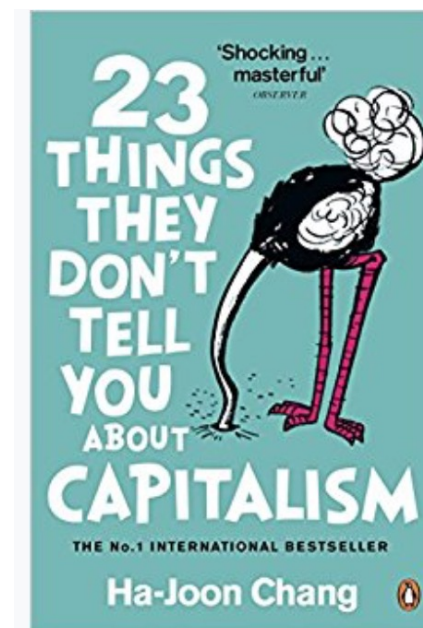


WELCOME TO
Introduction to Finance
for
MSc Financial Technology and Innovation

Lecture 1

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To learn about Finance: To read a lot, and to cover a lot



Key practicalities for your journey into Finance and Financial Management

- What is a cash flow?
- How do I calculate the rate of return? (why does it matter?)
- Is a higher rate of return on investment always better?
- Where does financing come from?
- How do companies issue new debt or equity?
- Debt or equity? Does it matter?
- What determines (asset) value in financial markets?
- How do we measure market risk?
- How does risk affect the opportunity cost of capital?

What you should know by the end

- Become cautious on financial decision-making
- Become knowledgeable in corporate finance
- Analyze the financial (as well as socio-economic) performance of different scenarios
- Don't get alarmed by conceptualizing and calculating numerical examples

“Act, as a Finance-Professional”

What is the study of Finance?

Finance refers to all money-related **transactions** and to the **performance** of **decisions** that consumers, businesses, and governments make.

Two key ideas: Knowledge exists to “**price in**” the consequences of decisions, and that decisions shall lead to **maximize** financial performance.

What is the study of Economics?

Economics is the study of how societies use scarce resources to produce valuable commodities, to manage and to distribute them.

Two key ideas: Goods are **finite**, and that society must use its resources **efficiently**.

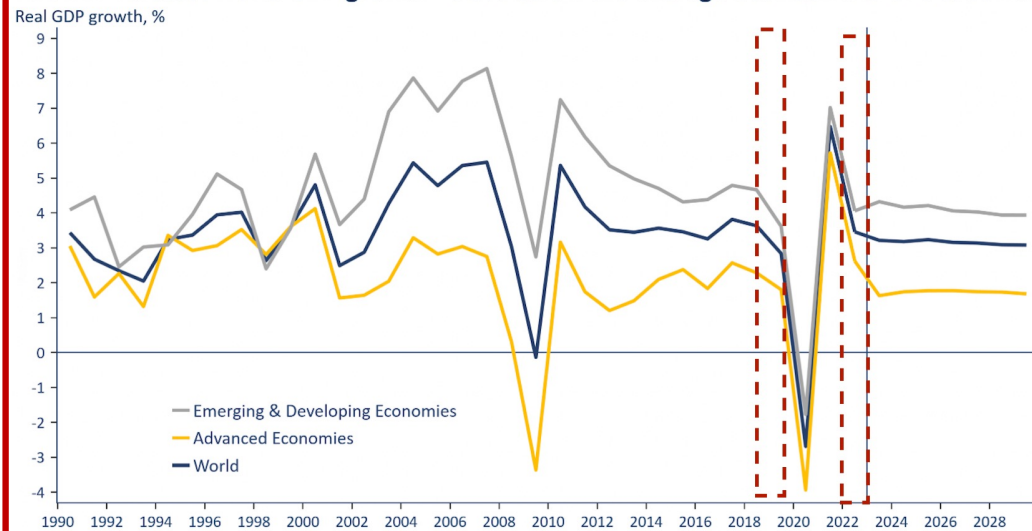
Is it Economics that drives Finance, or the other way around?

