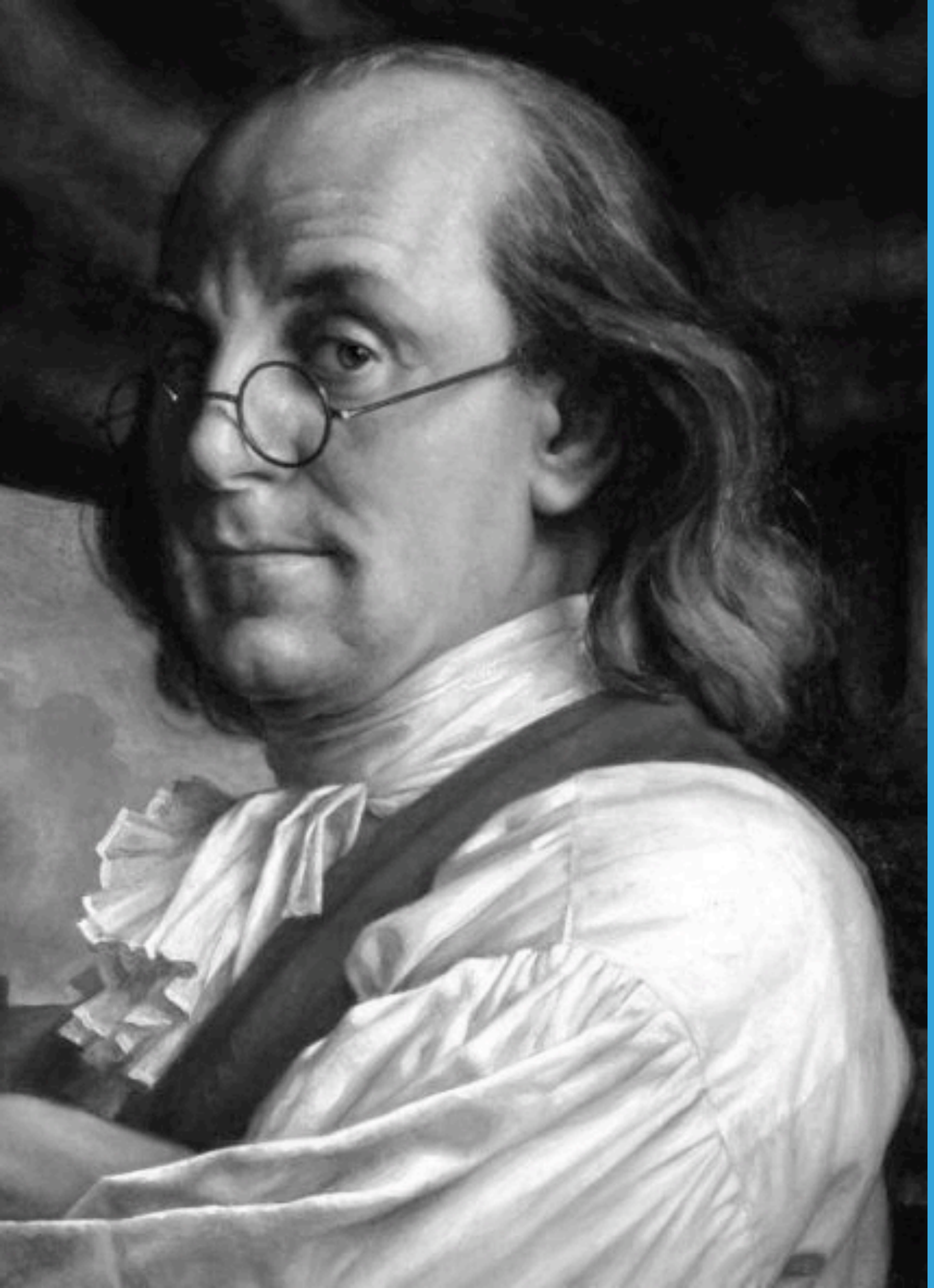


"IF YOU WOULD KNOW THE VALUE OF MONEY, GO AND TRY TO BORROW SOME"

