€ (5,000.00)	€ 330,000.00	€ (602,500.00)	€ 330,000.00	1	€ (35.83)		€ (54.50)
FP2	€ 5,000.00	€ (600.00)	€ (600.00)	€ (5,600.00)		€ 58,041.41		€ 81,544.00
res	€ -	€ 329,400.00	€ (603,100.00)	€ 324,400.00				

  

Market Value project 1	€ 4,964.17
Market Value project 2	€ 63,041.41

Then the NTV would be 81,544 Euros. Thus, we need measures like ROI or similar measures associated with the amount of risk taken in each project to determine which project should be pursued.