FINANCIAL

MANAGEMENT

Dpt. of Management - Universitat Politècnica de Catalunya
Viability of Business Projects
(Course 2011/2012)

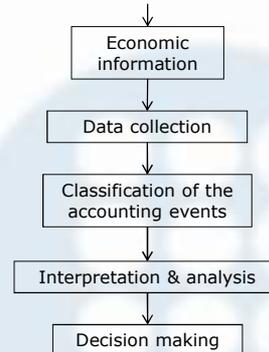**Jasmina Berbegal Mirabent**
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Introduction

Accountability

"Discipline responsible
for identifying, measuring and
quantifying the wealth factors of
companies (measured in monetary units),
with the aim of using them for decision-
making and control. To this end, a
systematic collection of information is
required at all levels".

Analysis of the financial statements: It is
used to obtain a diagnosis of a company
and detect problems in time (preventing it
from banckruptcy and ensuring its
survival).

FIRMS

↓

Economic information

↓

Data collection

↓

Classification of the accounting events

↓

Interpretation & analysis

↓

Decision making

Financial management

Cooperative activity 1

- Which is the main goal/reason of a firm?

- Think of different instruments used to assess the financial performance of a firm.

- Can you explain any of them?

Financial management

The balance sheet: definition

Definition: The balance sheet or statement of financial position is the summary of the financial balances of a company at a specific point of time. It tends to be calculated at the end of a fiscal year. It is the "picture" of the economic situation of the company.

Assets	Liabilities and equity
Goods (what the firm has)	**Equity** (owned by shareholders)
Rights (what is owed to the firm)	**Liabilities** (what the firms has to pay)

Assets: List of goods and rights of a company at a given time. They represent the utility or the place where enterpises' resources are invested. Any thing tangible or intangible that is capable of being owned or controlled to produce value, and that is held to have a positive economic value.

Passiu: Debts and obligations that have the company at a given time, either with the owners or with creditors. It represents the place from which funds and resources have been obtained.
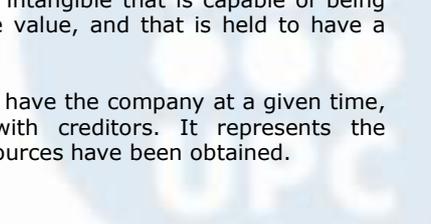
Cooperative activity 2

- Try to make a list of...
  - ✓ Assets
  - ✓ Equity & liabilities

- Can they be subdivided?
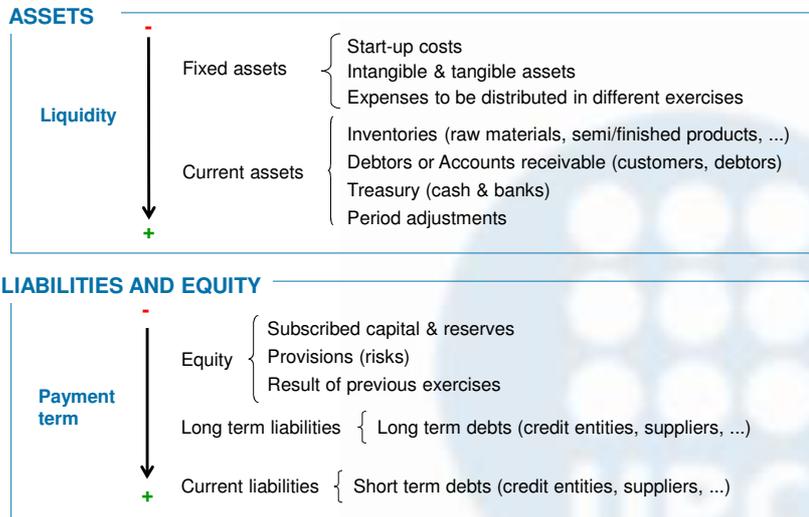

The balance sheet: indicators

Indicators of the assets

- **Liquidity**: Ability to meet short-term payments.
  - ✓ Fixed assets (what the firm has): assets that are not going to be sold in a short term or while the firm is actively operating.
  - ✓ Current assets (accounts receivable): assets that are going to be transformed into money in the short term.
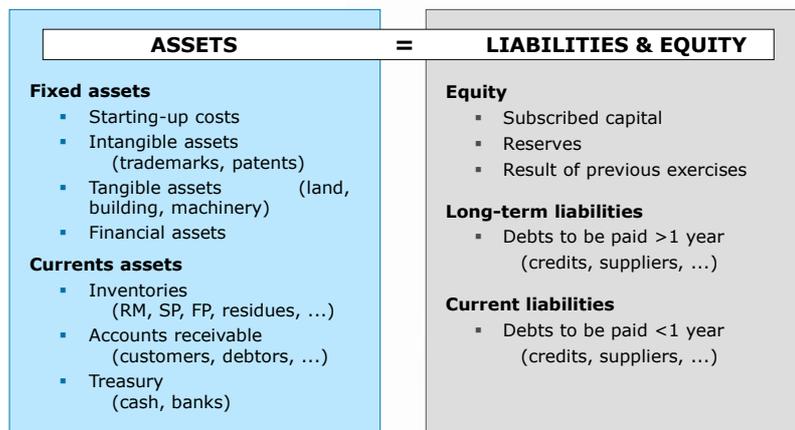
Indicators of liabilities and equity