Benjamin Franklin

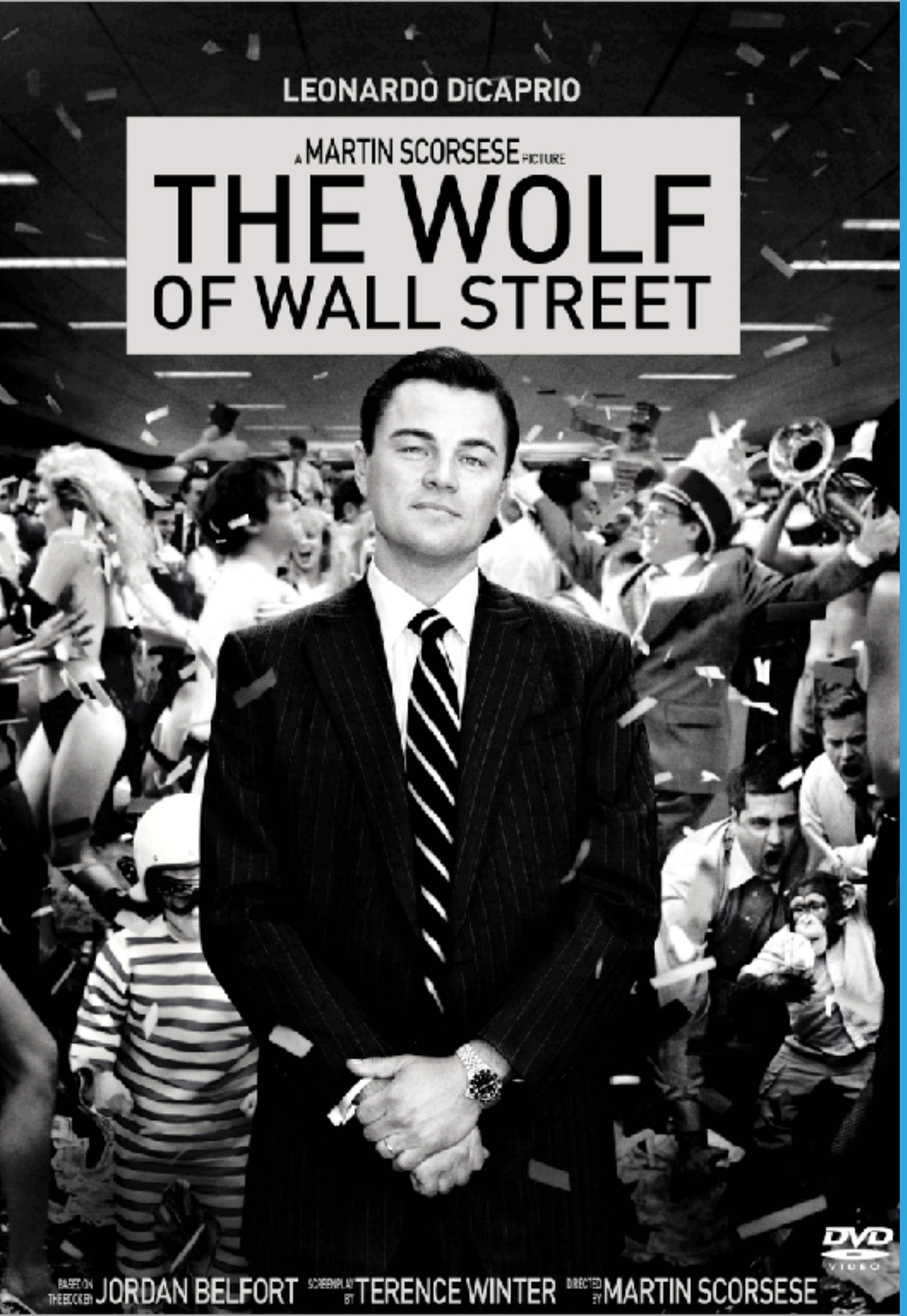
MANAGEMENT ESSENTIALS
FOR PHYSICISTS

EPISODE 3: FINANCIAL MANAGEMENT

MICHEL HERQUET - UCLOUVAIN - MARCH 2017

"FINANCIAL MANAGEMENT REFERS TO THE EFFICIENT AND EFFECTIVE MANAGEMENT OF MONEY (FUNDS) IN SUCH A MANNER AS TO ACCOMPLISH THE OBJECTIVES OF AN ORGANISATION"

Wikipedia



WARNING: IT'S NOT ONLY ABOUT MONEY.