AI (i.e. Google's Gemini) would say:

*“It is not a matter of one driving the other; rather, Economics and Finance are deeply intertwined and mutually influential, with Finance often viewed as a **branch of Economics** that focuses on money and financial systems, while Economics provides the broader theoretical framework and real-world context that influences financial activities and outcomes”*

Economics is slow in motion, whereas financial markets allow rapid move of capital in and outflow

The IMF forecast world GDP growth ~0.3% below the average between the GFC & Covid

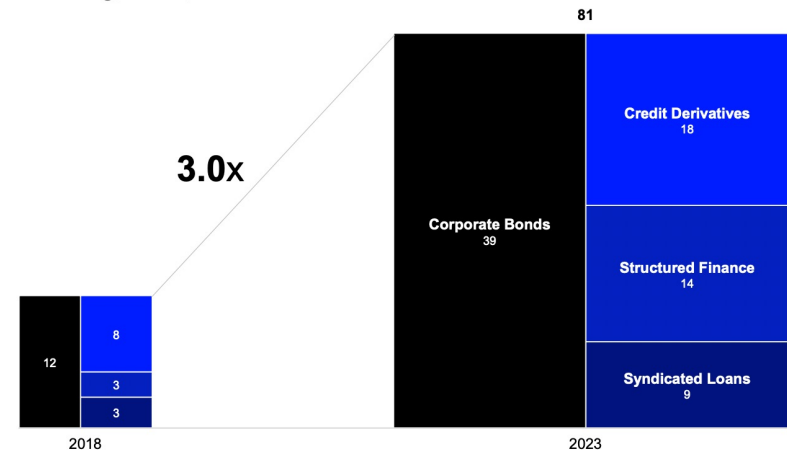


Credit markets have tripled in size since 2018.

Despite the issuance slowdown in securitization issuance, the growth in credit markets was +5.7% YoY in 2023 driven by corporate bonds and syndicated loan segments.

Credit market dynamics

notional outstanding, trillions \$



Source: LSEG, BIS, Dealogic, Euroclear

What is money?



>



?



Easier to define it via the functionality it fulfils: Unit of account, medium of exchange, store of value

First usage of **commodity** money was circa 3000 BC, in Mesopotamia

- Gold: become a commodity money, serves as a physical token of wealth based on people's perceptions

Money: Fiat versus commodity

Fiat money becomes the token of people's perception of worth

- It is a government-issued currency, not backed by a physical commodity (i.e. gold) but by the *stability* of the issuing *government*.

Thus: It is the people's *perceptions* in an *economy* that must be supported by an economy that can produce the products and services that people want

As U.S. dollar becomes fiat money by the 70s, it became possible to create more paper money than there was gold to back it; as the health of the U.S. economy could back the dollar's *value*.

What is the *value* of fiat money?

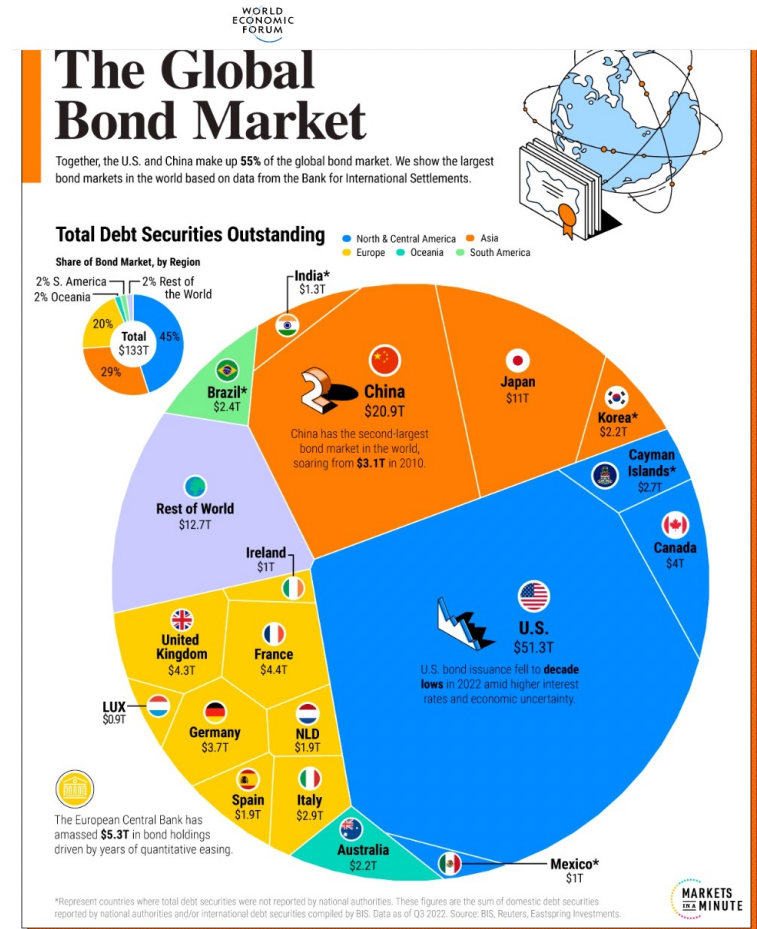
Money has worth because for most people it represents something valuable

