POLITECNICO DI TORINO

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Master’s Degree II Level Thesis

Financial education of individuals and the pros and the cons of digitalization in the context of financial choices

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How do people invest their money ? How do people learn about investing ? Which are the main factors that influence individuals in the choose of the best investment for them ? These are just some of the question this thesis will try to answer and analyse.

In This thesis it will be described the actual status of the financial education, in particular in Italy and in Europe; and it will be also analysed how new technology have influenced the way the individual takes their decisions and the tool they have nowadays to make them.

It also will be described the difference between the traditional investment method and the new methods that are emerging these days.

Basically every new investment that is emerging these days is based on high level of technology, showing how important also the technology level of a country is as important as the financial literacy; this show, also, how nations must hurry to create a new system of education that it’s in line with today life; many nations, and Italy is one of these, still have an obsolete educational system that it’s not in line with the world of today.

For the analysis of all these issues, only verified data and data taken from scientifically reliable sources, such as scientific publications and books, or statistical data released by established organizations, will be taken into consideration.

One of the most used tool in this thesis is Statista, which is a tool in collaboration with Politecnico di Torino, that give students reliable data on basically every aspect of the society and the economy.

Chapter I:
Financial Education

In the last years, one of the most discussed trends is the financial education of the individual.
Financial education can be described as the acknowledge and the capability of a person to decide about some financial choices, which can be for example when to open a bank account , with which company of it can be, how and when to ask for a mortgage; another example could when and how to trade stocks.

Years ago, there was not a proper financial education path offer for the people; lately, school has understood that the financial acknowledge is important since the first year of the individual education.
There are a lot of differences in the nations, that have different programs and different priority for this topic; for example in USA, children are exposed to a much better financial education, they take courses since first year of school and they talk more with their parents about this topic; in Europe, especially here in Italy, the topic is not so discussed, because it's seen as a bad manner to talk about financial status; but this is part of the culture of the people and it cannot be changed overnight.

Having a good financial literacy is the base to have a stable life in the economic point of view, an individual nowadays needs to know how to do proper decisions financially.
For example, a lot of people still think that taking debt is totally wrong and it must be avoided at every cost , but they don't know that debt is a tool that can be really valuable, if used correctly and, especially in the companies, can be a really good instrument to optimize the expenses and increase the margin.
Also, a good financial literacy is the base for a nation that works well and it's economically prosperous.

According to a survey of OECD (source 1) done within 26 countries , over the half of the European adults haven't a decent knowledge of the financial basic decision, in particular older people and young adult scored really low in most of the sector in the survey.

In the survey the nation that come as the best is Hong Kong , while Italy scored as one of the lowest in the rank.
The survey divided the skill in three different sectors: Knowledge , Behaviour and Attitude

A lot of interesting point have come out from this survey:

-Men appear to have better financial knowledge overall in all the economies, even if in some countries the difference was lower, like in east Europe.

-There is a positive correlation between people that save a consistent part of their annual income in savings and financial scores obtained in the survey.

-Older people have a worse financial literacy.

-Young people are less prudent financially too and have a worse financial literacy.

-Another interesting element is that people who used digital tools to answer to the survey had better score overall.

The Covid Pandemic situation of the 2019 has showed how important is the financial education, especially where there is economic crisis both for the individuals and for the society.
A study by Intrum (resource 6) found that, after Covid, about the 40 % of European consumer started to improve their financial literacy and almost the half said that after the pandemic financial certainty is now a priority for them.
In the years following the COVID Europe reacted pretty well to the situation, European Banking Federation (EBF) has done research and found out that 35 European nations started to worry for the financial education of the people , with a total of more than 110 initiative in all the Europe.
As Raymond Frenken, EBF's Director of Communication department said : <<It has become clear that a new international financial literacy movement has emerged, globally as well as in Europe and in Brussels. A wide range of players are active: academics, public policy-makers, NGOs, banks, insurance companies>>.

Even if many European countries tried their best with the financial literacy improvement , there are some countries that are having some difficulties in understanding its importance, like Belgium and Greece.
So, there is still a lot of work to do, and this will take a lot of time since important elements that are part of the culture of a country are really hard to modify.

Another important study (resource 4) by GLFEC (Global Financial Literacy Excellence Center) stated that North Europe is the area with the highest financial literacy, with Australia and Canada.
On the other side of the classify there is South Asia that scored the lowest , where less than 25 % of individuals have reported a sufficient financial education.

To improve financial literacy there were initiatives in all the major European nations:

- In the Netherlands for example it was born Me & Money , which is a program to actively increase the financial interest in young students, through their teachers.
- In Finland it was instituted the 'Talousguru prize', which is a price that is given to excellent students that are invited to study in the top University in the country.
- In Spain, which has always had an unstable economy in the last years, there has been implemented a program 'Your finances, your future' by the Spanish Banking Association, which is a practical guide on how to use money for young students.
- France created the 'I invited a banker to my classroom' which is a workshop that teaches very young students the really basic of the personal finance.
- Germany and Austria, teamed up together and created 'School Banker' a competition for secondary school students that create a virtual bank and present a game to let the students understand how the real banks work, while increasing skills that are important in the real job word , like good teamwork communication and complex problem analysis.
- Finally, also in Italy, there were some interesting initiatives on the topic; for example, there was the 'Saving Champions' project , which is a joint venture between UBI Banca and the Italian National Olympic Committee, which offers athletes a very user-friendly online tool that promises to help them improving their financial education.

Also, the European Union with the OECD's International Network worked hard to improve the general financial literacy of Europe; in particular it created a lot of initiative , with the force of the countries in order to work with students and improve their financial curriculum.
OECD commission has recently said that its work on financial literacy has just started, and by learning from what countries like Finland or Sweden made , it wants to keep working on this problem, especially considering that the world of the finance is changing really fast.

One of the most important works of OECD, joint with EU commission is a document (resource 7) where they tried to create a financial competence framework for people in the EU.

For example, the document analysed the first topic ‘Money and Currency’ and tried to understand the most important key element one person must be aware of, like in the next picture.

Topic	Awareness, Knowledge and Understanding	Skills and Behaviour	Confidence, Motivation and Attitudes
1.1 Money and Currencies	**Forms and use of Money** 1. **Aware** that money can take different forms 2. **Understands** the meaning of legal tender	3. **Can use and store** money safely in all its forms 4. **Takes into account** the relative advantages and disadvantages of different forms of money when choosing which to use	5. **Motivated** to learn about different forms of money 6. **Confident** in using different forms of money
	Notes and Coins 7. **Knows how** to identify genuine notes and coins 8. **Aware** that currencies or specific notes and coins may become obsolete over time as official money/means of payment	9. **Takes appropriate action** if notes or coins are thought to be counterfeit 10. **Exchanges** obsolete notes and coins for new ones within time limit set for such an exchange	11. **Has developed the right attitude** when confronted with counterfeit money

Picture1- Extract of the financial competence framework[resource7]

Another important framework for the financial literacy is the one (resource 5) created by EESC where they tried to outline the most important point that must be followed in order to offer a good financial education to an individual, showed in the next picture.

Financial education programme outline[5]

Products	Topics and target groups	Means of imparting the information
Savings and liabilities (savings accounts, pay slips)	Learning how to save (children and young people)	Schools Workplaces
Investments and assets (consumer loans and mortgages)	Starting work (young people) Starting to live independently (young people)	Employers associations and trade unions
Payment methods (debit and credit cards)	Starting a family (adults)	Consumer associations and NGOs
Other financial products (insurance, pensions)	Preparing for retirement (older people)	Retirement homes
Services (transfers, advice, charges)	Managing money in a micro-business (entrepreneurs)	The media Internet

Picture 2- Financial education outline (resource 5)

Financial behaviour of people follows strictly their financial literacy.
One of the most interesting papers in this field is the Guido Sodini's paper (resource 9).
He stated that << more risk tolerant investors are more likely to participate because they are more likely to invest a larger share of their financial wealth in risky assets. The same is true for investors who face less background risk or who are less likely to be liquidity constrained. In general, any factor that increases the optimal portfolio risky share will encourage stock market participation>>.
Also, it stated that stock market action that has been done by every individual are not casual, but they are linked to their financial literacy , background, logical skills and some intrinsic characteristic of the individuals.

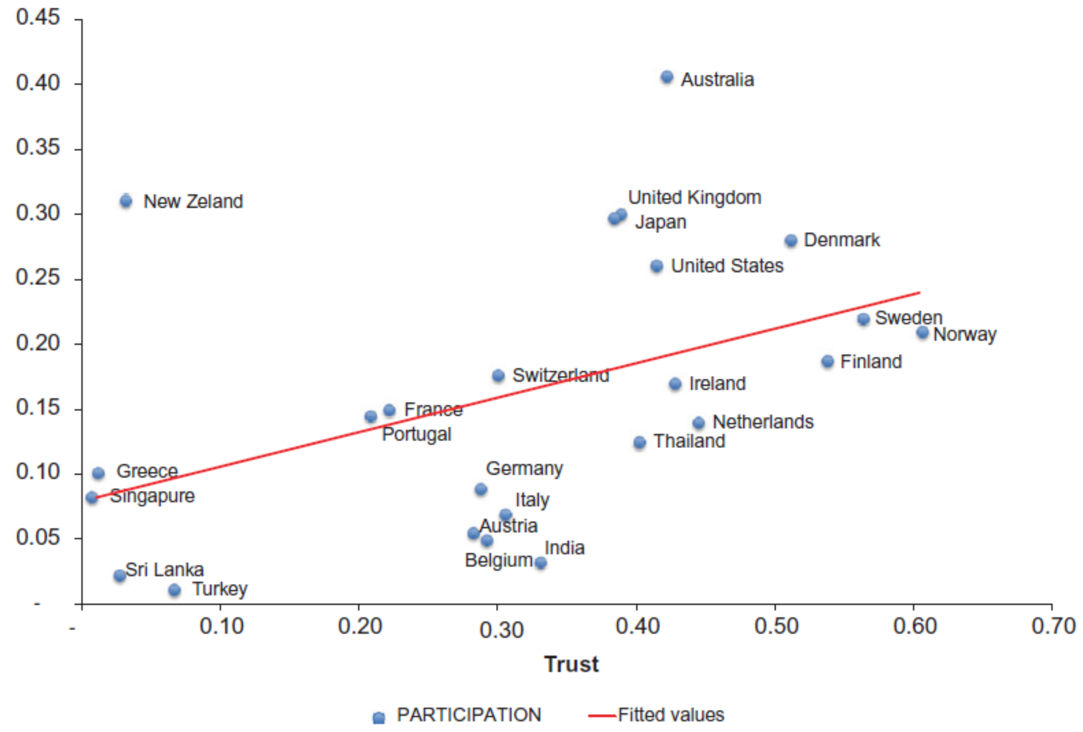
Another important study has been done by Dimmock and Kouwenberg (2010); they found out that loss aversion is strictly related with the investment in the stocks, directly or not. So, if the return of the stocks is uncertain the premium risk must be proportional.

In portfolio theory, with fixed consumer utility preferences, investors are eager to buy more risky assets only if they are offered a proportional risk premium; if they don't believe that the premium is not proportional to the risk they are taking, they will not acquire those assets, even if there are no ownership cost.

Another important point that comes out from Guiso's study is that the portfolios of the less educated households are generally less diversified, thus having a worse risk premium. Diversification is one of the simplest principles to follow for the best portfolio possible and even if it's really cheap, not implementing it can be really dangerous for the investors.
Optimal portfolios must have a high diversification since investing all the money in a single asset is too risky. This is not known by everyone unfortunately, because currently, about half of stockowners possess one or at maximum two stocks, even if it's not easy to measure the diversification of the investors very precisely.

Guiso's study also highlight how the information that the individual has about the stock influences positively the possibility for him to acquire it; in fact, often people who have no knowledge in the stock market argue that playing in the market is like gambling.

Another important factor in the individual behaviour is also the nationality and the culture, in fact the data show how different is the behaviour and the trust that individual have for the stock market, depending on the nationality they come from, as it can be seen in the next Picture.



Picture 3- correlation between trust and participation in stock (data from Resource 9)

In the picture it can be seen as some nations follow the fitted value as Norway or Sweden, while others nationality like Australia are outliners, showing a really high participation; on the other hand, there are nations like Turkey or Sri Lanka that have a really low participation in stock, compared to the trust they have for the market.

Also, school education is positively correlated with risk taking, a lot of studies showed it clearly , like the Polkovnichenko(2005) one; educated investors often take more risk and they have more knowledge about what they are risking and what it's the risk premium.

The situation in all the EU is getting better, but there are still important differences between the difference nations ; for example in Spain and Italy the families are still investing much less than nations like France and ,especially, Germany, that results one of the best countries for the financial management of the individuals; but the gap is getting smaller, in fact, Italians are getting more interested in investment and finance day by day, as studied by Consob (resource 26).

The biggest problematic zone in Europe is , anyway, the Southeast part, which, in a study that has been done by OECD, testing the financial literacy of adults (resource 28), has scored 57/100 against the average European score of 65/100.

One of the biggest problems found in these populations is the quality and quantity of the info these people are getting, in fact most of them don't trust financial tools and in general financial institutions; this reflects on their capability of financial planning and their wealth management.

An important data in this sense is the retirement plan investments: in the OECD study has been showed how in the East Europe Region only the 25% of people trust the retirement plan, against the 75 % of individuals of average Europe.

