# CHAPTER 2: CAPITAL BUDGETING ANALYSIS.

We are starting with the numbers, if I was you, I would study this theory with the excel that I made.

## Definition.

> **Budgeting Analysis** consist on using different techniques (Payback, Net Present Value, Internal Rate of Return, and Internal Rate of Return Modified) in order to determine if an **investment improves the value of the company** and if is worth it for the company to **invest resources**.
>
> It is also used to compare different investment so we can choose the best one.

## Concept of Free Cash Flow (FCF).

The **Free Cash Flow** consist on the cash generated by an investment after considering all the operating cash inflows and outflows including the investment needs. Excluding those cashflows associated on financial (FCF = Operating Cash Flow - Cash Flow to investment):

- **Sunk Cost:** If I decide not to do the investment, this cost can't be returned. Included in the income statement, but not the analysis. There are exceptions. **Ex.:** A consultancy payment or a **dividend**.
- **Opportunity cost:** Because of doing the project, we no longer have the money. They are not included in the income statement, but in the analysis. **Ex.:** Parking lot used for something else.
- **Increase the cash and payment of interest:** Capital founding.

**Note:** The taxes are included on this concept, even if they are applied in unrealistic number as the financial cost are not represented.

Because of all this, we will get it from the EBIT.

## Techniques: Payback.

**Payback** is the technique that allows the business to know the **how much time** the investment will have to be alive in order to perceive some benefits. Basically, when are going to receive back what we invested.

We need to use this technique with others as by itself doesn't work.

**Note:** We use the cumulative FCF to know that.

## Decision making.

The firm stablishes a **Maximum period** when it should receive some gains/benefits.

If the investment has a lower payback period than what was stablished by the firm, we will accept it. If that is not the case, we won't accept it.

**Drawbacks.**

1) **Time Value of the money:** This technique does not take into account the <mark>time value of the money through time</mark>. **Ex.:** 100 € few years ago were less or more valuable than now.

2) **Not indicate the value:** As the technique <mark>stops when the investment costs are paid</mark>, we do not actually know what happens afterwards, which ends up without the business knowing which is the value that the company will receive.

3) **Not showing the Risk:** It does not show the risk that the investment involves as we do not know the <mark>final amount</mark>.

4) **Not aligned with the principal objective of the company:** If we only use this technique we can't be sure if the <mark>value of the company is going to be increase</mark>, again, we do not know what happens after the company receives back the investment cost.

5) **Arbitrary:** The technique is arbitrary as uses a <mark>maximum stablished by the company</mark>, without any objective reasoning apparently.

**Advantages.**

i. **Simple:** It is easy as f***.
ii. **Intuitive:** You do not need a degree in math's.
iii. **Everybody understands:** Even someone who does not speak in English.

## Net Present Value (NPV).

It a technique that is used by the companies to know <mark>how much **value added**</mark> or **subtracted** is the investment is going to give to the company.

**Note:** The technique uses a **currency** as a unit and also the **discount factor** as an equalizer of the outflows and inflows.

**Decision making.**

We will accept the project if the number is greater than 0. That will mean that the company will perceive an increase in its value. **Ex.:** If a company has a value of 1 M and the investment is 0,25 M, then the company will increase its value to 1,25 M.

**Drawbacks.**

1) **Not easy to understand:** Compared to the previous technique is not easy, you need a minimum financial understanding.

**Advantages.**

i. **Risk:** The risk is taken into account as we know the overall amount of the investment. Also, the discount rate allows to evaluate the risk.
ii. **Change in value over time:** The change in value for currencies are taken into account thanks to the discount rate.
iii. **All the cashflows are represented:** Nothing o explain here.
iv. **Not arbitrary:** As the discount rate is calculated in an objective way, there is no arbitrary opinions.
v. **Linked to the purpose of the company:** It represents the value of the investment, showing straight away if it will increase the value of the company or not.

## Internal Rate of Return (IRR).

It uses the equalization of the inflows and outflows to 0 in order to know **what the internal rate of return** is**,** which could be defined as the <mark>percentage of return is going to be perceived from the investment</mark>.