- **Debt claim** (borrowings from persons/banks/firms)
  - ✓ No claim: debts from the company owners that are not going to be claimed
  - ✓ Claim: debts to third parties that have to be paid.
- **Term of payment**
  - ✓ Long term: debt to be liquidated within more than 12 months.
  - ✓ Short term: debt to be liquidated within less than 12 months.

The balance sheet: Structure (I)

Financial management

ASSETS

Liquidity

Fixed assets
- Start-up costs
- Intangible & tangible assets
- Expenses to be distributed in different exercises

Current assets
- Inventories (raw materials, semi/finished products, ...)
- Debtors or Accounts receivable (customers, debtors)
- Treasury (cash & banks)
- Period adjustments

LIABILITIES AND EQUITY

Payment term

Equity
- Subscribed capital & reserves
- Provisions (risks)
- Result of previous exercises

Long term liabilities
- Long term debts (credit entities, suppliers, ...)

Current liabilities
- Short term debts (credit entities, suppliers, ...)

The balance sheet: Structure (II)

Financial management

ASSETS	=	LIABILITIES & EQUITY

Fixed assets
- Starting-up costs
- Intangible assets (trademarks, patents)
- Tangible assets (land, building, machinery)
- Financial assets

Currents assets
- Inventories (RM, SP, FP, residues, ...)
- Accounts receivable (customers, debtors, ...)
- Treasury (cash, banks)

Equity
- Subscribed capital
- Reserves
- Result of previous exercises

Long-term liabilities
- Debts to be paid >1 year (credits, suppliers, ...)

Current liabilities
- Debts to be paid <1 year (credits, suppliers, ...)

Financial management

The balance sheet: Graphic (I)

How to represent it?

- It consists of dividing each element in the balance as a percentage regarding the total.
- It allows to appreciate the importance of each item as a percentage of assets / liabilities+equity.

A balanced balance...

- Current assets must be higher than current liabilities (in order to pay debts with no problems).
- Liabilities (current+long term) must be less than 60% of the total amount of the assets.

Assets	Equity & Liab.
Fixed Assets	Equity
Current Assets	Long term liabilities
	Current liabilities

Financial management

The balance sheet: Graphic (II)

Comparison fo balance sheets

Assets	Equity & Liab.
Fixed Assets	Equity
Current Assets	Long term liabilities
	Current liabilities

PROBELMS!!

Assets	Equity & Liab.
Fixed Assets	Equity
Current Assets	Long term liabilities
	Current liabilities

It seems quite good...

The balance sheet. Depreciation

Depreciation or amortizations

- The gradual decrease in the economic value of certain assets, due to obsolescence, wear suffered or changes in the demand.
- It tends to follow a linear model.

$$Annual\_amortz = \frac{Depreciable\_value}{\#years\_lifespan}$$

$$Annual\_amortz = \frac{Acquisition\_value - Residual\_value}{\#years\_lifespan}$$

Where do we have to reflect the depreciation value of an asset?

Financial management

Cooperative activity 3

Determine the balance sheet.

Subscribed capital	5000
Cash	600
Lands	3000
Machinery	2500
Inventories	800
Doubtful customers	400
Suppliers	1200
Buildings	1800
Divers debtors	1000
Customers	1500
Long-term bonds	200
Reserves	3750
Result of last year exercise	250
Long term debts	1600

Financial management

Income statement: definition

Financial management

Definition: Also referred as profit and loss statement, statement of financial performance, earnings statement, operating statement, is the company's financial statement that indicates how the revenue is transformed into the net income.

Function: It displays the revenues recognized for a specific period, and the cost and expenses charged against these revenues, including write-offs (e.g. depreciation and amortizaiton of assets) and taxes.

Purpose: Show managers and investors whether the company made or lost money during the period being reported.

Revenues: money received from the sale of products and services before expenses are taken out.

Net profit: the result after all revenues and expenses have been accounted for.