The nations that scored the worst among the East Europe countries are Romania and Georgia, which scored the worst for, respectively, Financial Knowledge and Financial Behaviour.

Another confirmation that also in this study is found is the positive correlation between economic status of the country and financial literacy.

The governments must understand how to improve their citizens financial literacy in these years, in particular they must teach them how to manage compound interest, debt and the most important financial instruments.

The governments should also distinguish different social group and target them specifically, proposing different level solutions.

In order to keep the financial literacy increasing, the different entities must track the result, using tools like surveys of questionaries.

The different methods to value an investment

How to understand if the investment is convenient ? There are different methods for single investment and indexes that are often used for company valuation; the most important ones are : NPV, IRR, Payback, ROI, ROE ,ROCE.

-NPV

The main goal of NPV (Net Present Value) is to understand if the value for the stakeholder is met and if the forecast can guarantee a proper return for him.
Also, the return must be balanced with the time passed and the rate of return.
The NPV is calculated as in the Picture below.

$$NPV = \sum_{t=0}^{T} \frac{CF_t}{(1+r)^t}$$

Picture5 - formula of the NPV

The formula consists in a sum of every cashflow at time t , discounted for the rate of return at time t. From the total sum obtained you must remove the initial money it was necessary for the investment ; some formula also consider the tax in it and multiply the sum for a coefficient that calculate tax paid.
This method says that if NPV >0 the investment is positive and you can have money back from it; otherwise, if NPV <0, the final cashflow is not positive and the investment is not worth.

The NPV is also useful to compare different investments, in fact the individual or the company can see if an investment is a more valuable than another one, seeing which NPV is higher.

Unfortunately, this method is not perfect but has different flaws; for example, it’s really hard to find a method really accurate that forecast the future cashflow and also, it’s really costly to obtain all the data in order to forecast every Cash flow calculated with the rate of the return. Another problem is that this method cannot manage different resources, so you must simplify the cashflow in a single one.

-IRR

The IRR(Internal Return Rate) Method is strictly related to the calculation of NPV; it is basically the discount rate r that you obtain if you consider the NPV, subtracting the initial investment money, equal to 0, as you can see in the formula in the picture below.

$$IRR = NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_0 = 0$$

Picture 6 – IRR formula

The calculation of IRR often consists in more iterations and not only one, until the perfect value is found; some software can be used in order to make the process faster.

After the value of the rate is obtained, it is compared to a threshold rate , which often it's called acceptance rate; if the rate of the return which it's obtained by the iterations is higher than the threshold one, it can be considered a positive investment.

The method is also useful to compare one investment to another one; if two investments have similar characteristics but one presents a higher return of rate you can consider that one the preferred one.

The IRR method is used both for financial asset and for real investment.

-Payback Period Method

The Pay Back Period is a method that is often considered the easiest method to calculate if an investment is valuable or not. It consists in the calculation of the time which is needed to recover the investment done at the start of the project through cash flow , as you can see in the picture below.

$$\text{Payback period} = \begin{matrix}\text{Years before}\\ \text{full recovery}\end{matrix} + \frac{\begin{matrix}\text{Unrecovered cost}\\ \text{at start of the year}\end{matrix}}{\begin{matrix}\text{Cash flow during}\\ \text{the year}\end{matrix}}$$

Picture 7- Payback Period method

For example: there is a machine that costs 50000€ and it produces 10000€ of cash flow annually from selling the products it produces; on the other hand, there is a machine that costs 70000€ and generates cashflow for 17500€ annually. Which machine is the most profitable ?

Machine A takes 5(=50000/10000) Years to recover the capital , while the other machine needs 4(=70000/17500) years.

Following the principles of the Payback Time method it is more convenient to buy the second machine that costs 70000€, since it requires only 4 years to recover the investment, differently from the other machine that requires one year more.

Since the Payback Method is really simple it has a lot of limitations, for example it doesn’t consider what happens after the payback method is reached; for example, one investment could require more time to recover the initial investment , but after that the cashflow could surpass the other investment.

Since the Payback Method gives limited information is almost never considered alone, but together with other indexes or method.

-ROI

ROI (Return of Investment) is one of the most important indexes used in the world to evaluate the performance of a single company.
The ROI has a pretty simple formula as you can see in the Picture Below.

$$ROI = \frac{(Outcome - Costs)}{Costs}$$

Picture8 – ROI formula

ROI is used to calculate the performance of the investment and to analyse if it's profitable or not; it calculates the return you get from the sum of invested capital.

To calculate it in the right way , it must be understood who invest the capital, if it's a company or an investor.

If it's an individual investor the capital is just the sum of money that is used to do the investment, otherwise if it's a company the invested capital must be considered as the sum of the net assets in the balance sheet of the company.

ROI helps the investor to understand the efficiency with which the capital has been invested and if the generated return is proportional to the initial capital.

The most important usage that must be done with ROI is to compare it for different companies, maybe in the same sector or industry; analysing a single ROI of a company doesn't give so much information.

Furthermore, ROI , as all the other indexes, cannot be considered alone, but it must be considered together with other indexes.

-ROE

ROE, acronym for Return on Equity, is an index that divides the annual net income by Shareholder 'Equity, as seen in the next Picture.

$$\textbf{ROE} = \frac{\textbf{Net Income (Annual)}}{\textbf{Shareholder's Equity}}$$

Picture 9 – ROE formula

The index can be considered as a sum of every profitability index, and it is used to check if the shareholder's equity has been well managed and has created high income or not; ROE is influenced a lot by both the asset management decisions and the financial of the company.

ROE, like most of other indexes has no meaning alone, but must be compared to other ones; in particular if it's compared to other indexes that are in the same industry and in the same sector, ROE results to be one of the best indices.

Often, it's used together with the risk-free rate, which is the return one investor gets from the government bonds, that generally have a really low risk and low return, depending on the stability of the nation; for example the one of the Switzerland , which is considered one of the most economical safe nation on earth , is near to 0.

It is clear that even if ROE hasn't an absolute meaning , the higher is ROE, the better is for the company investing, since the stock market results more attractive.

If the ROE <0 it generally is a really bad situation, showing that there are important imbalances between the equity and the income generated.

The difference between risk-free rate and ROE can be considered as the risk premium, which is the premium that the investor gets if he chooses to contribute with its capital to a company and which usually it's riskier than a bond.

-ROCE

ROCE , or Return on Capital Employed, is one of the most important indices of the financial world that indicates how much a business is efficient. It shows how much earnings before interest and tax a business can generate starting from a capital employed, like you can see in the picture below.

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital Employed}}$$

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Net Sales}} \times \frac{\text{Net sales}}{\text{Capital Employed}}$$

$$\text{ROCE} = \text{Operating Margin} \times \text{Capital Employed Turnover}$$

Picture10 – formula of roce

For example, if a firm presents a ROCE of 10 % , it means that if you had invested 20€ you would have a return of 2€, not including taxed and interests.

The EBIT are obtained by taking Revenue and subtracting Operating expenses and Cost of Production. The capital invested is the difference between the sum of every asset and the current liabilities.

The total asset of the company is every asset the company owns , like machinery for production, equity, buildings or offices and so on; it includes also intangible assets, such as patents or any other intellectual property correctly registered.

Liabilities are usually payable elements of the company, for example there are the payable to the supplier, payable to bank, payable to external contractors and so on.

Usually, the capital invested is used by the company to finance new methods of production or marketing and also to invest in R&D activities.

Usually, ROCE must be compared with previous years index, for example a ROCE that increases over time indicates that the company you are analysing is getting better in using the capital it gets from the stakeholders and it’s creating increasing returns.

An increasing ROCE can also indirectly shows that there are possible increases in the dividends and possible increase in the shares.

In these days, there are different investment possibilities to follow, they can be divided in the Traditional Investment Methods and Innovative Investment Methods, that are the newest method to invest that are born these days; they will be discussed in the next Chapters: II and III.

Chapter II:
Traditional Investment Methods

-Asset

Asset is probably the most basic and primitive element of investment, and it indicates every entity whose value can change .
An asset can be a tangible or intangible entity, depending on if it’s correlated directly or not to a money value.
Assets are divided usually are divided in two types: underlying asset and company asset; the former one is linked to financial tools that are usually property of an individual, the latter one refers to the asset owned by a business.

-Company Assets

The overall value of a business is calculated on its balance sheet, which shows how a business can manage its assets ,such as building, machinery, patents and so on.

A company asset is something that a business can own or control with the intention of making money or getting an advantage in the future. The term "asset" in financial trading refers to anything traded on the financial market, including securities like stocks, bonds, currencies, and commodities.

-Underlying Assets

Underlying assets include a wide group of instruments, such as commodity, bond, currency or option, which will be described in detail in the next pages.
One key characteristics of these underlying assets is that the investor can put money on a derivative linked to them; the price of the derivative is based on the value of the underlying assets linked to it.

Traditionally the asset was an investment done because the investor saw an economic potentiality in it; for example, a stock that it’s sold at 20 € but the investor values it 30 €.
Nowadays buying the asset is not necessary to create profit by it , in fact there are different techniques that permit the investor to don’t own the asset but to generate value from it.
An interesting instrument in this sense is the derivative, which is a contract between two entities, and it bases its value on other financial assets or other financial indexes.

Trading a derivative means that you are forecasting the economical movement of the underlying asset, its value could increase of it could lose all the value.

Another interesting tool in this type of investment is the Contract for Differences(CFD) whose price is not directly determined but it comes from other investments tool; usually CFD is a type of derivative contract between an investor and the bank; it is based on the difference of the value of the security(or asset) between the opening and closing time; the banks must pay the investor if the price of the underlying assets increases at closing time and on the contrary they can keep some money of the investor if the value of the underlying assets decreases.

The procedure by which the percentages of the different investment types with which the portfolio will be made is determined upon in order to maximize income and minimize risk and is known as asset allocation. In other words, the investor is required to concretely and effectively choose the instruments through which to allocate his or her funds once the range within which to move has been specified, considering one's objectives, time horizon, and other factors.

-Real Estate

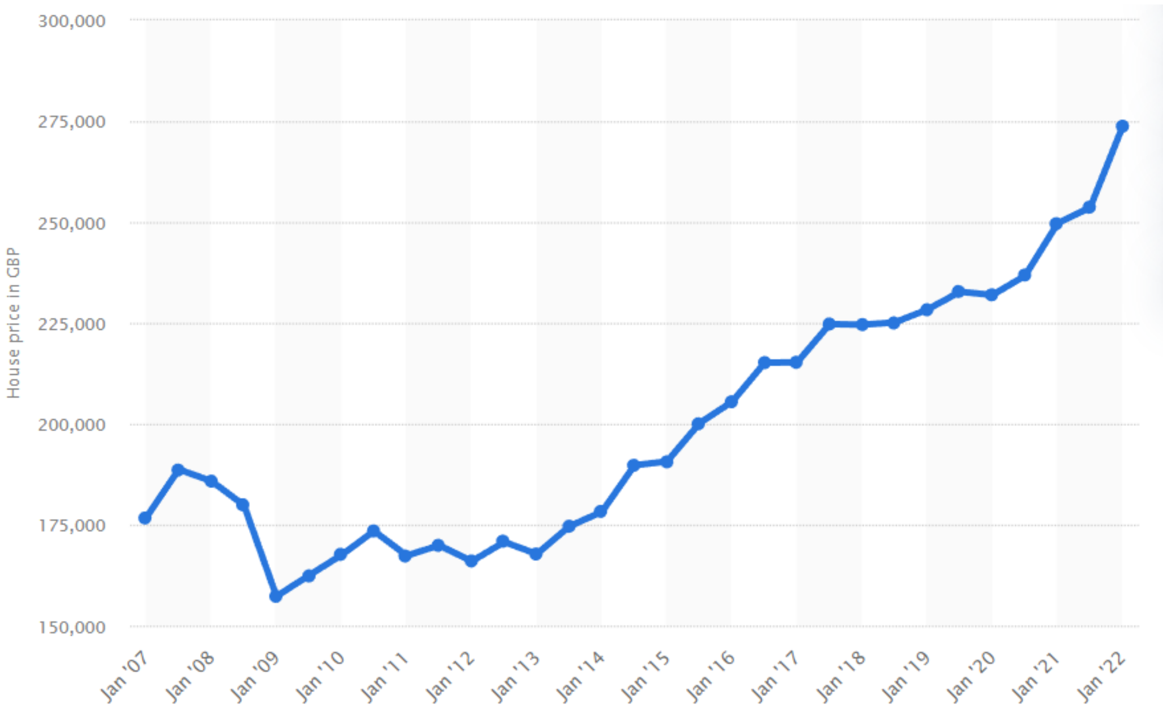
Real Estate is intended as the buying and the selling of any land or structure, that in the most cases represent an house, but it can also be a structure such as a mall or a cinema.

The buildings intended to trade, gain value following many factors, the main ones are:

- geographical position
- physical dimensions
- life time
- internal/external design
- quality of furniture/material
- other attached secondary elements (garage, parking lot , garden, etc.)

Real Estate is one of the oldest and simplest way to invest money, there are different methods that make Real Estate one of the most valuable sectors in the economy and they will be discussed in the next pages.