### Decision making.

If the percentage is higher than the **discount rate, we will accept the project,** remember that the discount rate is the minimum return that the company considers it should receive from the investment.

If the percentage is lower, we won't accept the project, and if the percentage is the same we will be indifferent.

### Drawbacks.

1) **Difficult to calculate:** Nothing to explain here.
2) **It is not always consistent with the final objective of the company:** When we are comparing two projects which are **exclusive (we can only choose one)** the IRR can mislead us into a project which is less valuable.
3) **Mutually exclusive projects:** When two projects which are exclusive have different amounts but are compared with the **percentage** of internal rate of return, we can get mislead. **Ex.:**

| Projects Name | Net Present Value | Internal Rate of Return |
|---|---|---|
| A | 100 M | 12 % |
| B | 120 M | 10 % |

**Note:** As we can see, if it was for the NPV, we will choose project B, it gives more value to the company. Instead, we choose the A project just because the IRR is greater, which defers from the final objective of the company.

4) **Projects with unconventional cashflows:** The percentage is useful when the project has a constant slope, but when it turns into different cashflows were there is a <mark>parabolic because of different inflows and outflows at different times</mark>, then the percentage change **its decision making depending on the number**.

This is how it should look, do you understand now the problem of the cashlows?



NPV, conventional cashflows
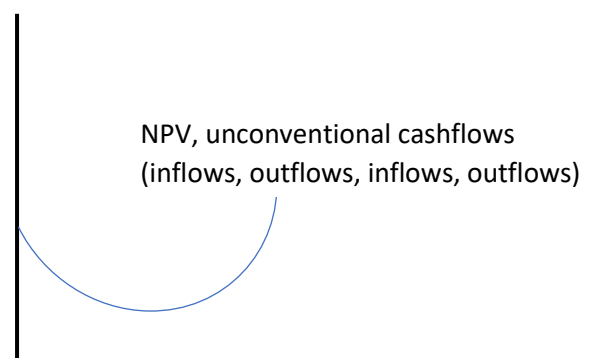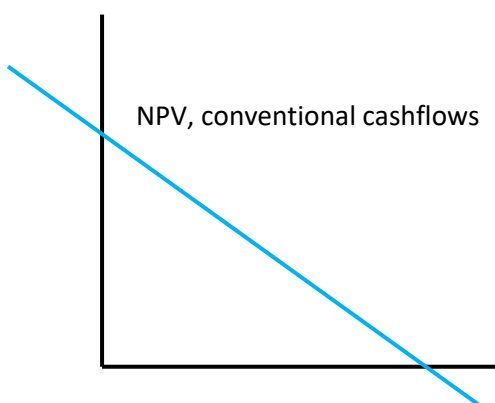
NPV, unconventional cashflows
(inflows, outflows, inflows, outflows)

## Relation between NPV – IRR.

They are closely related through the **discount rate (US federal reserve, European Central Bank).** When lower the discount rate is, the higher the NPV is, as well as helping to compare the project viability. **Ex.:**
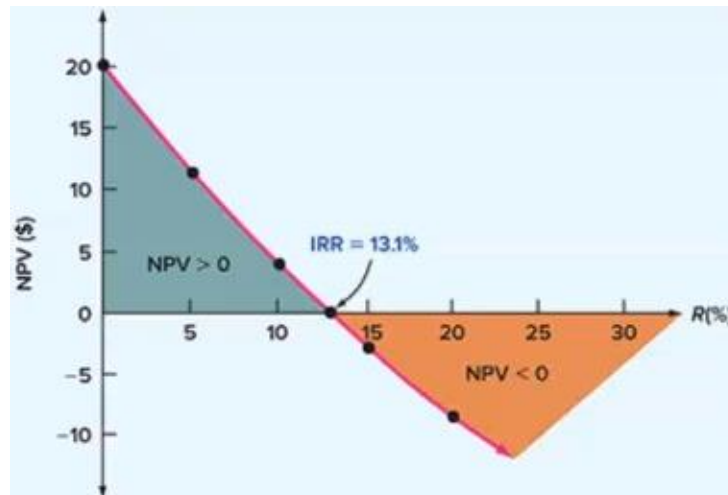


**Note:** The investment return is always going to be 13,1 %. But when lower the discount rate is, the greater the return is going to be (Net Present Value).