Income statement: structure (I)

Financial management

EXPENDITURES	INCOMES
Sales	Sales
External services (outsourcing)	Subsidy
Maintenance & cleaning	Financial incomes (interests)
Salaries & SS costs	
Rentals & Office	
Computers, servers, connectivity	
Electricity & water	
Marketing & publicity	
Administrative expenditures	
Amortitzations	
Financial interests	
Taxes (corporate)	

Income statement: structure (II)

+	Gross sales	
-	Cost of sales (purchases, storage, …)	
=	**Gross margin**	
-	Operating expenses (utilities, suppliers)	
-	General and administrative expenses (rents, wages, publicity)	
-	Amortitzations	
±	Other operating revenues/costs	
=	**Operative margin**	
±	Financial and interest expenses/incomes	
±	Extraordinary results	
=	**Profit before taxes**	
-	Corporate tax	
=	**Net profit**	

Structural cost

Financial management

Income statement: example

+	Gross sales	20.039,26
-	Cost of sales	1.224,20
=	**Gross margin**	**18.815,06**
-	Wages	21.962,50
-	Suppliers	11.200,00
-	Taxes	1.000,00
-	Rental	7.000,00
-	Promotion	2.432,00
-	Amortization	2.832,70
=	**Operative margin**	**-27.612,14**
-	Financial costs	589,17
=	**Profit before taxes**	**-28.201,30**
-	Corporate tax	0,00
=	**Net profit**	**-25.368,60**

Financial management

Variable and fixed costs

Financial management
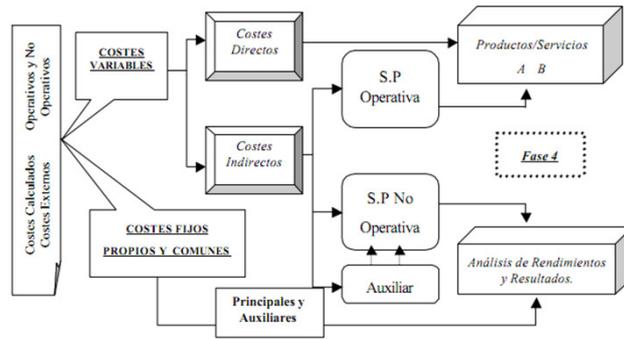
Direct costing & full costing (I)

Full costing or absorption costing

- All costs of production are treated as product costs, regardless weather they are variable or fixed.
- Attributable costs are: direct materials, direct labor, and both variable and fixed manufacturing overhead costs.
- It includes all costs of production as product costs

Direct costing

- Costs of production that vary with output are treated as product costs.
- Attributable costs are: direct materials, direct labor and variable portion of manufacturing overhead
- Fixed manufacturing costs are treated as period costs, therefore, the cost of a unit of product in inventory or the cost of goods sold under this method doesn't contain any fixed overhead.
- Handling of selling and administratives expenses are never treated as product costs, but period costs.

Financial management

Direct costing & full costing (II)

Data:

- Product: plastic bottles of 1,5 L
- Annual production: 50.000.000 units
- Selling price: 7 €/unit

- Fixed costs: 28.000.000 €
- Variable costs per unit: 5 €/unit
- Annual sales: 45.000.000 units

Calculations: $Total\_cost\_per\_unit = \dfrac{VC_u \cdot Production + FC}{Production} = 5,56 \text{ €/unit}$

	Full costing	Direct costing
Sales	45 x 7 = **315,00**	45 x 7 = **315,00**
Production cost	45 x **5,56** = 250,20	45 x **5** = 225,00
Margin	**64,80**	**90,00**
Fixed costs	-	28,00
Income	**64,80**	**62,00**

Is there any relationship between FC and DC incomes and the total volume (number of units) produced and sold?

Direct costing & full costing (III)

Some observations... if

- Production units > Sales units $\Rightarrow$ Income FC > Income DC

    When production (units) is greater than units sold, FC will show greater net income than DC. Ending inventory has increased.

- Production units = Sales units $\Rightarrow$ Income FC = Income DC

    When production (units) and units sold are the same, FC will show the same net income than DC. Ending inventory has not changed.

- Production units < Sales units $\Rightarrow$ Income FC < Income DC

    When production (units) is less than units sold, FC will show less income net income than DC. Ending inventory has decreased.
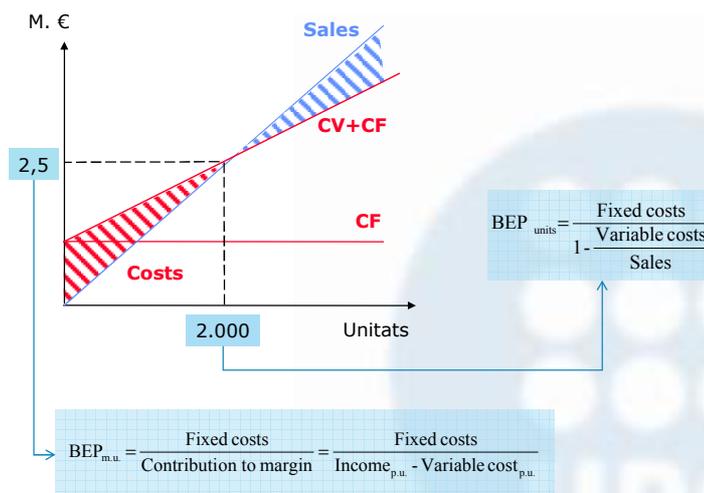
Financial management

Break-even point

Definition: The BEP is the point at which cost or expenses and revenue are equal.