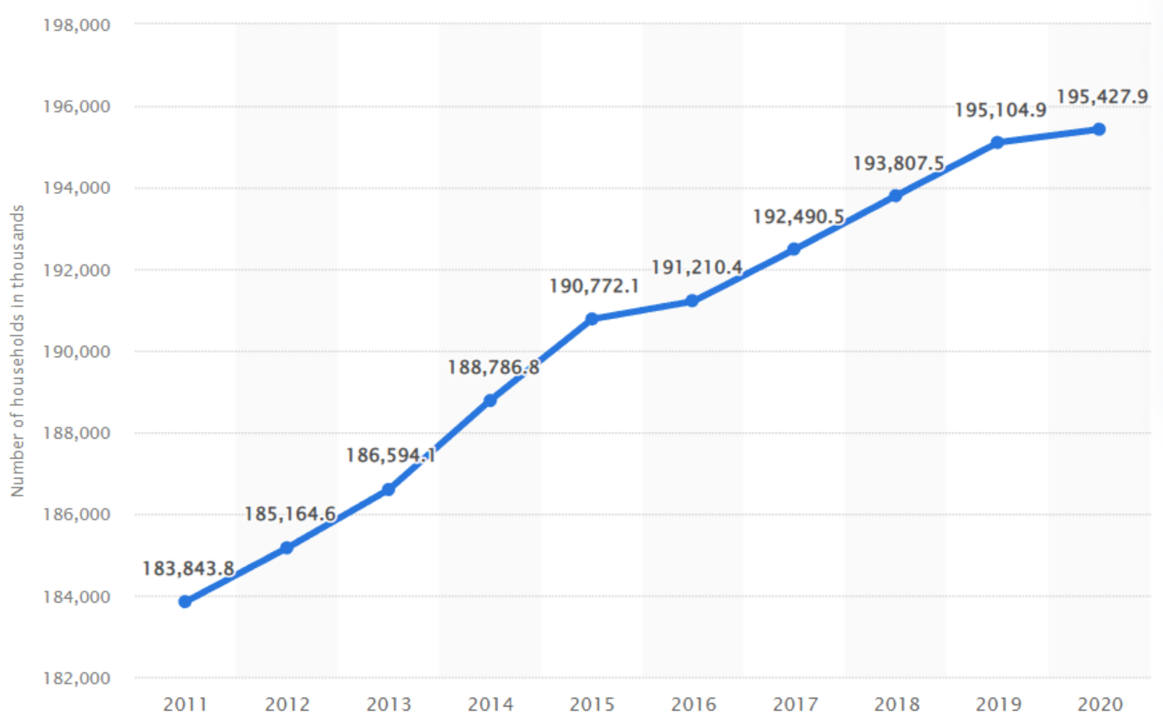
The most important feature of real estate is safety; usually investors really like real estate because even if the return in the short period are not so high, it gives almost always positive return; in fact usually the price of the houses, excluding crisis, keep increasing annually; for example, since years ago in the UK market, the price has been keeping increasing, as shown in the graph below.



Picture 12 – prices in UK (resource 11 - Statista)

Real Estate investments are probably the most desired ones, in fact in some country, like Italy, the objective of a worker is to buy its own house; countries in the north, like UK or Sweden have a lower % of households.

In 2020 there were about 196 million households in all the EU members, as showed in the next Picture.



Picture 13 – Number of households in EU (resource 11- Statista)

Germany is the nation with the highest households , followed by France.
As said before and showed in the previous graph, it is clear how the householders have increased during the last years.

In average, in the EU market with an investment of 1000000€ you can get a monthly return of about 6500€, excluding taxes and interests.

Properties that have a good return are not only the residential one; also, commercial buildings can have a very good return; usually the most important centres for investing in this market are big cities, in Europe some of the best places to invest in this sector are London, Paris, Milan; Nice and Amsterdam.

Crysis , like the COVID one or the one in Ukraine right now have a big impact on real estate market; anyway, the impact this sector gets is much less than what other sectors get and it's more gradual .
One important statement to do is that the main source of decreasing of the returns of this sector is the inflation and , also, expert investors advise to invest in real estate only if you have a not indifferent sum of cash.
Another critical point with real estate is that it's influenced by the mortgage interest, so inflation has , also here, a big effect.
A big fact about real estate is that the investor can use leverage, in particular a lot of future householders pay only a portion of the total house and ask the rest of the

sum to a bank, which lends him the money, adding of course an interest rate, that can be both fixed or variable, depending on the contract done.

There are different ways to invest in Real Estate:

-Rental Properties

For anyone with high business abilities and the patience to supervise renters, owning rental homes is a terrific opportunity to make money.
This method requires not only an important amount of money at the start, in fact you need not just a capital at the start of the investment, but you also need money to pay the taxes and to assure the maintenance of the property.
Another important benefit is that most of the properties allow the investor to make the invested capitals tax-deductible.
This method has also cons, for example, it's not easy to manage the people in the house you are renting and also, they could damage your property; this could also require you more money to manage lawsuits.

-Real Estate Investment Groups (REIG)

REIGs are the perfect tool for the investors that want to own rental property but don't want to manage them directly; REIGs are like funds that invest in real estate, a company build one or more property and then allows investors to buy them; so it will manage all the expenses and legal stuff; of course this is really comfortable for investors that have money to invest but don't have the time to manage tenants and to follow every problems attached with it, but this of course has a cost, that must be paid to the REIGs.

-House Flipping

House flipping is like trading stock, you buy a property with the intention to sell it at higher value; of course, the property must be already ready to be sold and it mustn't require any other costs; usually, the time required by this kind of investment is under six months.

House flipping can be really profitable but it's also the riskiest method of property usage, since 'flippers' usually request a mortgage to buy an house; if they aren't able to sell the property for a sum higher than the starting price and before too long, they start to lose a lot of money, spiralling down.

Since it’s a risky method it’s not for beginner investors, but it’s better to have a good knowledge of the market and a big channel of possible clients.

- Real Estate Investment Trusts (REITs)

For investors that want to invest indirectly in the Real Estate but don’t want to participate directly into it, REITs are a good solution.

REIT are basically businesses that take the money from an external investor and buy and manage the property independently and also REITs can be traded on the markets.

REITs usually give the investors monthly dividend payments, like standard equities; REITs give investors access also to property that are not only residential, like mall, office or other type of commercial buildings, which usually require really high capital of money to run.

To be considered REIT, a business must give away as dividend the 90% of its taxable profits; doing like this REITs avoid paying income tax like standard businesses, which are taxed on profits and decide if give dividends or not after tax.

REITs can also be divided into the market are in, like equity or real estate.

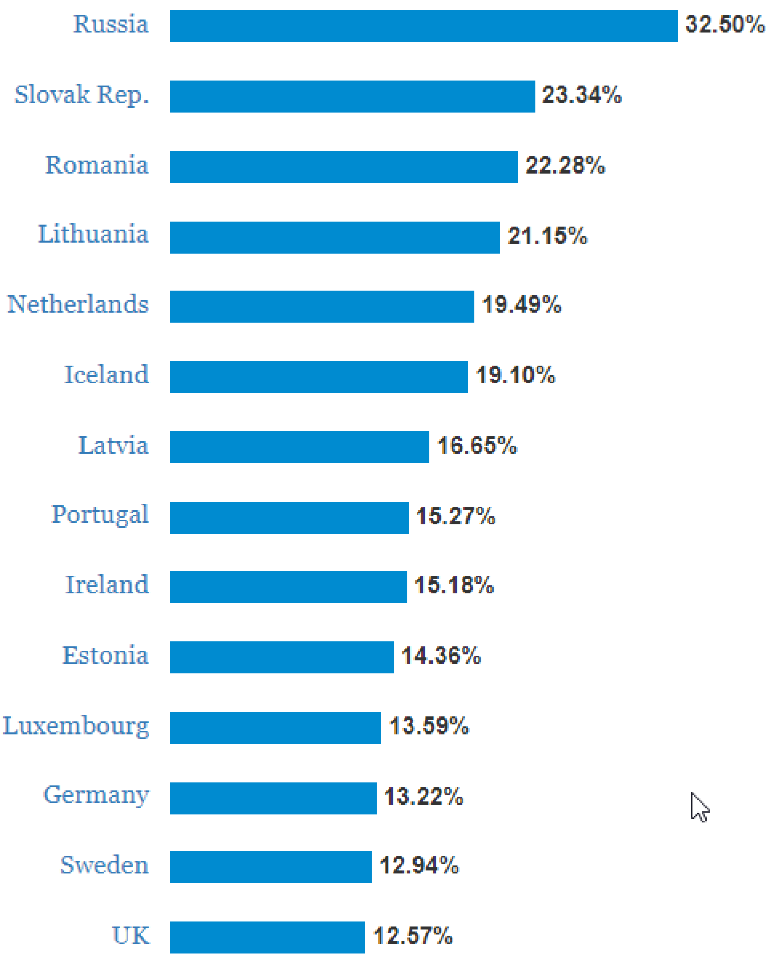
-Online Real Estate Platforms

Online Real Estate Platforms are a method made for people who want to invest their money into a larger pool, both for commercial and residential property.
These platforms are online, and the investor can navigate which investment it’s better for him and with how much percentage participate.
This is a good method to diversification own portfolio without investing too much money; in fact, you can diversify your portfolio with this method, investing in another nation or in another place that is economically different from your zone.

The cons of this method are of course the fee that you have to pay to the platform that lets you do the investment and the low return during lockup times.

Real estate is one of the best assets that the individual should insert in their portfolio, because it has a lot of customizable option, because it can be as a periodic income or as a single investment

Another important reason is that the prices of the houses , which compose a really big part of Real Estate, have been constantly growing in the last year in Europe, like showed in the below Picture.



Picture 14 – house price change in 1 year in Europe (resource 12)

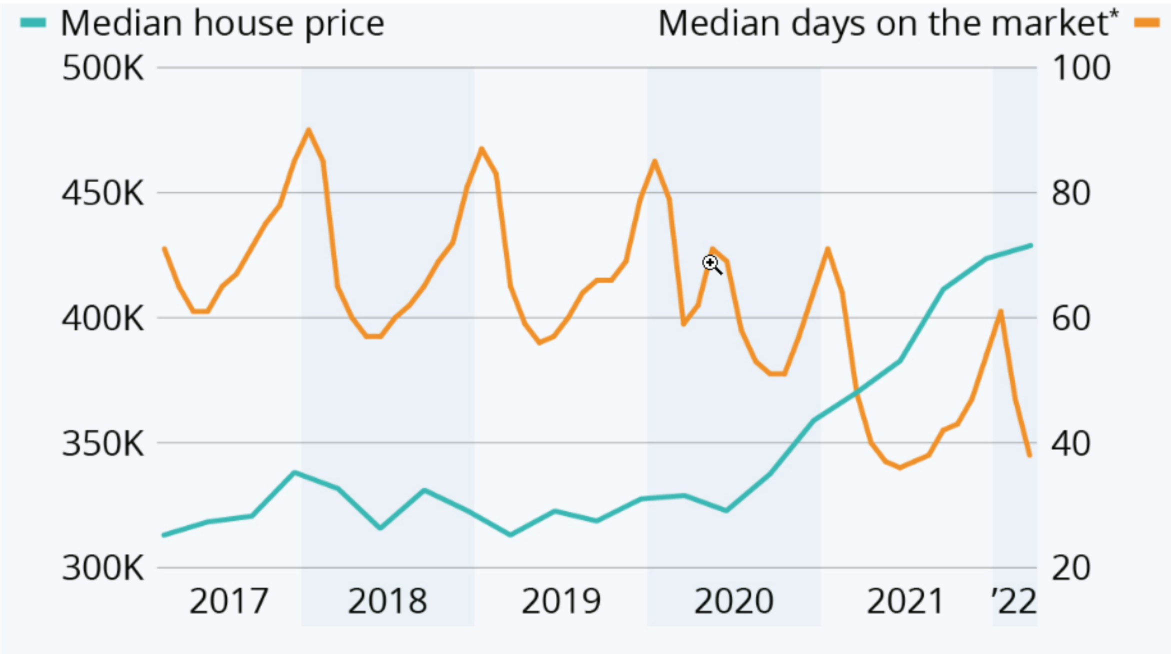
The most interesting place to invest seems to be the East-Europe, where house prices are increasing at a terrific pace; also, North-Europe is having a very good increase in prices.

Outside of Europe one of the most interesting places to invest in Real Estate seems to be Dubai, which is attracting an insane amount of new investors nowadays.

Dubai, in fact, is becoming one of the best places in the world for investments in this sector, the government is doing everything it can to attract the highest possible number of investors, for example investing in Dubai at least 1 million $ gives the investor a short-cut to obtain the permanent residence there.

One of the reasons that many people are investing there, is because of the taxation, in fact , if compared to the standard for other rich country, the tax on buildings and lands in Dubai is really low.

Also, USA continues to be one of the most profitable countries to invest in, as it's visible in the next Picture.