What does fiat money “represent”?:

Our beliefs in the health of the underlying economy

The stronger the economy, the higher its money will be valued (and vice versa)

2022, the global bond market totalled \$133 trillion



What does the rule of “too big to fail” represent?

If the economy stalls (i.e., economic performance drops), the value of the U.S. dollar will drop both through inflation and through currency exchange rates.

“The implosion of the U.S. economy would plunge the world into a financial dark age, so many other countries and entities are working tirelessly to ensure that never happens” (see further Investopedia)

1st main goal of (corporate) Finance is to understand investment decisions of trading agents

Real assets

- Assets used to produce goods and services, can be **tangible** or **intangible**
- Examples include up-front investments, human capital, patents, corporate brand

Investment decision

- Purchase of real assets
- Managing existing assets, disposing non-profitable ones, managing investment risk
- **Capital budgeting** decisions, capital expenditure decisions

1st main goal of (corporate) Finance is to understand financing decisions of trading agents

Financial assets == promise(!)

Financial and contractual claims to the income generated by the firm's real assets, such as:

- Bank loans: Bank providing cash in exchange of a financial asset == promise that the corporate will repay the loan with an interest
- Corporate bonds: Investors providing cash in exchange of a financial asset == promise that the firm will pay a fixed interest on the bond annually, and will pay off the bond at maturity

Financing decision

- (Sale) Management of financial assets
- Making sure that outstanding obligations can be met!

What is a corporation?

A business organized as a separate legal entity owned by shareholders

Types of Corporations

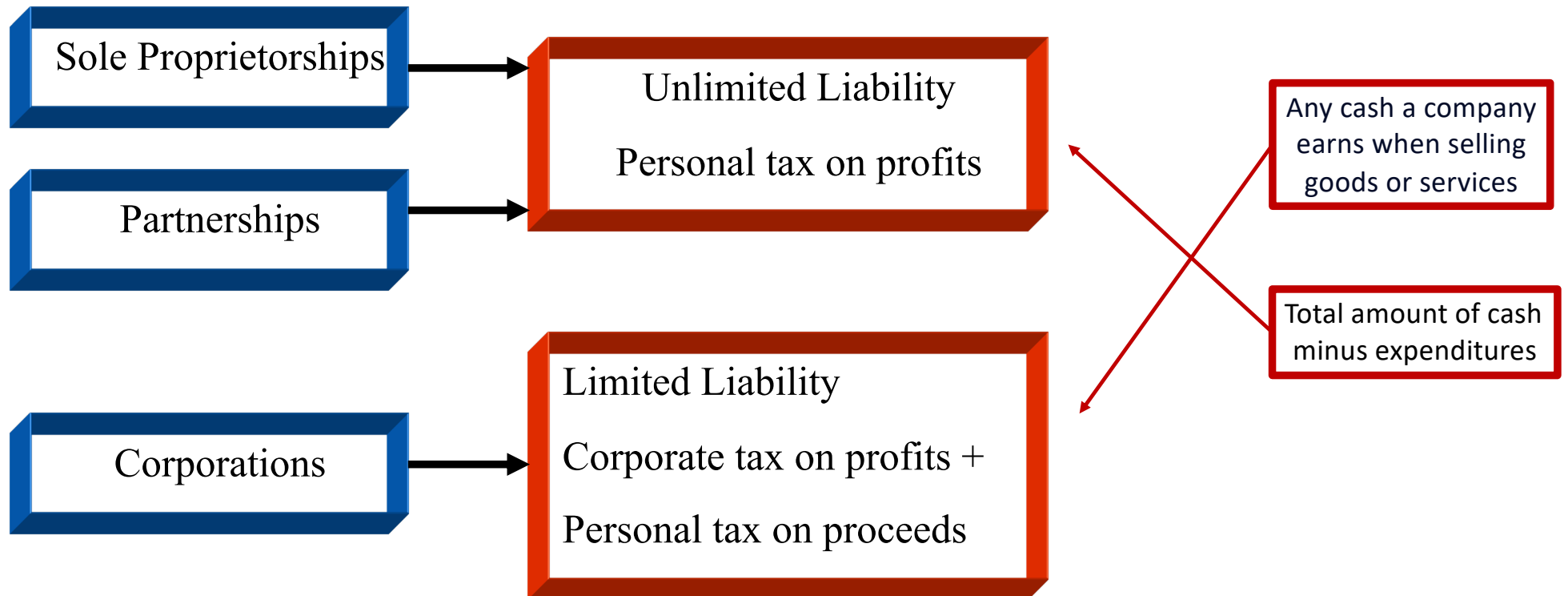
- Public companies
- Private corporations (start-ups)
- Limited liability: The owners of a corporation are not personally liable for its obligations