How { much do I have to invoice / many units do I have to sell } to cover expenses?

We need to know: Price per unit (or total sales + # units sold)
Fixed costs
Variable costs

Break-even point: representation

M. €

Sales

CV+CF

2,5

CF

Costs

2.000   Unitats

$$BEP_{units} = \frac{\text{Fixed costs}}{1 - \dfrac{\text{Variable costs}}{\text{Sales}}}$$

$$BEP_{m.u.} = \frac{\text{Fixed costs}}{\text{Contribution to margin}} = \frac{\text{Fixed costs}}{\text{Income}_{p.u.} - \text{Variable cost}_{p.u.}}$$

Financial management

Cooperative activity 4

- What to do if we have a selling price lower than the BEP?

- Or if we don't sell enough units to ensure the viability of the business?

Financial management

Treasury prediction

Income statement vs treasury prediction plan

Income statement
- Summarizes the incomes and expenses of a firm.

Treasury prediction
- List of all payments and collections of cash (from all kinds) during a fiscal exercise.
- Reflects the whole movement of cash entering and leaving the firm.
- Indicates the cash needed to pay bills.

Treasury prediction: money flow

Financial management

Collections from...

- ✓ Customers
- ✓ Subsidies
- ✓ Financial interests
- ✓ VAT returned
- ✓ Other

Payments from...

- ✓ Rents (local, machinery)
- ✓ Maintenance & repairs
- ✓ General & administration expenses
- ✓ Cleaning service
- ✓ Transport
- ✓ Assurances
- ✓ Outourcing services
- ✓ Suppliers
- ✓ Publicity and marketing
- ✓ Amortizations
- ✓ Wages
- ✓ Interests & credit lines
- ✓ IRPF, VAT & corporate taxes
- ✓ Purchases of new fixed assets
- ✓ Other

Treasury prediction: structure

Financial management

We have to decide and negociate the payment and collection periods!

We use to calculate the treasury preduction monthly, during a fiscal year.

	January	February
INITIAL TREASURY BALANCE	**1.200**	**1.000**
Collections		
Sales	4.000	4.200
VAT	250	-
Interests and dividents	-	-
TOTAL COLLECTIONS	**4.250**	**4.200**
Payment		
Supplies (purchases)	1.600	2.200
General & administration expenses	800	800
Publicity	500	500
Amortizations	-	-
Salaries	-	-
IRPF	-	-
Social Security	-	1.200
VAT	-	-
Corporate tax		
Interests & credit line devolutions	600	-
TOTAL PAYMENTS	**3.500**	**4.700**
MONTHLY BALANCE	**750**	**-500**
FINAL TREASURY BALANCE	**1.950**	**500**

Financial management

Cooperative activity 5

Given the following data at 31/12/2010, estimate the treasury balance.

ASSETS		EQUITY & LIABILITIES	
Machinery	2000	Subscribed capital	1500
Inventories	1000	Debts	1500
Customers	500	Suppliers	800
Banks	800	Treasury Deptartment	500
Total	**4300**	**Total**	**4300**

1. Sales (collection period of 30 days), are estimated to be of 600€ monthly from January to July, and 700€ from August to December.
2. Sales from December 2010 (500€, as stated in the balance) are going to be collected in January 2011.
3. Suppliers (corresponding to 2010 purchases), are going to be paid in January (300€) and February (500€).
4. New purchases to suppliers are going to be paid each 60 days, and the estimated amount is going to be 450€ monthly.
5. A montlhy amount of 150€ corresponding to fixed manufacturing overheads is going to be paid during all the year 2011.
6. 2010 payment to the Treasury Department must be done in April.
7. Debts of 1.500€ should be refunded in June 2011.

Financial management

Main ratios: Dupont analysis

Efficiency ratios: how efficiently we manage the company?