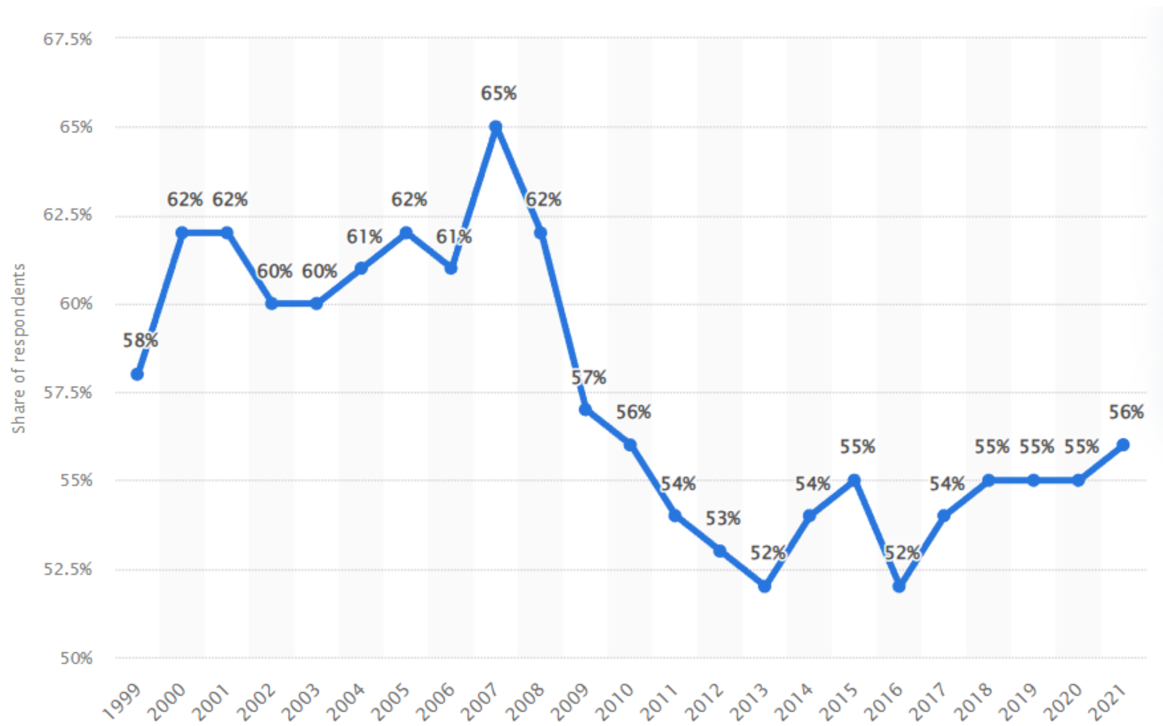


Picture 15 – Home prices in the USA market (resource 26)

-Stock

If a company needs cash, it has different opportunity, one of those is to issue shares, receiving the money from the investors that decide to buy them(shareholders); shares can be seen as the single units of the stocks.
When an investor decides to buy shares, it means that he's investing in the company's capital; the share can be seen as a sellable part of the company that an investor can buy.

Stocks have always been one of the most diffused methods of investing money, in USA, more than 50% of adults have some type of stock in their portfolio.
The percentage of stock owner has positive correlation with the status of the economy; for example, in the 2008 there was a drastic decrease of shareholders in USA, as it can be seen in the next graph.



Picture 16- Percentage of shareholder in USA – resource 13

The value of the shares reflects the performance of the company, it has an higher value if the performance of the firm is positive; on the contrary it loses values if the company is not in a bright period.

The price of a share varies from day to day, sometimes also hours to hours; like normal products, also the price of the share is influenced by the balance between supply and demand, the more people want to buy that stock the higher the priced. The price is also influenced by the forecasted profit of that company and, of course, its expected overall performance.

Investors make money from stocks in two ways. First method is by trading stocks. Since the price can change a lot, as mentioned before, investors can sell a stock at higher price that the one at which they bought it and make profit; of course, this can be done only if the attractiveness of the stock increases, otherwise it loses value and the investor incur in a loss.

The second way to make profit from a stock is with dividends. When a company issue stock, it can opt to distribute profit to the shareholders, in the form of dividend, that can be directly cash or can be other stocks. Companies that issue stock can opt to distribute profit in the form of a dividend.

There are two main types of shares : ordinary and preferred share.

Ordinary shares

Since this is the form in which most shares that are for sale are issued, ordinary shares are more prevalent than preferred shares. Voting rights are a key distinction between ordinary and preferred shares. Ordinary shareholders usually have a vote on business issues like the election of board members, influencing management and policies of the company.

Preferred shares

As said above, shareholders of preferred stock haven't voting privileges like the holders of common stock. Anyway, preferred stocks have some advantages too , for example the shareholders of preferred share typically get a fixed dividend with a priority on the shareholder of ordinary shares.
Another benefit is that in case of liquidation shareholders of preferred shares have the priority over the holders of ordinary shares.

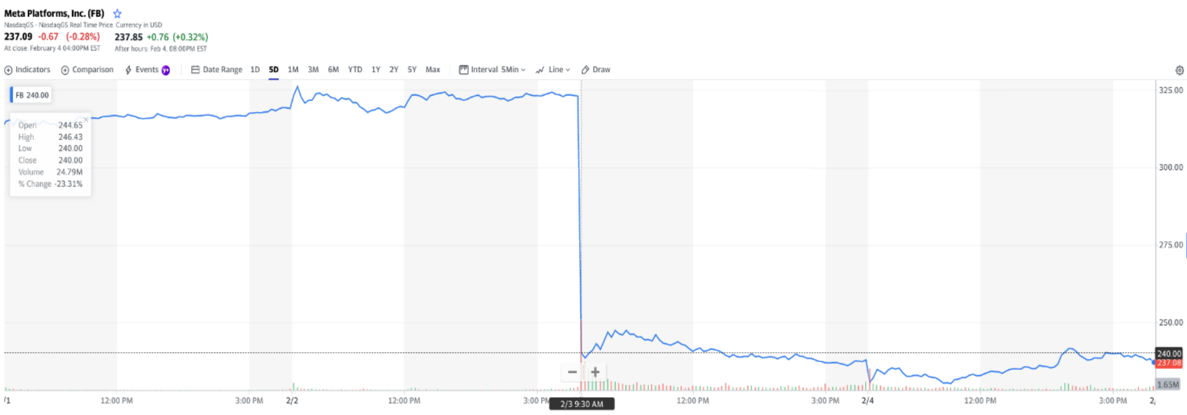
An important tool that works with the stock is the stock fund: investor can decide to buy stocks through an equity fund and not directly on the market; this diversifies your portfolio and your risk is diluted.

There are different pros and cons in investing in an equity fund, as a pro is that you delegate the choice of the fund to an individual that could have superior knowledge of the argument and more capabilities, the cons , on the other hand, could be that you have no direct power in the choices in the fund and you have to pay some fees in order to join the fund.

Similar to stock fund are ETF, which will be discussed in a couple of chapters.

Investing in stock is an activity that can be very profitable, but it has a lot of cons; as seen earlier, the fluctuation of the price is the main reason why this type of investing could be really positive or really negative.
There have been many cases of high rises as cases of big lost in little time.

Usually, it's recommended to not invest in stocks cash that you could need in short term, but a minor amount that you can lose without any financial problem; often high technological sectors see the highest rapid increase and rapid decrease; one of the biggest drop in the history was the one that happened to META on 3rd February 2022, which dropped of 26,4 % of its value in a day, as you can see in the picture below.



Picture 17 – Price of the Meta in USD(Resource 14)

Value Investing

An important investment framework linked to the stock market is 'Value investing'. It is a new-born strategy of investment that is based on the study of Benjamin Graham and it's really famous in the USA; the most famous investor that bases its decision on this investment is Warren Buffet, CEO of Berkshire Hathaway, which is one of the biggest holdings of the United States that has created its empire on value investing.

Value investing is a methodology of chose the investment , it consists in buying stock only when the ‘intrinsic value’ is below the market value and selling them again when the market value goes up again. Even if it seems a simple strategy, it’s really far from it, it requires years of personal experience and study; Buffet said that you need to know every little detail of the company you are investing in and, especially, you need to know how to understand them; this requires a really solid economic and financial background that most of the people don’t have.

But how do expert investors know the intrinsic value of the stock ? Share must be seen as owning a part of the business, so the investor must understand how the business performance are and how they will become, as Charlie Munger explained:<<You must value the business in order to value the stock >>, trying to value the business independently from the current price of the stock.

-Bond

The person who purchases a bond gives money to the "issuer" of it, who uses it to finance its activities, promising to return it at maturity along with interest.

The issuer, who gets the money at the start, can be usually a government, a company, a bank, etc. The ability to pay interest and recoup capital investments depends on the status of its economy in that moment.

Maturity is the term when the bond finishes or the deadline for the issue to pay back the money he received at the release of the bond; the term can be both short or long, depending on the type of bond issued.

The fee an investor charges to lend his money is known as interest, which is typically paid through coupons. It serves two purposes: first, to make up for the buyer's loss of a specific sum of money, and second, to cover the risk to which the buyer is exposed because the issuer might not make the money back.

There is another key element to know, the yield; it consists of the capital gain that the individual has when the security is bought for less than what it is sold or redeemed for. On the other hand, there is a capital loss if the bond is redeemed or sold for less than it was paid for.
The yield on bonds is reduced, also significantly, by trading fees and taxation.

There are two main types of bonds: ordinary bonds, divided in fixed rate and variable rate and structured bonds.

Fixed rate give back to the investor a constant amount of money which doesn't change over time.

Variable-rate, on the contrary has an interest which changes over time depending on market rates. If interest rates rise, these kinds of securities are unable to change their coupons, hence the price must be modified in order to adjust the yield to the new rate levels; on the other hand, variable rate bonds don't allow price changes to excess a limit, since the coupons are adjusted to the fluctuations of rates.

Structured bonds, as the word suggests, are not like simple ones, but are composed by two elements : an ordinary bond and a derivative contract ; the ordinary part may or not give the periodic coupon independently.
The performance of one or more financial or real criteria, such as indices or combinations of stock market indices, shares, mutual funds, exchange rates, or commodities, is made reliant on the investor's return via the derivative contract.

Bond have a high complexity to be fully understood and used. An individual must study all its structure to be sure to be able to use it efficiently; bonds are risky , like most of the assets; usually high interest is strictly negative correlated to high risk.
It should be noted right away that safety and profitability are typically mutually exclusive ideas: high interest means high risk, and, on the other hand, low interest means low risk.

There are different types of risk related to bond.
Interest risk, which it's correlated to the price of the bond; it shows that the price of the bond follows the interest rates changes.
Fixed-rate bonds are more vulnerable to this risk than floating-rate ones, particularly those with long maturities.

Credit risk is the danger that the issuer will go out of compliance (default)and stop paying the interest or the principal amount.

The credit risk is often calculated on the trustiness of the entity that it’s issuing it; for example, government are usually more trustworthy than companies , proposing bond with lower interest rate.

Furthermore, not all bonds for a same issuer have the same risk. In fact, there exist subordinated bonds whose coupon payments and principal repayments depend on the satisfaction of other non-subordinated creditors if the issuer experiences severe financial difficulties (or lower-ranking subordinates, because there can be different levels of subordination, to which correspond different levels of risk).

The risk of not being able to quickly and profitably (i.e., without losing money) sell one's bonds before they mature is known as liquidity risk. Unlisted bonds unquestionably have less liquidity in this regard than listed bonds.

When investing in securities with a value other than the home currency, there is a risk of foreign exchange due to the irregular nature of the exchange rate between the two currencies.

Bonds can be bought in different ways:

Primary market: Purchasing them directly as they are available to the general public.
Secondary market: Purchasing them from those who have already purchased them "on the exchange" when they become available.
If there is the need, the investor may sell their shares before maturity thanks to the existence of a secondary market. Without a secondary market, the investor would likely have to hold onto his stake until the asset matured before selling it.

In the last year, in Italy, individuals’ interest bond is decreasing, while the interest in stocks is increasing ; as Consob analysed (resource 27) the number of transactions for stocks were 34 billion, while the number of transactions for bond were about 2 billion; the data, showed a decreasing trend in the last year.

Rating

One important tool that companies and individuals have, in order to understand the affordability and to forecast the behaviour of the bonds, is the rating, which is a method that gives a rate to bond (or also to companies), that gives a score to the bonds that represents the risk of that bond to be insolvent.

There are firms that do this task, the most famous ones are : Moody’s, Fitch, and Standard & Poor’s, that have different ways of classification for the rating; for example, Standard & Poor’s classifies the bonds from AAA, which represents the total capability of the issuing entity to repay the debt to D, which, on the contrary, represents the total incapacity of the issuing firm to repay the debt.

-Option

Stock options are premiums that top management of a firm can get , after a good performance of the company; sometimes these options are not granted only to high management but also to employees or to the board.

Stock options give the individual who gets them a right to buy a limited number of shares of the company, usually there are also time limit, and the price is fixed. Option can be compared to American call options, which have an option expiration and a strike price (fixed price to buy).

The employee who receives the option offer, generally at or below the strike price, can realize a capital gain if at some time after the options are granted the stock price exceeds the strike price. Otherwise, the options lose all value.

The majority of stock option programs create different windows of opportunity when the individual can select whether to exercise his or her option right and buy the shares being offered at a set price.

There are three main phases:

the granting: the phase when the entity gives its employees the capability to buy the shares at a predetermined price and over a predetermined period of time in the future;
the vesting: time period that goes from the offering to the start of the period valid in order to claim the option right;
exercising: when the option is exercised.

The purpose of stock option is to urge employers of the entity to do their best, binding their private earning with the performance of the stock option.

The employee could eventually benefit from purchasing the shares at the original price if stock prices increase between the time of grant and exercise, perhaps realizing a profit from the difference between the two values.

-Commodity

The word "commodity" refers to raw material, a specific class of products that are traded on the market without distinguishing the items on their quality. To be more precise, they are so-called fungible items, which can be interchanged with one another in order to accomplish the linked requirement regardless of who creates them; this is literally the contrary of NFT, which are an innovative method of investment that will be analysed in the next chapter.