TODAYS AGENDA

- Origin and goals of financial management
- Financial statements: the balance sheet and the P&L
- Financial planning, Net Present Value and investment decisions
- Basic financial instruments and their trade
- Tips & Tricks

A BRIEF HISTORY

- Concept of money (shells), short term loans and interests invented by early civilisations to facilitate commodity exchange
- Concepts of insurance, commodity markets, and security markets invented by the Phoenician
- Modern banks, corporations, double-entry book-keeping developed during Italian Renaissance
- 1776: Adam Smith, defines modern capitalism in The Wealth of Nations
- 1792: the New York Stock Exchange is created, first evolved trading instruments
- 19th century: apparition of Central Banks
- 1929: Great Depression (US then Germany)
- 2008: Global economic crisis

GOALS OF FINANCIAL MANAGEMENT

- Profit maximisation (occurs when marginal cost is equal to marginal revenue)
- Wealth maximisation (maximisation of shareholders' wealth)
- Short and long term survival of organisation (e.g., by maintaining proper cash flow)
- Minimisation on capital cost

THE BALANCE SHEET

- A balance sheet is a financial statement that summarises an organisation's **assets**, **liabilities** and shareholders' **equity** at a specific point in time
- It is a **snapshot** of an organisation financial condition
- It obeys the "accounting equation": equity = assets - liabilities
- Commonly used ratios:
  - **Solvency:** debt ratio (liabilities/assets) and debt to equity ratio (liabilities/equity)
  - **Liquidity**: current ratio (current assets/ current liabilities) and Quick ratio ((current assets – inventories) /current liabilities)
- Compute those ratios!

Balance Sheet

As of December 31, 2011 (000s)

Assets		**Liabilities**	
Cash	481	Accounts Payable	625
Marketable Securities	1,346	Current Portion L-T Debt	1,021
Accounts Receivable	1,677	Taxes Payable	36
Inventory	2,936	Accrued Expenses	157
Prepaid Expenses	172	Total Current Liabilities	1,839
Other Current Assets	58		
Total Current Assets	6,670	Long-term Debt	2,332
		Total Liabilities	**4,171**
Gross Value of Property, Plant & Equipment	2,019	**Stockholders Equity**	
Accumulated Depreciation	(664)	Common Stock and Paid-in Cap	194
Net Property, Plant, Equipment	1,355	Retained Earnings	4,009
		Total Shareholders' Equity	4,203
Note Receivable	349		
Total Assets	**8,374**	**Total Liabilities and Equity**	**8,374**

BALANCE SHEET EVOLUTION: EXERCISE

- Assume a personal financial situation summarised in the following Balance Sheet
- Reflect the following operations by modifying successively this statement:
  - Buy office equipment for 400€ cash
  - Draw 200€ for hotel and diner with your Valentine
  - Pay 500€ off loan
  - Buy a 20.000€ brand new car on credit

Assets		Liabilities	
Cash	5500 €	Loan	70.000 €
House	100.000 €		
		Owner's Equity	
		Capital	35.500 €
	105.500 €		**105.500 €**

PROFIT & LOSS (P&L) (OR INCOME STATEMENT)

- A P&L statement shows the organisation's revenues and expenses during one or several defined period of time
- One should differentiate Revenue, Gross Margin, Operating Income (EBIDTA) and Net Profit
- Return on equity is calculated by dividing net income by total equity
- Useful tool: www.a-systems.net/financial-statement

Profit and Loss Statement

	FY2015	FY2016	FY2017
Revenue	**$465,530**	**$510,000**	**$551,500**
Direct Cost	**$267,640**	**$292,800**	**$315,800**
Gross Margin	$197,890	$217,200	$235,700
Gross Margin %	**43%**	**43%**	**43%**
Operating Expenses			
Salary	$94,100	$102,560	$104,829
Employee Related Expenses	$23,537	$25,641	$26,208
Marketing	$23,000	$26,000	$28,000
Leased Equipment	$1,800	$1,800	$1,800
Rent	$30,000	$31,500	$33,000
Utilities	$1,500	$1,750	$2,000
Insurance	$900	$1,200	$1,500
Total Operating Expenses	**$174,837**	**$190,451**	**$197,337**
Operating Income	**$23,053**	**$26,749**	**$38,363**
Interest Incurred	$2,297	$1,949	$1,298
Depreciation and Amortization	$15,000	$15,000	$15,000
Income Taxes	$863	$1,470	$3,310
Total Expenses	**$460,637**	**$501,670**	**$532,745**
Net Profit	**$4,893**	**$8,330**	**$18,755**
Net Profit/Sales	**1%**	**2%**	**3%**