- Asset turnover: Sales / Total assets

- Collection cycle: Total customer account / Average daily sales

- Commercial debt cycle: Total debts with suppliers / Average daily sales buys

- Inventory days: Inventory value (at cost) / Average daily sales cost

- Productivity: Total turnover / number of staff members

Leverage: information about the financial structure of the company, the way it finances its operations

$$Leverage = \frac{Total\ assets}{Equity}$$

Main ratios: Dupont analysis

Return on sales (ROS): information about the operating profit margin

$$\text{Return on Sales} = \frac{\text{Net profit}}{\text{Sales}}$$

Return on assets (ROA): information about margin with information about operations efficiency

$$\text{Return on Assets} = \frac{\text{Net profit}}{\text{Total assets}} = \frac{\text{Net profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}$$

Return on equity (ROE): information about shareholders profitability. It is a mix of margin management, efficiency and financial structure of the company

$$\text{ROE} = \frac{\text{Net profit}}{\text{Equity}} = \text{Return on Assets} \times \text{Leverage} = \frac{\text{Net profit}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

Financial management

Other ratios

Liquidity: Information about the capacity of our liquid or almost liquid assets to face our short term debts even if we would not sell anymore

$$\text{Current ratio} = \frac{\text{Total current assets}}{\text{Total current liabilities}}$$

Other ratios to check liquidity:

$$\text{Immediate liquidity} = \frac{\text{avail.} + \text{avail.credit} + \text{equity}}{\text{Total current liabilities}}$$

$$\text{Working capital} = \text{current assets} - \text{current liabilities}$$

Solvency: Information about the financial structure of the company and its dependence or independence on third party funds.

$$\text{Solvency} = \frac{\text{Equity}}{\text{Total liabilities (third party)}}$$

$$\text{Indebtedness} = \frac{\text{Total liabilities (third party)}}{\text{Equity}}$$

Financial management

Wages: a payslip

Example: Temporary employee, born in 1980, single, with no disability, no children, and no mortgage to pay.

Concept	Perception	Deduction[1] employee		Deduction[1] employer	
Basic salary	25.000,00				
Conveyance		4,70	1.175,00	23,60	5.900,00
Unemployment		1,60	400,00	7,70	1.925,00
Professional tax		0,10	25,00	0,60	150,00
IRPF tax[2]		15,00	3.750,00	-	-
Net income			19.650,00		32.975,00

[1] See http://www.seg-social.es/Internet_1/Trabajadores/CotizacionRecaudaci10777/
Basesytiposdecotiza36537/index.htm

[2] See IRPF-2011.xls for details.

Financial instruments

Definition

- It is the way by which a company provides itself of funds or financial resources in order to carry out their goals and expanding process.

Classification of financial resources

- According the origin: internal (shareholders), external (third parties).
- According the temporary character: short or long term

loan amount = C_0

Borrower → Lender

← capital + interests
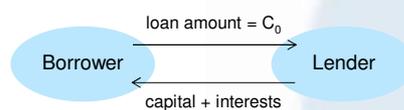
Cooperative activity 5

- List in 5 minutes all known instruments to finance a company and think about their characteristics.

- Compare the instruments you have listed with another group.

- Discussion with the whole class.

Cooperative activity 5: solution

Fixed Assets		Equity	**Initial investment** **Capital increase** **Reserve funds** **New partners**
		Long-term liabilities	**Long term loan** **Guaranteed Long term loan** **Leasing** **Renting**
Current Assets		Current liabilities	**Suppliers financing** **Tax office financing** **Short term loan** **Discount** **Credit account** **Factoring – Confirming**

Financial management

Bills of exchange

Definition

- Requires someone (drawee) paying a given amount of money in a specified date to someone else (drawer).

- Every drawer (receiver) of a bill has four options:
  - ✓ Retain the bill till the due date
  - ✓ Send the bill to his bank for collection on maturity
  - ✓ Send the bill to his bank for collection before maturity (discounting for a bill exchange)
  - ✓ Endorse the bill to one of his creditors in settlement of his own debts

- Every drawee (acceptor) has four possibilities:
  - ✓ Pay the amount of bill on presentation
  - ✓ Refuse to honor the bill (dishonor of a bill of exchange)
  - ✓ Request the drawer to renew the bill (extending the period of payment)
  - ✓ Get the bill retired (paying his obligation before the due date)

Financial management

Promissory notes

Definition

- Document where one party makes an **unconditional promise** to pay a given amount of money (nominal value) in a specified maturity date.

- This document is sold to the investor at a lower price than its nominal value (profit obtained by the investor).

Ordinary credit & credit line

Ordinary credit (loan)

- Classic credit contracted in a Bank.

- The Bank provides the whole amount of the loan in the beginning, and recovers it, with the corresponding interests, through regular payments previously arranged.

- It can be expensive as a short-term financing instrument (commissions)

Credit line

- There is a maximum limit of money available to the customer, but he will only pay interests on the quantity he has really used.

- If a positive balance, he will even get some interests.

- Banks do not use to favour it.

Financial management

Cheques and cards

Cheques

- Document which orders a bank to pay a given amount of money to one person, charging a specific account. The document must be signed by authorized people.