Our **1st axiom**: A corporation always needs money to operate

Our **2nd axiom**: Economic reciprocity == transactions carry value to all parties involved

“if you provide value, you (must) receive value”

Corporate structure



	Sole Proprietorship	Partnership	Corporation
Who owns the business?	The manager	The partners	The shareholders
Are managers and owners separate?	No	No	Yes
What is the owners liability?	Unlimited	Unlimited	Limited
Are the owner and business taxed separately?	No	No	Yes

Firm Structure

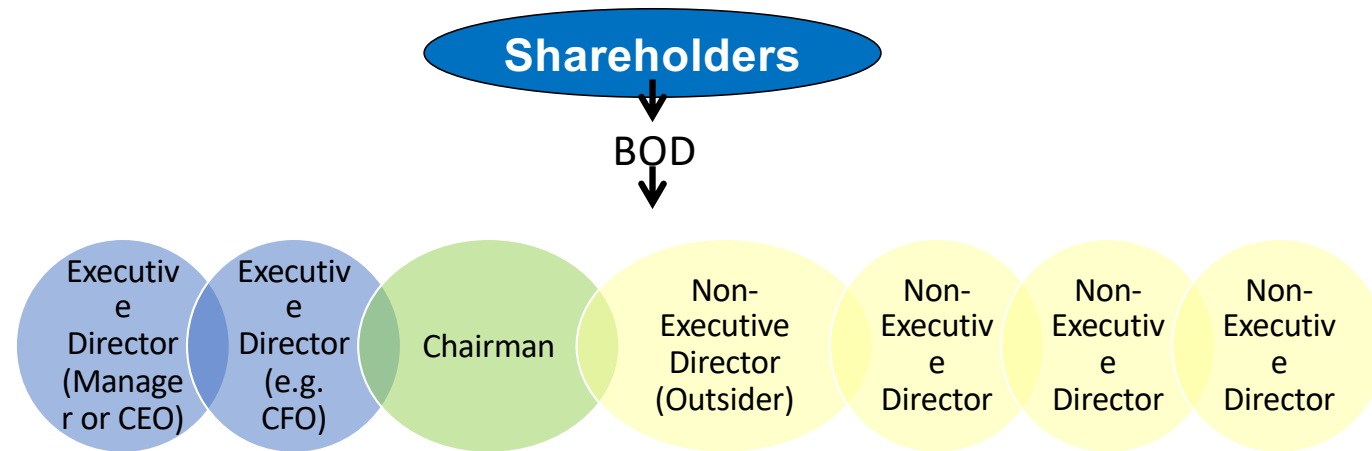
Sole Proprietor	Partnership	Corporation
Owned, managed by one person	Owned, managed by the partners	Separation of ownership and management
Unlimited liability	Partners have unlimited liability	Limited liability
Personal taxation	Personal taxation	Profits taxed at corporate and individual level
Life limited to owner's	Life limited to partners' lives	Life potentially unlimited
Financing limited by owner's wealth	Partners' (wealth) limits financing	Financing not limited by owners' resources

What are corporations? Cont'd

- Legal entity, owned by shareholders
- Can make contracts, carry on business, borrow, lend, sue, and be sued
- Corporations can be **public** or **private**
- A large public corporation may have hundreds of thousands of shareholders

How are they run?