## Solving the problem of unconventional cashflows.
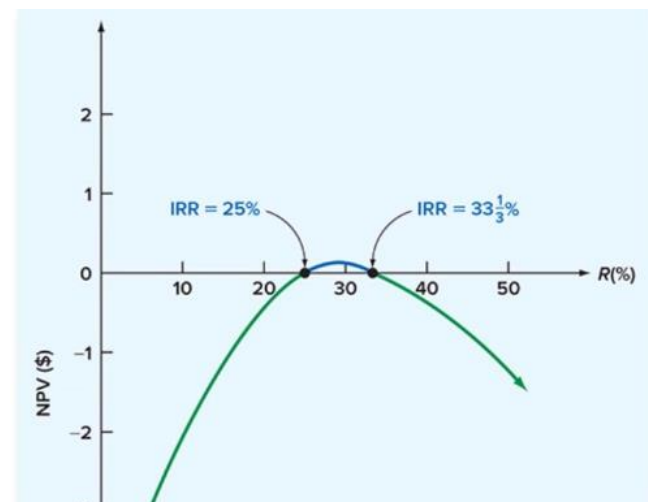


We can determine that if the **Internal Rate of Return** is between 25 % and 33,33 % it will be worth it.

### Jokes.

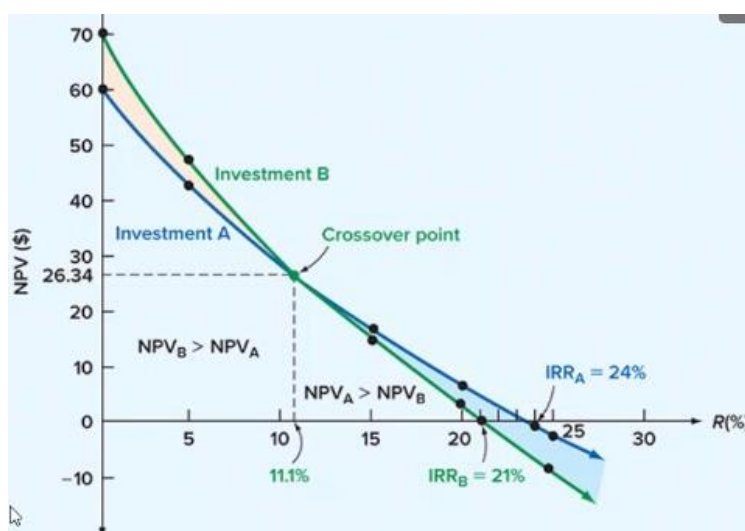- Where are average things manufactured?
- In the satisfactory.


- What do you call a fake noodle? An impasta.

- What did the 0 say to the 8? Nice belt.

**Comparing two Projects.**

| Discount Rate | NPV(A) | NPV(B) |
|---|---|---|
| 0% | $60.00 | $70.00 |
| 5 | 43.13 | 47.88 |
| 10 | 29.06 | 29.79 |
| 15 | 17.18 | 14.82 |
| 20 | 7.06 | 2.31 |
| 25 | − 1.63 | − 8.22 |



As we can see we have **two** different projects. The paradox here is how with the **Internal Rate of Return** we would choose the **project A**. Instead, we can clearly see through the table and the graphic that the project B is the one that gives more value to the company. **WRONG**