- The payee can be:
  - ✓ Anyone (bearer cheque)
  - ✓ The one specified in the document (nominative cheque)
  - ✓ To be paid into a bank account (crossed cheque)

- A cheque can also be endorsed.

Cards

- Debit: payments are immediately charged to the customer's account.

- Credit: payments are charged to the customer's account through monthly payments.

Financial management

Factoring and confirming

Factoring

- Delegation of the invoice emission and the management and risk of collection to an specialized entity (factor), which will assume it for a commission.

- Factoring differs from a bank loan in the sense that here the emphasis is on the value of the receivables (essentially a financial asset), whereas a bank focuses more on the value of the borrower's total assets.

- If the company deals with too many customers who are not very formal, the factoring entity can negate the provision of its services.

Confirming

- Similar to factoring but used in foreign trade, ensuring the payment to the importer and the recovery to the exporter.

Financial management

Leasing and renting

Leasing

- Leasing is a process by which a firm can obtain the use of a certain fixed assets for which it must pay a series of contractual, periodic, tax deductible payments.

- It is basically a tenancy agreement for a determined period of time, with an option to purchase when it finishes.

- The lessee is the receiver of the services or the assets under the lease contract and the lessor is the owner of the assets.

Renting

- An agreement where a payment is made for the temporary use of a good, service or property owned by another.

- It is like a rental (with no purchase options) which includes a pack of services (i.e. there is no need to worry about lifespan or maintenance).

Financial management

Cooperative activity 6

- How the debt is settled?

- Think about different alternatives for refunding an hypothetical loan with a maturity of 5 years.

Financial management

How the debt is settled? (I)

1. Just one payment

$$C_n = C_0 \cdot (1+i)^n$$
$$I_n = C_n - C_0 = C_0 \cdot \left[(1+i)^n - 1\right]$$

C_0 = loan amount
C_n = loan amount to pay at the due date (C_0 + interests)
I_n = total interests to pay
i = annual percentatge rate (APR = TAE)
n = number of loan repayment periods

2. Periodic payment of interest + loan amount payment at the expiration date

$$C_n = C_0 \cdot (1+i)$$
$$I = i \cdot C_0$$

C_0 = loan amount
C_n = loan amount to pay at the due date (C_0 + interests)
I = interests to pay each payment period
i = annual percentage rate (APR = TAE)
n = number of loan repayment periods

3. Payment of constant annuities

$$A = C_0 \cdot \frac{i \cdot (1+i)^n}{(1+i)^n - 1} \qquad Q = C_0 \cdot \frac{i_k \cdot (1+i_k)^{n \cdot k}}{(1+i_k)^{n \cdot k} - 1}$$

Periods < 1 year
$$\begin{cases} APR = TAE = i \\ (1+i) = (1+i_k)^k \rightarrow i = (1+i_k)^k - 1 \end{cases}$$

C_0 = loan amount
A = annuity (to pay each period: % C_0 + interests)
i = annual interest rate
n = number of loan repayment periods
k = number of loan repayment periods in a year
i_k = period percentatge rate (interest rate of the period)
APR = annual percentage rate (TAE)

Financial management

How the debt is settled? (II)

4. Payment with grace period

- Grace period: A period of time during which a payment can be made or late performance can occur without incurring any late penalties, fees or interest.

- Not paying neither the loan nor the interests

$$A = C_t \cdot \frac{i \cdot (1+i)^{n-t}}{(1+i)^{n-t} - 1}$$

$\Longrightarrow$

$C_t = C_0 \cdot (1+i)^t$
$t = $ grace period
$C_t = $ annuity during the non - grace period

- Paying only the interests

$$A = C_0 \cdot \frac{i \cdot (1+i)^{n-t}}{(1+i)^{n-t} - 1}$$

Financial management

Cooperative activity 7

Given the following information, complete the grid in order to compare the total amount to be refunded and the interests to be paid, according to different payment options.

$C_0 = 2.000.000 \ €$ $i = 10\%$ $n = 6$ years

1. One payment
2. Periodic payment of interest + loan amount payment at the expiration date
3. Payment of constant annuities (annually)
4. Payment of constant annuities (monthly)

Payment period	Total of payments	Total interest paid	APR	Period PR
One payment				
Periodic payment of interest + loan amount payment at the expiration date				
Payment of constant annuities (annually)				
Payment of constant annuities (monthly)				

Financial management

Investments

Definition

- An investment consists in putting money into something or somewhere with the expectation of obtaining gains, having a high degree of security that the investment is going to generate profits and that we are going to collect the amount invested within an expected period of time.

- Investing is to give up an immediately and certain utility/consumption in exchange for benefits in the future.