The word “commodity” has ancient root in the Anglo-Saxon world, but it comes originally from the French ‘commoditè’, which means convenience.

Commodities, like stocks, can be traded in the market and they can also be used as underlying assets for several financial investments , due to the fact that they are fungible.

There are mainly two types of commodities: ‘commodity bonds’, which are bonds whose principal repayment value and interest depend on the price of a commodity, and "commodity futures" that are contracts for the exchange of a precise amount of a commodity at a specific time and at a predetermined price that is established on the trading day.

There are several commodities in the markets, which differ a lot between themselves in size, use and quality, but they can be divided in Soft or Hard commodity.

In the Soft categories there are the products of the first sector of the economy, agriculture and farm; in the former part there are corn, oil , coffee, sugar and so on, in the latter part there are different type of meat, from pig to pork and so on.

The Hard category is linked to the second sector of the economy, the industry, which comprehends metals, such as gold silver or platinum and energy, such as gas, propane, and petroleum.

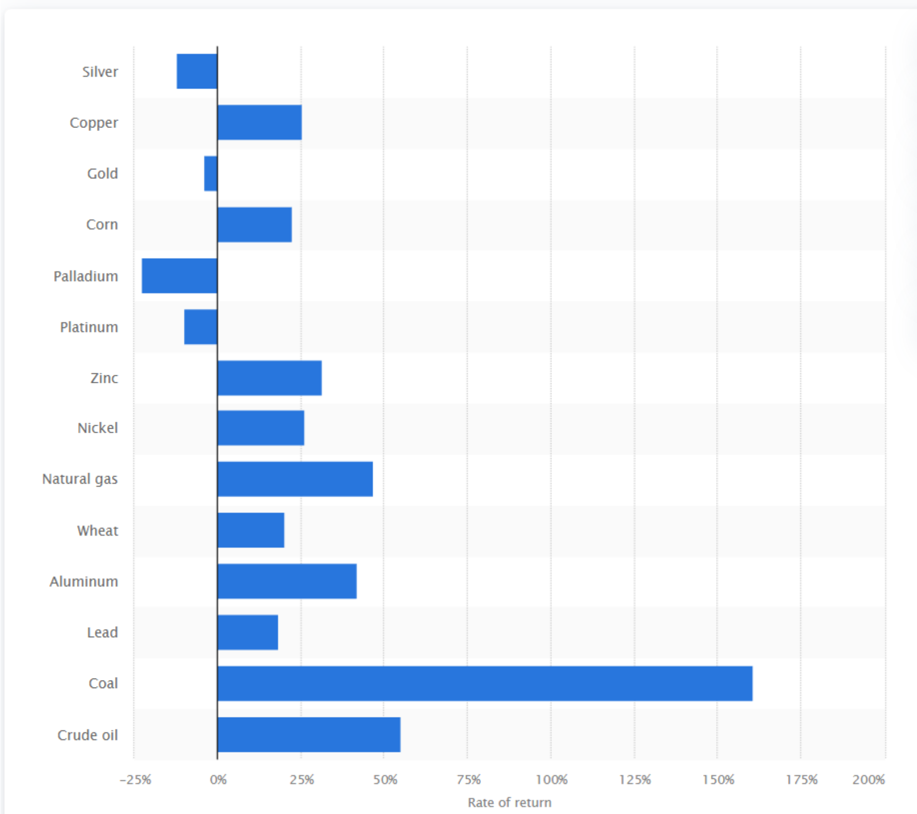
The United States, Asia, and Europe trade the most commodities.

The most significant markets in the United States are the Chicago Mercantile Exchange (CME), where a variety of products are traded, including futures (and options) on indices, currencies, interest rates, and commodities, as well as derivatives on economic indicators and patterns, and the New York Mercantile Exchange (NYMEX), which trades most hard commodities, like petroleum, oil and propane.

The Dalian Commodity Exchange (DCE), formed in 1993 and regarded as the second-largest futures exchange in the agricultural sector, and Multi Commodity Exchange (MCX), a private exchange with its headquarters in Mumbai, India, are two significant commodities markets in Asia. Trade is conducted in industrial/precious metals, oil, natural gas, seeds, and grains.

The European Energy Exchange (EEX), a regulated commodity exchange that owns and runs several markets for trading electricity in Europe, Asia, and the United States, is a part of the Eurex Group and is controlled by Deutsche Boerse.
The London Metal Exchange (LME) is where commodities like nickel and cobalt are traded.

As in any other type of investment, different commodities are not all equal, they have different rate of return. In 2021 palladium and platinum were the least profitable commodities, while coal and crude oil were the most profitable ones, as you can see in the next Picture.



Picture 18 – Rate of return of main Commodities (resource 15 – Statista data)

-Certificates of Deposit (CDs)

Certificates of Deposit is a restricted security that a bank issues in exchange for customer deposits of cash.

Certificates of Deposit are financial products that let customers invest money that they have deposited with a bank.
In essence, Certificates of Deposit are constrained securities that banks issue in exchange for a deposit kept in escrow and which give the client the option of receiving a refund (principal plus interest) when the bond matures.

Most experienced investors see the certificates of deposit as old and non-profitable, because the poor interest it gave in the time and because it's a tool that has always been discouraged by governments, having really high taxes. However, they can be profitable in some cases.

The term of CDs is variable, and it depends on the bank, it can go from 2 to 5 years, while the yield can be both fixed of variable.

In addition, the interest accrued and recognized to the client subscribing to certificates of deposit may alternatively be paid through coupons issued at a particular periodicity or in a lump payment at the contractual maturity.

The most important key features of CDs are:

-the initial invested capital is protected, it doesn’t lose value and the investor will receive the initial sum together with the accrued interest until the maturity;
-the payment of the interest at the end of the period of maturity can be chosen as a bond or as a periodic coupon;
-if a customer needs liquidity before the maturity time comes , it can take back the initial sum from the bank that will retain the interest paid until that day;
-bank that issue the CDs give flexibility to the investor, which can choose between different option and time frame for the bond;
- Interbank Deposit Protection Fund's guaranteed for each depositor.

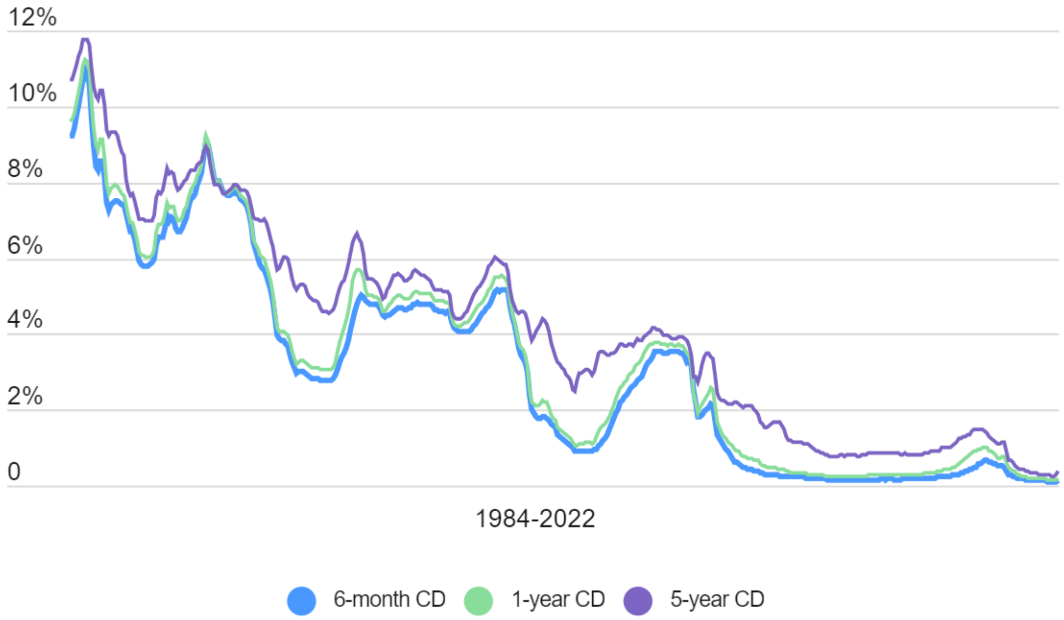
There are five different types of Certificates of deposit:

-fixed-rate, the principal is fixed and the return constant;
-fixed-rate with a final premium, like the first one but there is a sum given to the investor at the end of the maturity time;
-fixed-rate one coupon, the principal has a fixed rate and the interest in paid with a sum at the end of the maturity date,
-fixed rate increasing with recurring coupon payments,
-variable rate, the principal is not paid constantly, but it’s based on other indicators.

The biggest pro for individual who chooses to invest in certificated of deposit is the advantage that the principal is fixed, and it doesn’t depend on market or economy performance; also, since they are not listed, they are not exposed to variation like stock prices are.

Like what happened to commodity trading also CDs have been the target of taxation by the government; in the USA, for example the tax rate went up by more than 100% in less than 10 years.

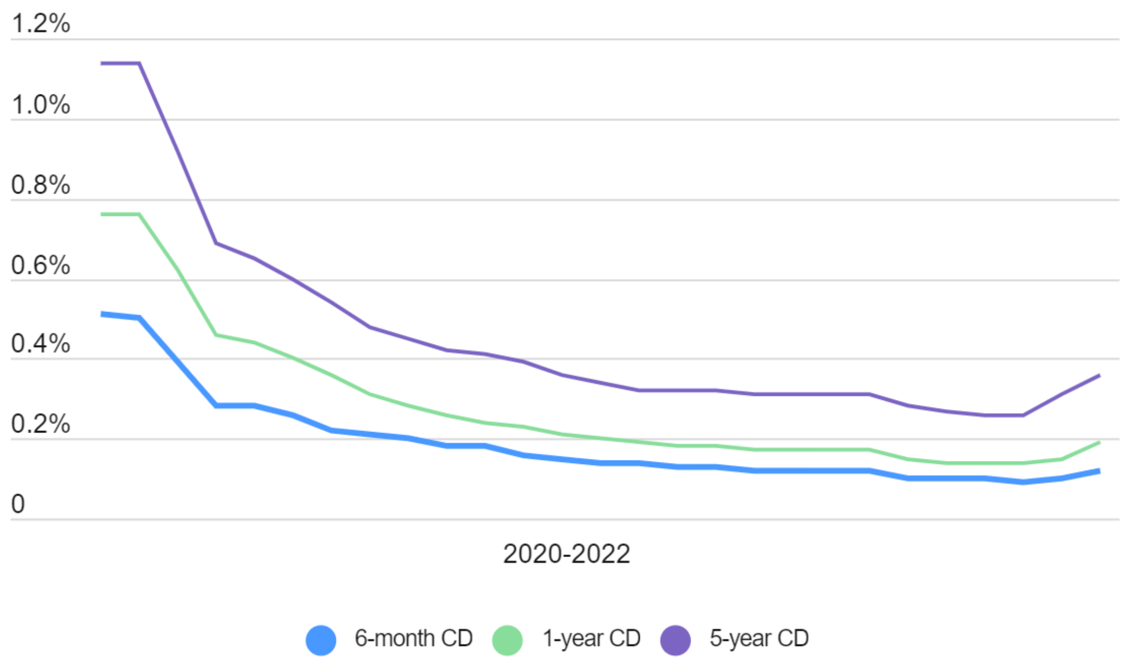
Because of the taxation the return the investors get from certificated of deposit has been decreasing, letting CDs lose a lot of competitiveness; CDs keep losing attractiveness year by year, how it's visible in the next picture.



Picture 19 (rate of CD 1984- 2022 in the US market- resource 16)

How it's reasonable the last two years that have seen COVID impacting every side of the economy has also impacted the rate of the CDs.

In these two years the rate come close to 0, as it's visible in the next picture.



Picture 20 (rate of CD 2020- 2022 in the US market- resource 16)

-Retirement Plan

Retirement plan is a long period investment plan that has as a goal the creation of a periodical income; the investor analyses the expenses that he will have after a certain period and it creates a future cash flow that could cover its forecasted expenses; usually retirement plan are the most chosen long period investment plan in modern society , they often present two phases : in the first one the plan is created, usually this coincides with the start of the work life of an individual ,here the goal and the savings of the plan are analysed and set ; in the second phase, which usually coincides with the end of the work life of the individual, the disbursement of the cash flow happens.

Retirement plan can be revised during the first phase, it mustn't follow the predetermined path necessarily.

Often analysing the retirement plan , the investor mustn't take in mind only financial aspect of the retirement, but also indirect choice of it ; for example it could decide to invest in an activity at the end of its work life , or he could decide to move to another country at the end, so every aspect of the future life must be accounted for a good plan.

Retirement plans differ from country to country, for example in Italy they are managed through an association called INPS, that automatically manages a pension for workers in Italy.

In USA it is common use to forecast as a good sum to reach 1 million $, which it's an amount of money that could let you live about 20 years in the average state of USA, not considering of course, the most expensive states, like California or NY.

Another simple method to calculate your retirement is the 80% rule, you need to accumulate 80% of your working salary for each year you plan to be retired; for example if you make 50000€ per year and you want to have 20 years retirements income, you have to save 800000€ (=50000*20*0,8).

Retirement plan in Italy can be divided in three categories: open pension funds, PIP (plan of individual pension) and closed fund, based essentially on who can apply them.

Open fund, as the name suggest, are for everyone, both employees or individual entrepreneurs; also, they are open both for individual or for entire group (often there are entities called 'unions' that represent the right of a determined work group).