**Crossover point.**

In order to calculate the crossover point what we will do is put them together and then calculate the IRR again. From that crossover we will choose which project is better. **For example:** If the discount rate is lower than 11,1 %, we choose the Investment B, if the discount is higher than 11,1 %, we choose Investment A. **We have to calculate the NPV for different returns!!!**
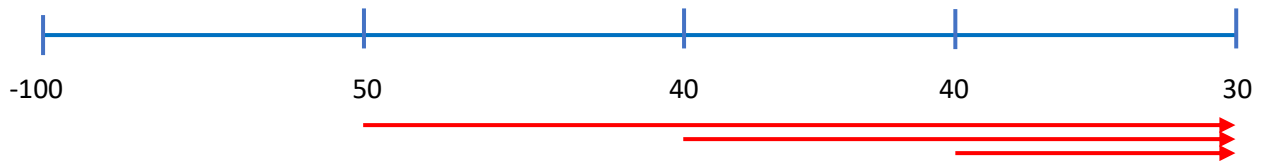
## Types of financing projects.
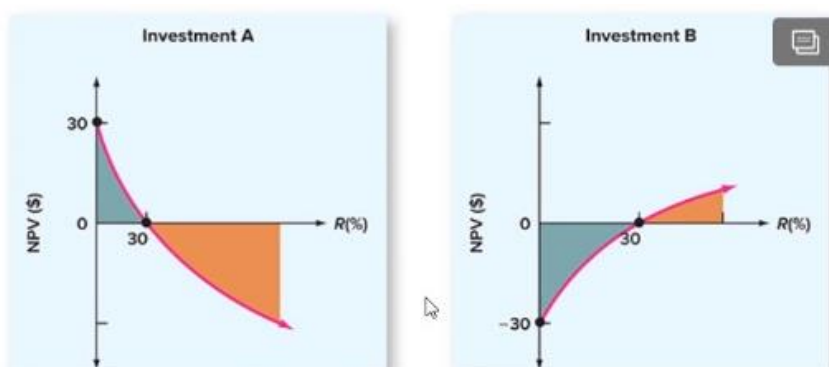




Those projects finance in advance, and those which you pay afterwards, receiving even before you pay.

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## Reinvestment of intermediate cashflows.

I am going to explain this part with an example.

| -100 | 50 | 40 | 40 | 30 |
|------|-----|-----|-----|-----|

**Imagine**

NPV = 29,06 €

IRR = 24,00 %                    We can determine that the project is good. We reinvest at a 10 % as well.

Discount Rate = 10 %

**Problems.**

If we reinvest at a 10 % or other rate, we cannot expect for the project to still be at a **24 % IRR,** normally the rate will be lower. Because of it, we will use the **modify Internal Rate of Return.**

## Modify Internal Rate of Return (MIRR).

**Step by step calculation:**

$40 \times (1 + 0,1) = 44$

$40 \times (1 + 0,1)^2 = 48,4$

$50 \times (1 + 0,1)^3 = 66,5$

$= 188,95 \longrightarrow -100 + (188,95/(1+MIRR)^4) = 0$

**MIRR = 17,24 %**

Now we can determine which is the real return of the investment with the reinvestments.
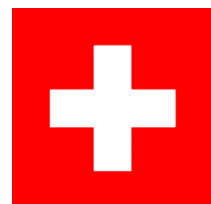
### Present Value of a perpetuity.

This value is used when we have an investment that is going to endure forever, it has no end.

**PV =** first cash flow / (interest – growth rate)

**Jokes.**

- What's the best part about living in Switzerland?
- I don't know, but the **flag is a big plus**.

## Microsoft Case

How can we get it from a big corporation? The starting position is the **Operate Income.** So, in order to approximate we need to differentiate between the accounting and the financial. Remember, it is just looking how the professor does it.

### Company has no debt.

So, we need to add the **CFFO and the Cash Financial from Investment** we will get something similar to the **FCF.**

### Company has debt.

We should get the Cash from Operations (CFFO) + the Interest Expenses (1 – t[Effective tax rate]) + Cash Flow from the investment = FCF

We are just adding the investment

**The End.**



← CHAPTER 1                                                      CHAPTER 3 →

https://youtu.be/ujGSt-93qZo - Some NBA just when Lakers won the Championship.

## Microsoft Case

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