In finance...

- ✓ The purchase of a financial product or other item of value with an expectation of favourable future returns. In general terms, investment means the use money in the hope of making more money.

In business...

- ✓ The purchase by a producer of a physical good, such as durable equipment or inventory, in the hope of improving future business.

Cost of capital: equity + debt

- **Cost of capital**: Cost of a company's funds (debt and equity). It is the required return necessary to make a capital budgeting project worthwhile (it is used as a benchmark that a new project has to meet). Represents the opportunity cost of an investment, that is, the rate of return that a firm would otherwise receive if it invested in a different project with similar risk.

- **Cost of equity**: Rate of return a firm theoretically pays to its equity investors to compensate for the risk they undertake by investing their capital.

$$R_e = \frac{\text{Dividends per share (next year)}}{\text{Current market value of stock}} + \text{Growth rate of dividends}$$

- **Cost of debt**: The effective rate that a company pays on its current debt. This can be measured in either before or after-tax returns; however, because interest expense is deductible, the after-tax cost is seen most often.

$$F_0 = \sum_{t=0}^{n} \left[\frac{Q_t}{(1 + k_d)^t} \right]$$

F_0 = net funds received by the firm at time t=0
Q_t = pay outs at period t
n = lenght of the debt (number of periods)
k_d = cost of the debt

Weighted average cost of capital (WACC)

- The **WACC** is the rate that a company is expected to pay on average to all its security holders to finance its assets.

$$WACC = \frac{\sum_{i=1}^{N} r_i \cdot MV_i}{\sum_{i=1}^{N} MV_i} = \frac{MV_e}{MV_e + MV_d} \cdot R_e + \frac{MV_d}{MV_e + MV_d} \cdot R_d \cdot (1-t)$$

tax effects

N = number of sources of capital (securities, types of liabilities)
r_i = required rate of return for security i
MV_i = is the market value of all outstanding securities i.
MV_e = market value of equity
R_e = cost of equity
MV_d = market value of debts
R_d = cost of debt
t = corporate tax rate

Investment selection (I)

Introduction

Imagine you have 120.000 €. What can you do with money?

- buy a flat
- start a business
- apply for a deposit/bond

How to decide which option is the best one?

We should look at:

- **Liquidity**: ability to convert an asset to cash quickly (Pay-Back)
- **Profitability**: it is the condition of yielding a financial profit or gain (NPV, IRR)
- **Risk**: preference for certain results, less risky or uncertain

Financial management

Intertemporal comparison

- **Net cash flow:** changes in the cash balance over a period (sum of all operational, investment and financing cash flows).

- **Present cash flow:** net cash flow at present value.

Financial management
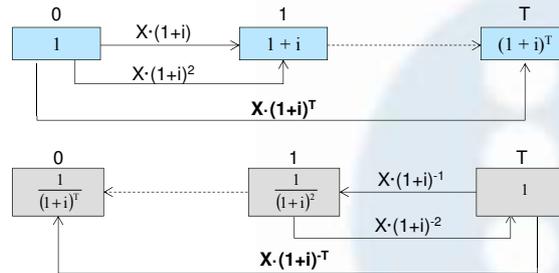
Intertemporal comparison: example

Discount rate: 10%

	0	1	2	3	4
Investment	-10.000				
Fixed costs		-2.000	-2.000	-2.000	-2.000
Variable costs		-5.000	-7.000	-8.000	-6.000
Total PAYMENTS	**-10.000**	**-7.000**	**-9.000**	**-10.000**	**-8.000**
Sales		6.000	10.000	15.000	12.000
Total COLLECTIONS		**6.000**	**10.000**	**15.000**	**12.000**
Cash flow	-10.000	-1.000	1.000	5.000	4.000
Present cash flow	**-10.000**	**-909,09**	**826,45**	**3756,57**	**2.732,05**

Investment selection (II)

The final value (FV)

Definition: Expresses the value that a present investment will have in the future.

$$FV = PV \cdot (1+i)^n$$

PV = value of the present investment
N = number of years of the investment (1,2,...,n)
I = annual interest rate

Example 1: Considering an annual interest rate of 10%, which value would have 2.000€ after 5 years of having them in the bank?

$$FV = 2.000 \cdot (1+0,1)^5 = 3.221€$$

Example 2: If today I buy a parking (2.000€) and it is annually revaluated at a rate of 3%, its value after 5 years will be:

$$FV = 2.000 \cdot (1+0,03)^5 = 2.318,5€$$

Investment selection (III)

The present value (PV)

Definition: Expresses the current value of a future investment.

$$PV = \frac{FV}{(1+i)^n}$$

FV = future value of the investment
N = number of years of the investment (1,2,...,n)
I = annual interest rate

Example 1: If within 10 years I will charge a monthly salary of 1.200€ in retirement, assuming an annual interest rate of 3%, it is equivalent as today I was earning a salary of:

$$PV = \frac{1.200}{(1+0,03)^{10}} = 893€$$

My purchasing power within 10 years is equivalent to a current salary of 893€.