- Shareholders vote to select the members of **The Board of Directors** (BOD)
- The BOD represent the interest of shareholders
 - Meet a number of times in the year
 - Sets out the overall strategic objectives of the business and make all the major decisions
- The BOD appoints top management such as the **Chief Executive Officer** (CEO)



- The CEO and other managers lead the development and execution of the business strategy and control the business's day to day activities
- The Board of Directors monitor management's efforts and actions and can intervene when management veers off course
- The board consists of **Executive** and **Non-Executive** (or Outside/Independent) directors
- Non-Executive directors are NOT managers, they are NOT affiliated with management and they are not employed by the business

So, you are a firm, and you need money

- You acquire a bank loan, you issue a bond with interest == **debt financing**
- You can as well issue stocks, or raise money from your existing shareholders (so-called equity investors) == **equity financing**

You make financing decisions based on the performance of different scenarios == **capital structure decisions**

Textbook-example on investment and financing decisions by major public corporations – have a look!

Company	Recent Investment Decisions	Recent Financing Decisions
Intel (U.S.)	Invests \$7 billion in expanding semiconductor plant in Chandler, Arizona.	Borrows \$600 million from Chandler Industrial Development Authority.
Amazon (U.S.)	Acquires self-driving start-up, Zoox, for over \$1.2 billion	Reinvests \$33 billion that it generates from operations
Tesla (U.S.)	Announces construction of new plant to build the electric Cybertruck	Announces plans to sell \$2 billion of shares
Shell (U.K./Holland)	Starts production at a deep-water development in the Gulf of Mexico	Cuts dividend to preserve cash
GlaxoSmithKline (U.K.)	Spends \$6 billion on research and development for new drugs.	Raises \$1 billion by an issue 8-year bonds
Ørsted (Denmark)	Completes a 230-MW wind farm in Nebraska	Arranges a borrowing facility with 14 international banks
Unilever (U.K./Holland)	Spends \$8 billion on advertising and marketing	Pays a dividend and completes \$200 million program to buy back shares
Carnival Corporation (U.S./U.K.)	Launches four new cruise ships	Raises \$770 million by sale of bonds; each bond can be converted into about 19 shares

We take capital structure and capital budgeting decisions
at a **specific time point!** (?)

But transactions can happen at different time points

... and so the performance, ie the outcome of our decisions might differ over time,
i.e. **money has a *time value***

Our 3rd Axiom:

The **present time point** is our common reference to calculate the **present value** of
all money movements.

THE FIVE BASIC PRINCIPLES OF FINANCE

Principle 1: Money Has a Time Value

A dollar received today is worth more valuable than a dollar received in the future.

- Why?

We can **invest** the dollar received today to earn interest. Thus, in the future, we will have more than one dollar, as we will have earned interest on the investment.

Principle 2: There is a Risk—Return Trade—off

Investors tend to be risk-averse and prefer certain return to an uncertain return. Investors might still hold risky investments.