Individual pension plans, or PIPs, are a particular type of retirement plan that can only be established by insurance companies. Individual pensions take the form of life insurance contracts even if they are actually pension funds and therefore must follow the same rules as normal retirement plan law. They distinguish themselves from the competition by only allowing individual memberships.

The third type of retirement fund is closed pension funds.
This type is opposed to the open plan, since not everyone can join it; it can be joined only under precise agreements and only by workers who are covered by the creators of the fund.

Retirement plan can be started from the early age, in some countries , like in USA, which have a really good financial literacy.

The key element of the success if individual investor chose to do it from early age is the compound interest, which basically indicates how interest increase exponentially in the time, so starting from the early age is essential to have an high final sum, even with little amount of money; if investor start saving early, the interest that they get becomes higher than the principle sum itself.

In the early 90’s an innovative method, similar to Retirement Plan has born: FIRE. FIRE, which literally means Financial Independence Retire Early is a movement born in 1992 that it’s based on extreme saving techniques and a clear objective: reducing every non necessary expense in order to build a sufficient money to retire the earliest possible and to live the rest of your life of passive income; usually, the recommended percentual saving is about 65% of the net salary.

There are different FIRE methods : Fat, Lean or Barista.

Fat FIRE is thought for people that don’t want an approach that it’s too aggressive and they just want an average lifestyle, including reasonable saving in their budget.

Lean FIRE is the most aggressive method, it’s for individuals that want to have maniacal control of their finance and want to avoid any type of unnecessary expense; a symbolic amount of minimum money estimated for this type of FIRE is 25000$, which is far away from the average salary in the USA.

Barista FIRE is the method in between, its objective is not an aggressive saving method but it’s a hybrid goal: individual want to quit their 8 hours job in order to switch to part-time job, using the savings accumulated in the years.

Even if FIRE is an interesting retirement method it has received many critics, especially it was criticized the fact it’s not a method for everyone, but it’s only for individual that reach a 6 figures salary; in fact, saving the 60/70 % of a salary is not feasible for average salary, even cutting every useless expense.

By the Way the creators of FIRE method insist that FIRE should not be seen like a goal to reach, but it should be seen as a technique in order to learn how to manage your finances; in fact, the main point of FIRE are detailed planning of all the personal finance and wise study of the investments.

-Mutual Fund

Mutual Fund are similar to stock fund, but if stock fund contains only shares of individual companies, mutual fund can contain hundreds of different financial instruments , stock, bond or any other asset.

A mutual fund is essentially a mean that take the money from some investors and use them to manage different financial tools. Usually, the individual that invest in the same mutual fund are precise targeted group; hardly the investors of a mutual fund present really important economical differences and preferences between themselves.

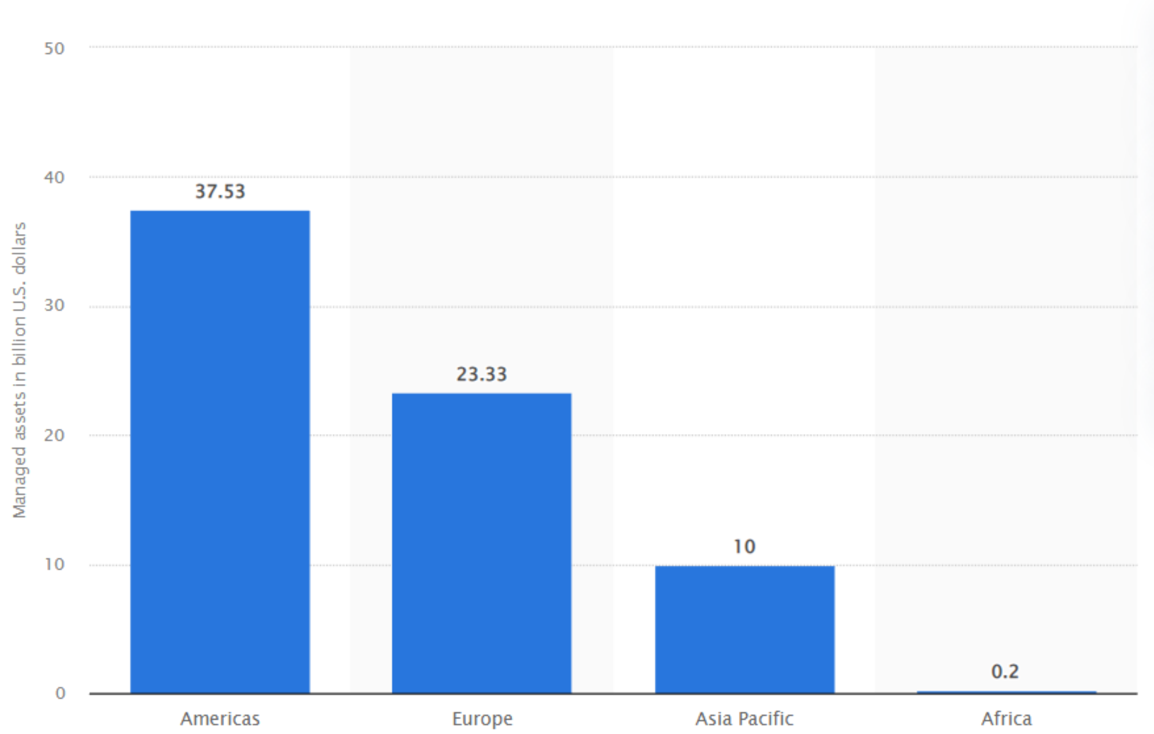
A big pro for the individual that chooses to invest in mutual fund is the differentiation they get automatically from it, in fact they don't need to have an high knowledge or markets or finance to create a diversified portfolio but they can invest in the mutual fund; of course, using an intermediary has some fees.
The investor pays a fee to the mutual fund, in order to be able to join it, usually the fees are on annual period and go from 0,5 % to 5% of the total money invested.

Mutual funds are based on analysts that search through the market and choose any final instruments or another mutual fund to invest in, following the goal and the strategy of the fund.

There are different laws and regulations regarding mutual fund in the international market, the most important ones are:

- Analyst must assure absolute transparency between market and investors , no information can have any spot of shadow.
- Fund cannot invest more than 5% of the money they manage in any one asset, which can be both a negative thing, where it would be possible to have higher profits, but it also can prevent from big and consistent loss to occur.
- Fund must avoid risky transactions; for example, it's forbidden for them to bet on 'short position'(when an investor sells a security with the will to buy it back) or, in general, to invest in any volatile securities.

Now, mutual funds are not an optimal way to invest, since taxation and law made it much less profitable than what they were, but they still have a big market going on; more than 70 billion $ of assets are managed, with Americas and Europe as the biggest spot; they respectively have37.53 billion $ and 23,33 billion $ in 2021, as it's visible in the next Picture.



Picture 21 – Assets managed by mutual fund in 2021 in USD (resource 17)

-Hedge fund

Similar to Mutual funds there are the Hedge funds, which in the last years have grown a lot as popularity, even if there are controversial opinion about them.

Hedge funds are a funds controlled by companies based on 'hedging', that is a technique used in order to cover the individual from potential loses for a position in a particular investment.

Every hedge fund is different from another one , since goal and strategy are never the same.

Hedge funds often follow a management strategy that try to maximise the return lowering the risk linked to the economy and the market variables.

Hedge funds are relatively new in the Italian legislation, also they had at the start a 200 cap of member number and 500000€ as a minimum investment; the 200-cap limit was removed in 2008.

One of the main features of the hedge fund is that stock that present a lower value than their real one creates value (like in value investing) and, it's true also the contrary with short position . This would protect the return from the status of the market in that moment , but it would focus the return on a real value increasing (or decreasing) of that business.

Another important element of the hedge fund is the leverage, often these funds use borrowed money to be able to invest more money than what they could afford, in order to maximize the return.

In the last year some hedge funds deviated completely from the starting point of use short position and leverage and tried to create a more complex strategy, using tools like derivative or swaps in order to have even higher return; for example some funds bet on the acquisition and mergers of the companies or some other fund bet on the performance of a currency , based on the event happening.

Hedge funds are instruments that are growing exponentially these years,
Hedge Fund Research has found that the total hedge fund market has increased of 400 billion $ from the start of 2021, reaching the exorbitant sum of 4 trillion $.

-ETF

In the middle between traditional investments and innovative investments methods there are the ETFs, which were born between the 90's and the 00's.

ETFs, which means Exchange Traded Funds, are similar to mutual fund, they have low management fees, but they are traded on a market, like stocks.
ETF is a tool with the main objective to replicate the return of other financial instruments, such as stock or bond.

It came also in Italy in September 2002, while after some years in USA; in the last years its market grew a lot and a lot of people started to invest in this type of instrument. Like stock, ETF value fluctuates a lot , also within one day, as it can be seen in the next Picture.

Symbol	ETF Name	Asset Class	Total Assets ($MM)	YTD Price Change	Avg. Daily Volume	Previous Closing Price	1-Day Change
QQQ	Invesco QQQ Trust	Equity	$166,399.00	-25.78%	74,850,120	$294.37	-1.96%
VUG	Vanguard Growth ETF	Equity	$72,814.90	-27.03%	1,463,232	$233.58	-2.08%
IWF	iShares Russell 1000 Growth ETF	Equity	$60,974.80	-24.95%	2,685,184	$228.63	-1.80%
IJH	iShares Core S&P Mid-Cap ETF	Equity	$60,002.70	-14.94%	1,656,990	$239.28	-0.54%
VGT	Vanguard Information Technology ETF	Equity	$43,549.80	-24.60%	813,460	$344.25	-1.88%
XLK	Technology Select Sector SPDR Fund	Equity	$40,831.60	-22.51%	9,984,830	$134.14	-1.62%
XLV	Health Care Select Sector SPDR Fund	Equity	$39,246.60	-6.21%	11,075,325	$131.18	0.51%

Picture 22 –volume of sales as 07/2022(ETF Database - resource 19)

ETFs have different key features:

Easiness to use: ETFs are passive instruments whose investment objective is exclusively to replicate the performance of the benchmark index to which they refer by allowing investors immediate exposure to the market of interest (equity, bond, commodity, etc.) or target strategy (short and leverage strategies, accessible through structured ETFs); also, ETFs can be exchanged real time like what happened with stocks, through the bank or external intermediaries.

transparency: ETFs must assure investors the full awareness about the risk and the expectations; also, the price must be real time updated on the main platform in order to inform the investors about its official value, often called NAV.

Versatility: investor can set their own goal and strategy , choosing the right ETF for them , letting them choosing also the time period they want to set the investment, which can be anything from short term to long term and from the very short term (intraday trading) to the medium to long term, also ETF can be traded in small portion , and not only in their totality; also they don’t have a maturity date.

Cost-effectiveness: ETF presents a really low management fee in respect to the return they can give ; for this reason, they are becoming one of the most competitive investments nowadays; also, they offer a really high differentiation portfolio for investor at a really low price.

Low risk: ETFs are legally completely owned by the holders , so the issuer bears almost no risk ,hence the assets of the ETF don't get changed if the fund has economic problems or goes bankrupt.

ETFs have different types which they can be divided in :

-stock ETF;
-real Estate ETF;
-currency ETF(ETC);
-commodity ETF;
-multi-asset ETF;

There are also complex ETF, which can put together more than on asset at the same time or they also can put together several indexes.

ETF, like other financial instruments can pay dividend to their holders and it works almost like stocks; also, the investor can choose if he wants to directly receive the dividend or if he wants to add the dividends on the ETF sum ha has invested in.

One of the most famous and controlled platforms where ETF is traded is ETFplus, where real – time instruments are traded , replicating the performances of several indexes or commodities.

Even if ETFs are increasing a lot in popularity and the investors are increasing daily, many experts are still not totally convinced in the opportunity that ETFs can bring; most of them, in fact, argue that they are only a speculative opportunity, not representing a real opportunity for the growth of the economy.

Anyway, this is probably not true, since ETF are not a stand-alone assets, but they are strictly linked to other real assets.

Chapter III:
Innovative Investment Methods

In the last years, digitalization has impacted every side of daily life; one of the most impacted worlds by technology is finance; a lot of new type of investments were born during these years, creating new and more competitive markets.
With financial literacy going up, a lot of young adults are approaching these new opportunities.
Most of these new investment options are still immature and are considered risky, but they are changing and evolving a lot lately.

-smart contract

Even if smart contracts are not a proper investment method, they are the base of most of the new investment frameworks that are being born these days; its key features are security, automation and non-ambiguity.

The scope of smart contracts is really wide , even if it has some flaws; it can be used in different kind of financial operation, from corporate transactions to intellectual property and trading goods; the most important usage smart contracts have , is in the blockchain industry, when smart contracts have developed the most.

Smart contracts are not contract in the strict sense of the word , but they are more like a sum of if->then function structure linked with an embedded software; for example if the there is a flight delay, a refund is sent to the customer ; if there is a bought on the site, the order is sent to the supplier and the info are sent to the customer.

There are different uses of smart contracts, for example the joint of engineers and lawyers that work with parametric insurance policies, based predetermined contract conditions.
An example is Etherisc, described by Francesco Bruschi, director of a blockchain department inside PoliMi as <<It is a decentralized air travel insurance, which operates on the Ethereum platform. The smart contract queries APIs (application programming interfaces, ed.) to get information about departure times and, in case of a delay of the flight guaranteed by the policy, automatically triggers reimbursement>>.