Investment selection (IV)

Net Present Value (NPV)

Definition: It is the difference between the PV of cash inflows and the PV of cash outflows. NPV analysis is sensitive to the reliability of future cash inflows that an investment or project will yield (time value of money), thus, it is used in capital budgeting to analyze the profitability of long-term investments or projects.

Comparison of the value of a euro today to the value of that same euro in the future, taking inflation and returns into account.

$$PVN = -A + \frac{[CF_1]}{(1+k)^1} + \frac{[CF_2]}{(1+k)^2} + ... + \frac{[CF_n]}{(1+k)^n}$$

A = Initial investment
CF = cash flows
N = number of years of the investment (1,2,...,n)
k = annual interest rate or capital cost rate

If PVN > 0
Profitable project

If PVN < 0
Non-profitable project

When choosing between two projects, we will select the one with a higger PVN.

Investment selection (V)

Internal Rate of Return (IRR)

Definition: It is the "annualized effective compounded return rate" or "discount rate" that makes the NPV of all cash flows from a particular investment or project equal to zero.

$$NPV = -A + \frac{[CF_1]}{(1+r)^1} + \frac{[CF_2]}{(1+r)^2} + ... + \frac{[CF_n]}{(1+r)^n} = 0$$

✓ A project will be profitable if its IRR exceeds the cost of capital used (WACC).

✓ The higher a project's internal rate of return, the more desirable it is to undertake it.

✓ The IRR is used as a complement of the VPN for selecting the best investment/project.

If IRR > cost of capital (k)
✓ Accept project

If IRR < cost of capital (k)
× Reject project

Exemple: If we assume a WACC of a certain company is equal to 10%, and we calculate an IRR of 13%, as r>k the project or investment will be profitable, so the company should undertake it.

Investments: to sum up... (I)

1. Pay-back (PB): period of time required for the return on an investment to "repay" the sum of the original investment.

$$\sum_{t=0}^{T} Q_t = 0 \rightarrow PB = T \qquad \sum_{t=0}^{T} \frac{Q_t}{(1+k)^t} = 0 \rightarrow PBC = T \qquad PB < PBC$$

2. Present Net Value (PNV): Sum of the cash flows along a temporal horizon

$$PNV = \sum_{t=0}^{n} \frac{Q_t}{(1+k)^t} = Q_0 + \frac{Q_1}{(1+k)} + \frac{Q_2}{(1+k)^2} + \ldots + \frac{Q_n}{(1+k)^n}$$

3. Internal Rate of Return (IRRR): Interest rate that makes PNV equal to zero.

$$VAN = \sum_{t=0}^{n} \frac{Q_t}{(1+r)^t} = 0 \rightarrow TIR = r \qquad 0 = Q_0 + \frac{Q_1}{(1+r)} + \frac{Q_2}{(1+r)^2} + \ldots + \frac{Q_n}{(1+r)^n}$$

4. Annuity (a): Average annual value

$$VAN = a \cdot \sum_{t=1}^{T} \frac{1}{(1+i)^t} \rightarrow a = \frac{i}{1 - \dfrac{1}{(1+i)^T}} \cdot VAN$$

Investment selection: example

Estimation of the demand

Year	1	2	3	4	5
Demand	100	120	80	150	200

Characteristics

Capacity	Initial invest.	Fixed costs	Variable costs	Selling price	100
120	10000	1500	40	k	10%

Investment A

Years	0	1	2	3	4	5
Initial investment	-10000,00					
Fixed costs		-1500,00	-1500,00	-1500,00	-1500,00	-1500,00
Variable costs		-4000,00	-4800,00	-3200,00	-4800,00	-4800,00
Total PAYMENTS	**-10000,00**	**-5500,00**	**-6300,00**	**-4700,00**	**-6300,00**	**-6300,00**
Sales		10000,00	12000,00	8000,00	12000,00	12000,00
Total COLLECTIONS		**10000,00**	**12000,00**	**8000,00**	**12000,00**	**12000,00**
CASH FLOWS	**-10000,00**	**4500,00**	**5700,00**	**3300,00**	**5700,00**	**5700,00**
TOTAL PRESENT VALUE	**-10000,00**	**4090,91**	**4710,74**	**2479,34**	**3893,18**	**3539,25**
ACUM. PRESENT VALUE	**-10000,00**	**-5909,09**	**-1198,35**	**1280,99**	**5174,17**	**8713,42**

PVN	8713,42		IRR	39,24%		PBC	2,48