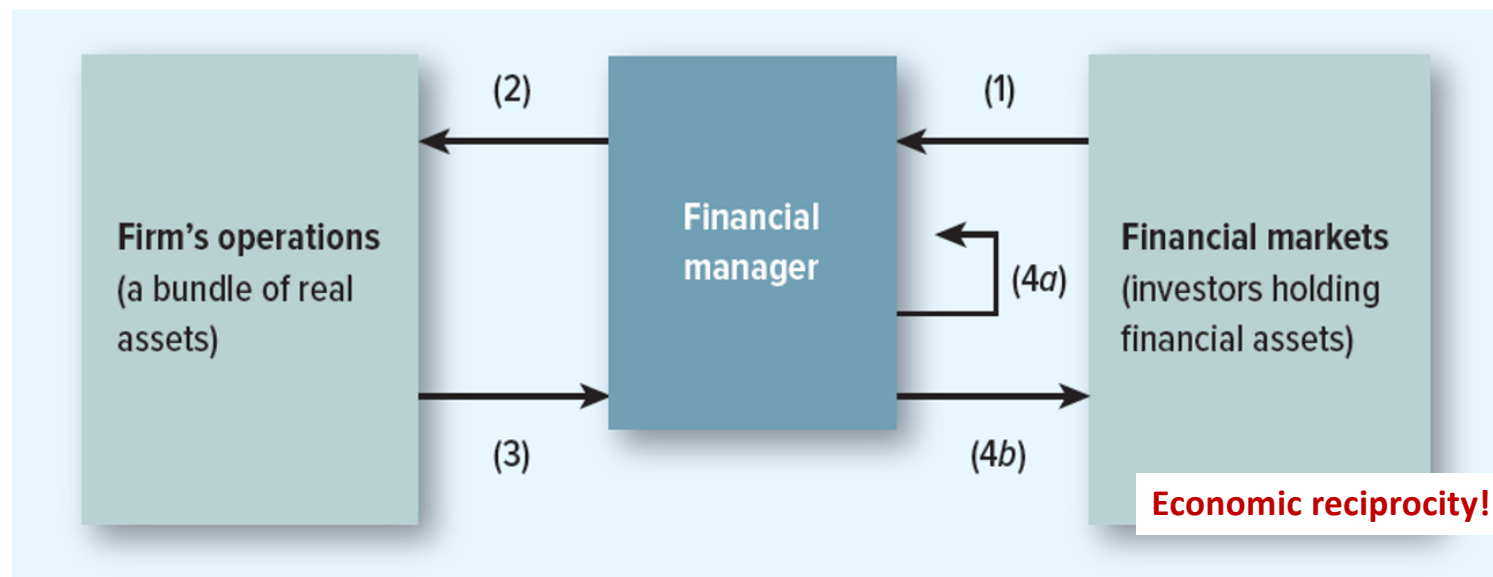
- Why?

Compensation is expected. Higher the risk, higher will be the expected return.

Note: Expected return may not be equal to the realized rate of return.

Thus higher risk does not guarantee higher rate of return.

Implications of Principle 2 for *corporations*, based on Axiom 1&2:
Flow of cash is the function of the risk the financial manager takes



- Cash raised from **investors** (1) by selling financial assets (e.g. securities), compensated by (4b) **return on investment**
- Cash **invested** in the firm's operations are used to purchase real assets (2) and in return, **generating income** (3)
- 4a) Cash reinvested

Principle 3: Cash Flows Are the Source of Value

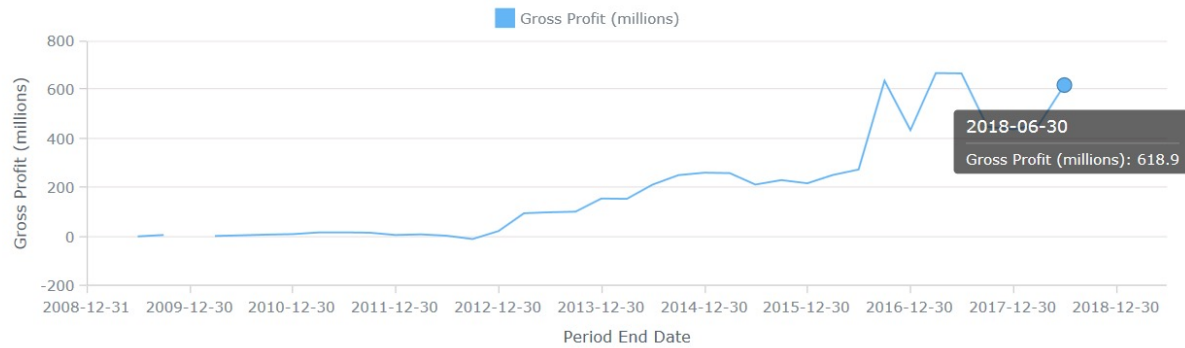
Profit measures a business's performance. Cash flow is the amount of cash that can actually be taken out of the business. Profits can differ dramatically from cash flows.

- Why?