FINANCIAL PLANNING

- Financial plans are part of business plans
- They are essentially forecasted (simplified) P&L statements, typically over 3 to 5 years, based on cost and revenue hypotheses
- A certain degree of risk is associated with those hypotheses and reflected through the notion of "discount rate" (determined through WACC or CAPM), reflecting uncertainty of future cash flows
- Combining financial plans and discount rate, investors can determine objectively the best investment strategy thanks to the notion of Net Present Value (NPV)

CHOOSING AMONG ALTERNATIVES

- An NGO fighting for women's right in Africa is trying to decide between two alternative uses of the ressources. The alternatives are displayed in the right table.
- The NGO uses a 14% discount rate based on WACC.
- Calculate net present value for each project.
- Which investment alternative (if either) would you recommend that the NGO accept?
- Would your decision change if Project B would have unexpected lifetime of 10 years ?
- Would your decision change if a one off training cost of 20.000€ on year 4 would need to be paid for Project B
- Politics risks decreases in Africa, and the NGO believes this causes the discount rate to decrease to 8%. Are your conclusions still valid ?

	Project A	Project B
Cost of equipment required	310.000 €	0 €
Annual project salary cost	0 €	100.000 €
Annual project turnover	175.000 €	170.000 €
Annual project operational costs	100.000 €	50.000 €
Salvage value of equipment in eight years	15.500 €	0 €
Life of the project	8 years	8 years

THE FUNDAMENTALS

- **Share** (or stock): piece of paper that denote ownership in a particular company (distinction market value/book value)
  - **Dividend**: a distribution of a portion of a company's earnings to a class of its shareholders. Dividends can be issued as cash payments, as shares, or other property
- **Bond:** debt investment in which an investor loans money to an entity which borrows the funds for a defined period of time at a variable or fixed interest rate
  - **Straight bond:** a bond that pays interest at regular intervals, and at maturity pays back the principal that was originally invested
  - **Subordinated bond**: a debt which ranks after other debts if a company falls into liquidation or bankruptcy

THE DERIVATIVES

- A **derivative** is any security with a price that is dependent upon or derived from one or more underlying assets (stock, bond, interest, currency exchange rate, …)
  - **Future** (or forward in their "private" version): agreement between two parties for the sale of an asset at an agreed upon price at certain predefined future date
  - **Option**: similar to future, except the buyer **or** seller is **not** obligated to make the transaction if he or she decides not to (**call option** is right to buy, **put option** is a right to sell)
  - **Swap**: a contract between two parties agreeing to trade loan terms (e.g., fixed vs. variable interest rate)
- Derivates are used to **hedge exposure** or **speculate**
- Take a quiz! (all but 5 to 11)

IN THE LONG TERM, NOBODY BEATS THE MARKET. AND, EVENTUALLY, THE MARKET WILL CRASH.

Definition and nature of the market

FINAL RANDOM THOUGHTS

- Finance can be very technical but stick to fundamentals if you ever feel lost: capital structure, revenue, cost, profit, discount rates, NPV, etc.
- Always be careful when managing finance. Actively seek for independent expert assistance.
- If you don't know much about finance, prefer simplest instruments (saving accounts, low risk bonds, maybe ETF)
- Portfolio diversification is always key
- The rule higher return equals higher risk bear NO exception in a perfect market (and most of the time in reality too)!
- Don't forget it is not (only) about money

KEY TAKEAWAYS

- Financial management first and foremost rely on fundamental documents: the balance sheet and the PNL statement
- NPV is a simple tool for project/initiative valuation, assuming discount rate is known
- Several financial instruments exists, ranging from simplest (shares and bonds) to most evolved and risky derivatives (futures, swap, options, etc.)