Software which manages these contracts don’t require much complexity, but the bigger is the platform that manages them , the higher security it gets.

Another use in the insurance world, as Salvatore Iannitti, a partner at Norton Rose Fulbright, says: <<Axa, the first major company to allow automatic refunds on credit cards for airline flight delays, has also moved, thanks to the Fizzy policy already active in Italy, which can be purchased via the web and is based on blockchain (Ethereum here too, ed.). And another example is in logistics, where the giant Maersk, with insurance companies such as Ms Amlin and Axa Xl, has launched a platform that leverages blockchain to certify the movement of goods between ports>>.

Many financial instruments are impacted by smart contract; an use can be found with swaps and derivatives, due to the fact that these smart contracts present a really high standardization and also have an high flexibility of the software code which they are built of.

One of the most important usages for smart contract is in the IoT world, where different component of the same system has no previous communication and trust relationship.

The biggest problem with smart contracts is that they present big technical-legal limits and high complexity is not possible; despite this some firms are actually working in making these kinds of contract as proper and legal ones, so they can be considered legally and not just as a secondary software instrument.

The most famous platform for smart contract is Ethereum and it uses, almost in every case, Solidity, which is a programming language that have some similarities with C++.

There are many reasons why smart contract has increased their popularity so much in the last years, one of them is probably the cost; in fact, they are much cheaper to enforce, since everything is digital and controlled by software and automatic processes.

-Cryptocurrencies

Within the new changes that technology is bringing, one of the most disruptive one is cryptocurrency, which has been the most discussed trend in fin-tech in the last years; crypto refers to the fact that the inside process of these kind of investments are not legible by non-authorized people and currency refers to the fact that this instruments has been conceptualized as a real currency; they are in fact like a virtual money that it’s exchanged only virtually; one of the most radical change in respect to the normal money is the fact is that these new type of currency can be exchanged peer-to-peer without an external intermediaries (like banks for traditional currencies).

A ‘wallet’ refers to a virtual wallet, like the real one, but with cryptocurrencies instead of real money .

A main classification of the cryptocurrency is the division between ‘closed’ and ‘open’ currency; the first method refers to a one-way transaction and it implies the impossibility to be exchanged directly with current currency; the ‘open’ type is like a two-way transaction and the crypto can be also exchanged directly for real currencies.

The element which the crypto is based on is the distributed ledger (or blockchain), which is a distributed ledger where it is safely registered the chronology of transactions between two peers.
Participants in the system are called 'nodes' and are connected to each other in a distributed manner.
The distributed ledger is basically a list of records , or blocks, which are connected all together; all these blocks are secured, thanks to the use of cryptography, which doesn’t let anyone not allowed to read the composition of these blocks.

By definition, a block's data cannot be changed, since a change would actually require a change in other blocks, but this would violate their nature of unchangeability.
The process to validate the security of the blockchain is really controlled and unbreakable, but it has a big flow, the consumption of electricity; all the required calculations for the crypto need a lot of data and time; this require an insane amount of electricity and generate an unparalleled amount of CO2; in fact, a single transaction using crypto creates as much C02 as one million transactions with visa transaction.

This process of calculation is called ‘mining’ and it’s one of the most discussed trend in the fintech community; since it had an insane impact of modern industry, mining is one of the reason of the silicon shortage in the world nowadays, since GPUs that are the best tool at the moment to process the calculation needed for the functions of crypt are made of silicon and everyone prefers to use their GPUs to make money by mining instead of their normal use.

Everyone can create a cryptocurrency; this is also one reason why there are thousands of crypts and a lot of them creating every day. In order to start a cryptocurrency, the first step is the ICO , initial coin offer, which is basically a fund-raise for starting the currency.

The ICO consists in the issuance of tokens through the distributed ledger technology (DLT).

These tokens which are given to the investors, who buy them with real money; sometimes ICOs can be also paid with other cryptocurrencies, such as Bitcoin which is the most valuable and stable one.

Since cryptocurrencies are relatively a new topic in the world economy, laws and regulation are still immature and they are not yet complete.

Cryptocurrencies actually are not a legal currency, almost anywhere in the world; in fact, almost everybody refuses it as a payment method, except some innovative firms that are accepting it as a normal currency; for a short period, one of the most innovative firm Tesla affirmed that you could pay its products with Bitcoin, which is the most popular cryptocurrencies today.

Cryptos are not centrally regulated by the governments , instead, they are controlled and regulated by the issuing company, which propose its own rules and regulations; in fact, not every crypto has the same regulation and the same law to be used.

Some nations are trying to use crypto as the official currency; for example, Venezuela that is having a hard time with its local currency due to inflation, has tried to issue a virtual currency, called Petro, thought to work as a proper currency; for example the government allowed citizens to use this crypto in order to pay daily services, such as public transportation.

Also in Europe, some countries tried to introduce the use of the cryptos, like Sweden with e-krona, which is a proper state-issued crypto.

All this power in the hand of crypto has attracted the attention of basically every sector in the economy; in particular, finance and banking are very concerned about them, since the transmission of money without any external intermediary could completely harm their business.

Almost every investment firm in the industry is starting to invest in this sector, since the potentiality is really high, and it could be disruptive for the world economy.

In fact, important firm, such as Morgan Stanley and Goldman Sachs have started to invest in the crypto world, as it's visible in the next Picture.

PROFILE/COMPANY	HQ	ASSETS UNDER MANAGEMENT	# OF INVESTMENTS	SIZE OF FUNDING ROUNDS AS A PROXY OF INVESTMENT	COMPANIES INVESTED IN
Morgan Stanley	New York, United States	$1,400B	2	$1,110M	Figment, NYDIG
Goldman Sachs	New York, United States	$2,000B	5	$698M	CertiK, Coin Metrics, Elwood Technologies, Blockdaemon, Anchorage Digital
BNY MELLON	New York, United States	$2,300B	3	$690M	Talos, Coin Metrics, Fireblocks
Commonwealth Bank	New South Wales, Australia	$785M	4	$421M	Lygon, Xpansiv, Gemini
citi	New York, United States	$2,291B	6	$215M	Talos, TRM, Contour, Blockdaemon, Amberdata
UOB 大华银行	Singapore	$1,450B	7	$204M	Kyro, Play It Forward DAO, ADDX, Assembly, Evrynet, Yield Guild, Jambo
HSBC	London, United Kingdom	$3,021B	1	$200M	Consensys
WELLS FARGO	California, United States	$1,948B*	2	$165M	Talos, Elliptic
KB금융그룹	Seoul, South Korea	$970B	8	$143M	Streami, Buysell Standards (PIECE), Xangle, Uprise, Kodebox, Lambda 256, Block Odyssey

Picture 24 – top banks investing in crypto (resource 20)

However, since cryptocurrencies are still in the initial stage of their evolution, for some investors, they could have the potentiality to completely change and rethink the way money will be stored and transferred.

Many regulamentations are taking places nowadays, but the situation is far from being completed, since there are different actors, privately and publicly, the scale on which these regulamentations should work is really wide; there are, in fact many opaque markets and systems that are really hard to monitor.

International organizations are playing a significant role in detecting and assessing the hazards posed by virtual currencies, in fact, organizations might undoubtedly assist in facilitating the process of adopting and improving regulatory rules at the national level.

The most important thing to do at the moment is the definition of worldwide standard, that giving the rules and law at an international level, could help the synergy between the cryptos, helping the market to become more regulated ,clear and efficient and also to reduce the danger of arbitrage methods.

There are thousands of cryptos today and everyone has their different particularities, but the thing they all have in common is the volatility, their value can have sudden increases over night, or it can drop near to anything in an hour ; the principal element that drives the price is the equilibrium of the supply and the demand.
This of course can attract a lot of investors who want to speculate on cryptos, but also, it’s not optimal for individuals who want a long period investment, since cryptos are new to the economy and there aren’t proof of their validity as a long-time investment.

One of the most symbolic events happened in June 2011: Bitcoin, after reached a value of 32$, due to a hacker that stole many accounts, dropped to a value of 1cent, losing all of its value; but this is not a unique event, in fact there are frequent ups and downs of its value, as it’s visible in the Picture below.

Picture 25 - Bitcoin value - end of August ' 22 (resource 21)

One important key feature of cryptos is the transparency; differently from our current financial system which manages the transactions through many intermediaries, cryptos have no one between the individuals who are making the transaction .

Another important upside of cryptos is that the crypto market never closes, it's opened 24/7 ,this allow investors to have fully flexibility on how to manage their time to invest in this market; this is totally different from , for example, stock market, which opens and closes at a predetermined time.

Finally, one of the most important characteristics of cryptocurrencies is that they aren't touched by inflation, in fact most of them have a cap, which can be normal or periodical, in order to limit the maximum amount of currency in the market and don't let it out of control.

Since the technology level that is involved in cryptocurrencies is really high, people who have not a good knowledge of the technology could have high problems in completely understanding the functioning of this investment; furthermore, investing in crypto is not so immediate, you need to have a base knowledge of the current technologies in order to manage your wallet of currencies.

Even if the technology behind crypto is totally secure, people who are not literate about crypto bear many risks, for example they could banally lose their private key that allows them to fully use the cryptocurrency, of they could be victim of informatic frauds , such as phishing or hacking.

One of the biggest problems of cryptocurrency is scalability, in fact many experts say that blockchain has already reached its limit , the transactions are becoming too many to be fully processed and their speed, which is one of their most important characteristics cannot be guaranteed anymore.

At the moment Bitcoin is the most valuable and famous crypto in the market but for an investor Bitcoin is not always the best option; for example, one of its biggest problems is the management of a high number of transactions.

Other currencies could have some upsides, for example some crypto have a better management of the volatility, allowing from a side, to not lose too much money in a short period, but on the other side blocking investors to gain a really high value.

Another strategy is for example the environment management, some currency proposes more sustainable internal process or a particular interest for some social problems.

-NFT

NFTs, which means Non-Fungible Token can be seen as a unique digital asset stored on a blockchain ; they are an innovative instrument in the financial world that basically consist in a sum of automated processes that are setup together with the smart contracts.

One of the most innovative things is that the investor can directly buy them, there is no need for other intermediaries; this makes it one of the most appealing instruments that young investors are preferring these days.
Buying an NFT doesn't mean the investor properly owns it, but they have a right over it, using a smart contract that is incorporated on the blockchain.

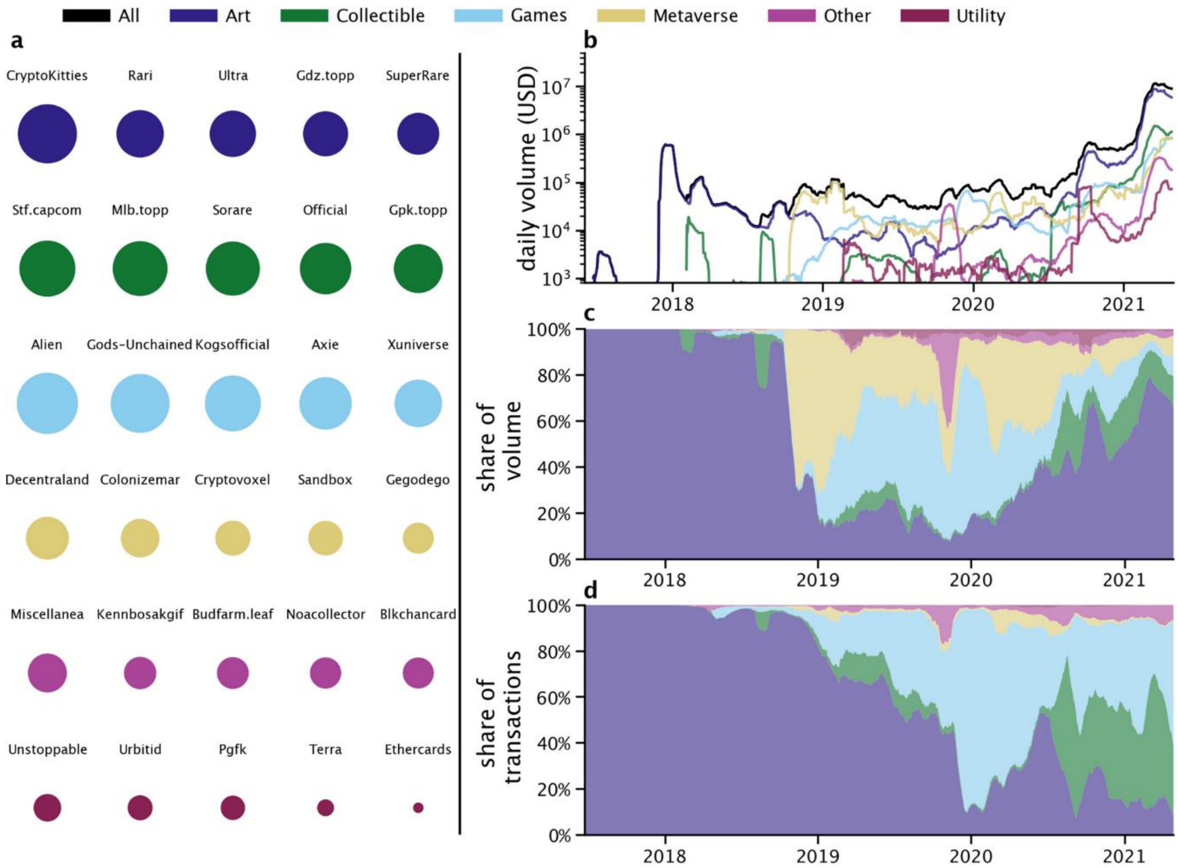
The digital asset which you want to create as a token makes the NFT one of the most customizable investment an individual can choose. These tokens have a really wide field of applications, for example they can represent a song (many artists have released lately some of their track as 'NFT' which is a different market strategy than just put the song on Spotify), a picture or any other intellectual work.