It is possible for a company to report profits without generating any cash and vica versa

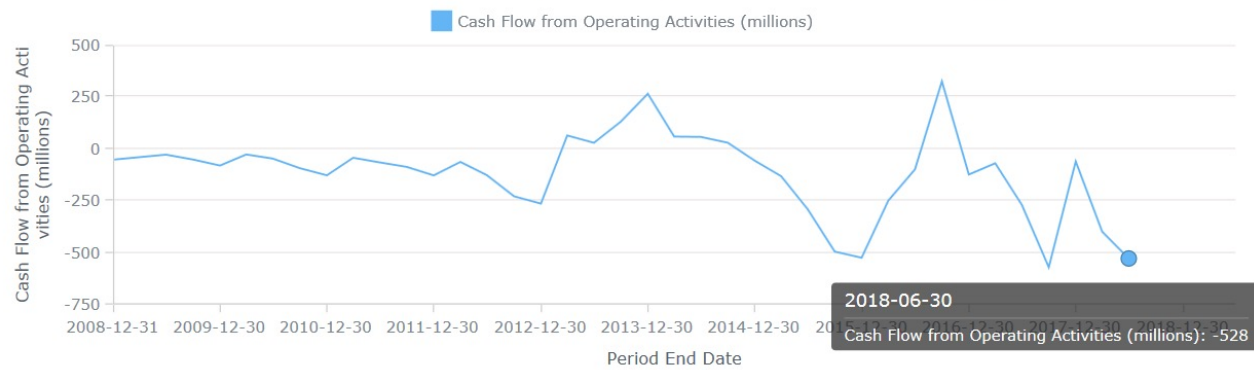
Look at Tesla:

Gross Profit (Quarterly)



Would you invest?

Cash Flow from Operating Activities (Quarterly)



Would you (still) invest?

CHECKPOINT: *Working with data*

How much money will you have in your pocket next year?

Your problem-solving model

Step 1: Picture the problem, *list what you know*

Step 2: Decide on the solution strategy, *list what you have*

Step 3: Apply the techniques and solve the problem

Step 4: Conclude, interpret results

Your venture has an income 70.000 GBP this year and 50.000 GBP next year. The market rate is 10% per year. Your venture spends, however, 90.000 GBP this year.

How much will you have available for next year?

1) List what you know:

- 1) Y1: 70k GBP income; 90k GBP spending, 10% interest
- 2) Y2: 50k GBP income

2) Solution strategy:

- 1) I need to calculate my funds available for next year. I also figure that I need to borrow money this year to compensate my spending.
So, I figure how to work with lending *today* and paying back *next year*.
- 2) I also figure that I need to repay what I was lending, so I need to deduct my costs from my future earnings.

Your venture has an income 70.000 GBP this year and 50.000 GBP next year. The market rate is 10% per year. Your venture spends, however, 90.000 GBP this year.

How much will you have available for next year?

3) Apply the techniques and solve the problem

- 1) I borrow 20k GBP to cover my expenses
- 2) I apply the *future value rule* ($PV * (1+rate)$) to calculate the *future* effect of 20k borrowing *today*

3) Next year I have $50k - (20k * 1,1) = 28.000$ GBP

4) Conclude, interpret:

- 1) If I was just adding, subtracting, I would argue: “My total income for 2 years is 120k, why to bother?”.
- 2) Timing is important! Y2 is not 50k, but 28k only: I spent ex-ante, so borrowed in light of future cash flows

Digest the terms: Present and Future Value

Future Value:

The amount to which an investment will grow after earning interest

Present Value:

The value today of a future cash flow

Remember the technicalities: Calculating Future Value

FV stands for future value

C₀ is the cash flow today at time t zero

r is the interest rate

t is the time period

$$FV = C_0 \times (1 + r)^t$$

Remember the technicalities: Calculating Present Value

$$FV = C_0 \times (1+r)^t = C_t$$

So, FV is the amount I have in the future, my future capital C_t

If I knew my capital-to-be in the future (C_t), would I know the amount I have today?

Of course, we need to calculate “backwards”, i.e. consider C_0 as unknown, i.e. the capital today

$$PV = \frac{C_t}{(1+r)^t}$$

Remember the technicalities: Calculating Present Value

PV stands for present value

C_t is the future cash flow at time t

r is the interest rate

t is the time period

$$PV = \frac{C_t}{(1+r)^t}$$