One of the most used approaches for NFTs is the authentication of product, in fact thanks to the NFT technology the product you are acquiring can be certified as unique; this could partially solve the problem of piracy that it's spreading day by day in the daily online trading.

One odd use could be with food, in fact this technology could help authenticate all the manufacturing process of the product, maybe using a QR that link you directly through the information page.

Another sector that NFTs have joined is the Real Estate; NFTs can represent a perfect opportunity to have a really fast way of financing.

NFTs are being used also as gaming tokens, representing a unique content in the videogames; also, they are used as financial tool, from invoices to bills; in short, the NFTs are joining basically almost every aspect of nowadays economy, like it's visible in the next picture.



Picture 23 - NFT overall view (resource 19)

One of the reasons why some NFTs are so expensive is because the possibility they have in the Metaverse, which is like a virtual universe created by Meta, the same firm as Facebook.

One of the biggest key features of the NFTs is the variability of their value, some NFTs have been bought for an insane amount of money, right before losing all their value.

One of the biggest features of NFTs is volatility, since they are a new instrument, they have many sudden value changes; as the math professor at University of London said Andrea Baronchelli said :

<<What we observed is that there is this gigantic heterogeneity in the success of NFTs[…]. Some, very few, do very well, a bunch do decently, and the majority are worthless>>.

This is also the main reasons why a lot of investors are sceptical about this type of investment, at the moment NFTs represent an interesting investment opportunity but their risk is still really high.

The highest paid NFT is ‘The Merge’ by the artist Pak, which currently has a value of 91.8 million $ and it is actually a fusion of more than one NFT.
The second most valuable NFT is ‘The first 5000 Days’ that has a value of 69.3 million $.

Other NFTs that have a very high value are the CryptoPunk ones, some of them have been sold from more than 20 million $; the most valuable one is the CryptoPunk#5822, bought for 23.7 million $.

Since NFTs are digital assets, in case the original work is a physical one, a virtual version of the work must be created virtually; the NFT structure essentially consists in a sequence of binary code; after this, the sequence is translated into an ‘hash’ which is like a unique identification for digital items but protecting it from recreating it from scratch.
The sequence composed by the binary code create the blockchain.
The NFTs are based on cryptocurrency, so in order to buy an NFT the investor must own a crypto portfolio, which can be created on different online platforms.

Many of NFTs are transaction free, while most of them have a transaction fee to be paid in order to be purchased. The most well-known NFT trading platforms are Open Sea and Rare.
As said before, NFTs are sold through online platform and most of them are sold through an auction: an interested investor proposes a bid, when the time is expired the system automatically send the NFT and all its info to the winner and manages the transactions.

-AI based investment

One of the most innovative investments methods that are born these days are the ones based on AI calculations.

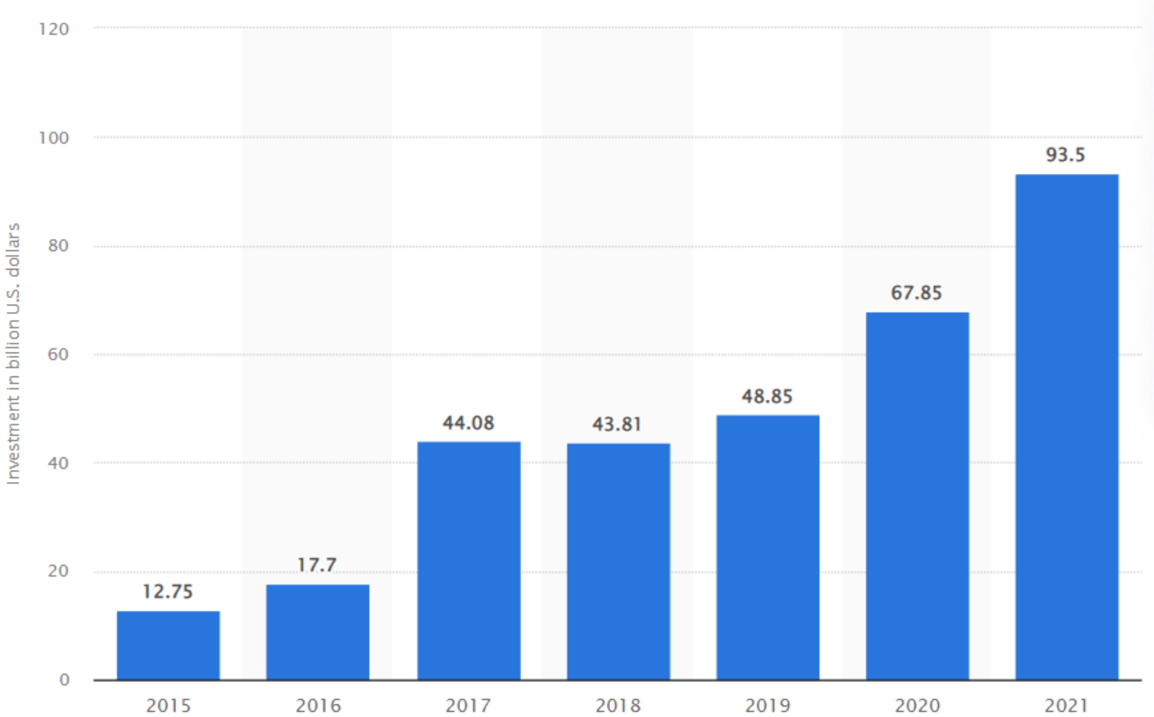
AI, or Artificial Intelligence, refers to software created in order to replicate the reasoning of the human brain; in particular AI should be able to interpret every variable in the environment that it’s analysing and propose a solution to a pre-determined problem.

Since AI presents an infinite possibility of evolution, every government is trying to regulate it; for example, EU proposed a risk-based approach that divided the risk that AI implies, from absence of risk to unbearable risks; the AI, in fact, must be always trustable and it mustn’t present any bug.

A lot of investments have been made in the last year by company that have understood how important AI in business is, in particular most of the investment are related to software that help business to forecast the behaviour of the market; also private investors have put money on it, in particular investing in software or companies that help them take the best possible decision for their personal finance.

The utilities that AI brings to the management are different, such as better relationship management or the capacity to reach the right client by analysing the different datasets and every possible sources, such as social media.

It’s clear that the personal investment are a small part compared to the corporate investment that in the last years has seen a daily increase of the total amount invest, as you can see in the Picture below.



Picture 26 – Total corporate investments in AI (resource 22)

One important tool in this field is Robo Advisors, which are older that AI, they aren't proper robot, but they are software that combining complex maths and algorisms help customers to manage their finance and chose which instrument to invest in.

With the coming of AI, Robo Advisors have been updated, now they can use also AI and machine learning; this, as showed by a Forbes Article (resource 28), has helped with the efficiency and transformed RA in a much more time-effective tool.

One of the main differences between the Robo Advisors and the standard AI software offered to the investors is that Robo Advisors often present a very direct approach and often take decision by their own, not required a human interaction.

One of the most innovative firms in the sector is Wealthfront that has chosen to base its client consultancy 100% on software-based decision, as their site expressly says <<Wealthfront delivers all its services, including financial planning, investment management and personal banking, exclusively through software>>.

According to what Wealthfront site says, they have a really innovative use of AI for their decision processes; in particular, the client is asked to fill a questionnaire and trough AI, all the results are analysed to create a custom investment portfolio; also the AI algorithm studies the behaviour of the investor real time, proposing him tips and advices on the management of its wealth, such as investment in stocks or ETFs.

They base their decision on cost minimization, in fact the fee that Wealthfront requires is only the 0,25 % with investment bigger than 5k$, which is much less than the 1% that people who propose human or hybrid consultancy ask.

This strategy hasn't worked so much until now, since the revenue of Wealthfront in this segment haven't grown so much; the reasons could be several, for example the clients expect a more user-friendly layout for the application helping them in the investment or maybe they don't trust a software-based approach and prefer a real person to advise them.

Another important tool is the Personal Advisor Services (PAS - Vanguard), which is a platform that offers safe return in the long run and low fees; this platform is based on robots that give advice on the investments, mainly ETFs and stock funds.

PAS functioning is like the approach of Wealthfront , but it uses less AI and a more mathematical approach; after the survey has been done to clients, the software translates the answers in data, which put together with a risk of analysis compose possible investments decisions that are proposed to the client.
In fact, PAS doesn't automatically make decision , but proposes the best option to the client that will choose which path to follow.

Since PAS has a low risk and a low reward approach, it's often used by people that want to create a really long investment plan, like what happens with retirement plans.
One tool that is used often in this process to analyse the investment is the MonteCarlo analysis which is an iterative process that simulates the behaviour of a determined pool of individuals (clients in this case), dividing every one of them, based on the simulated rankings. Together with the IT tools, PAS has implemented also a human interface, differently from Wealthfront tool, which ,of course, presents a fee slightly higher than the only-AI approach.

Probably the human interface is the key feature that led Vanguard to be one of the most important players in the sector.

One important firm that is joining this sector is Morgan Stanley that worked on Next Best Action System in the last years.

This system uses AI to choose the best investments suitable for a client , but how happened for PAS, also for Next Best Action System, the human interface hasn't been left out but it has been made an integral part of the system, as the chief analytics officer Jeff McMillan said: <<We have a very sophisticated machine learning algorithm to identify topics of interest to clients. But in the end, financial advising is a human-based game. If all the system does is remind them that the adviser is there and looking out for them, that is often enough>>.

Another thing that McMillan said is that financial advisors are not obliged to use the AI approach, but looking at their internal results, AI based approach are more efficient and have an higher customer satisfaction value.

A peculiarity of the AI application is the differentiability and the customizability; in fact, every AI is made by different creators, following different rules and chasing different objectives; for this reason, the market cannot yet decree a better AI over another one, since they are different and have different purposes.

AI has been used lately also in the stock trade; a lot of companies are born that through machine learning invest on stock trade.

One of these companies is Trading Technologies that trough its platform allows the client to build ad-hoc algorithms based on its preferences and choices, allowing also the user to automatically manager its stocks.

Also, in the crypto world there are companies that are using AI in order to forecast the market, such as Intotheblock, a Miami based start-up that predict the crypto value changes by using AI and deep learning.

-Big Data based investments

The insane data creation and growing technological complexity continue to influence economy and how companies compete between them. It's estimated that more than 2 quintillion bytes of data is generated daily. The management of this enormous amount of data and the numerous tools that are being born these days compose the world of 'Big data', that has the objective to extract knowledge and facts from a big pool of data.

Every aspect of the business is being interested in the Big Data world in the last years, from health care to finance, that seems the segment where Big Data are taking over the most; trough algorithms and big data a lot of companies are proposing new financial models that promise to maximize the return from the investments.

Big Data has 4 main characteristics : volume, variety , veracity and velocity.

Volume means the quantity of the data that are stored and analysed; when the volume becomes too much the risk is to not being able to handle all of them and also to not recognising 'junk data', that could be for example, wrong data or duplicates.

Velocity is the rapidity of the tools to store and analyse data; some platform can guarantee the real time updates of the value, offering the most precise result possible.

Variety refers to the number of sources of the data; some data can have trustable sources and have a proper structure while other could be completely detached by relevant sources; in this sense, Big data are divided in structured and unstructured, where the first refer to data that come from recognizable sources, while the second type are not .

Veracity is about the reliability of the data; all the data analysed must be only from trustable sources and must be also updated at the right time.

Some experts also think that BD should have other two properties :variability and value.

One of the most important tool that Big Data has created is the 'algorithmic trading' which is an automated method that allow computers to trade at an insanely high speed, calculating the best options in the least possible times.

Companies can use these algorithms to order all the data they have and create a good strategy based on their previous situation, reducing the risk to the minimum and discarding data that have no real value.

Usually, this approach is very good for long term investments as Model Portfolio theory suggests but lacks possibility of high return in the short period.

One big capability of Big Data is the real time introduction of the data, in fact info like the ones on social media or news can be automatically introduced in the forecast algorithm.

Big Data has different pros and cons; the biggest pro is definitely the forecasting capability that this method has, that can be used in every part of the economy.

For example, through Big Data, a firm can forecast the sales of the next semester or the expenses it will have.

Another big pro is that decisions are not influenced my human emotions and human mistakes, so their structure is intrinsically less biased.

One of the biggest cons is the technical complexity of managing an high number of elements; in particular with financial services where the complexity of the data and the quantity of it is really wide, the analysis technique must be really well structured; in particular noise is a problem for this kind of analysis, some patterns could emerge randomly, being mistaken for statistical meaning data; this is another reason why this kind of investment is better for short period, since in the lost period noise is more easily reducible.

Another big concern for Big Data is the privacy; in fact, colleting some sensible data is not an easy task, many governments have strict regulamentations on the collection of these kind of data and don't allow companies to use them.

There are different ways for the Big Data to be used, for example often Big Data is used with AI in order to propose a really detailed analysis of an investment.

Another way Big Data is used is trough audio-based data, in fact there are many legal tools that allow to collect audio data and translate them in usable data; for example, the device Alexa, by Amazon, can register any info it listens legally, since in order to use it, the client must agree to the data collection.

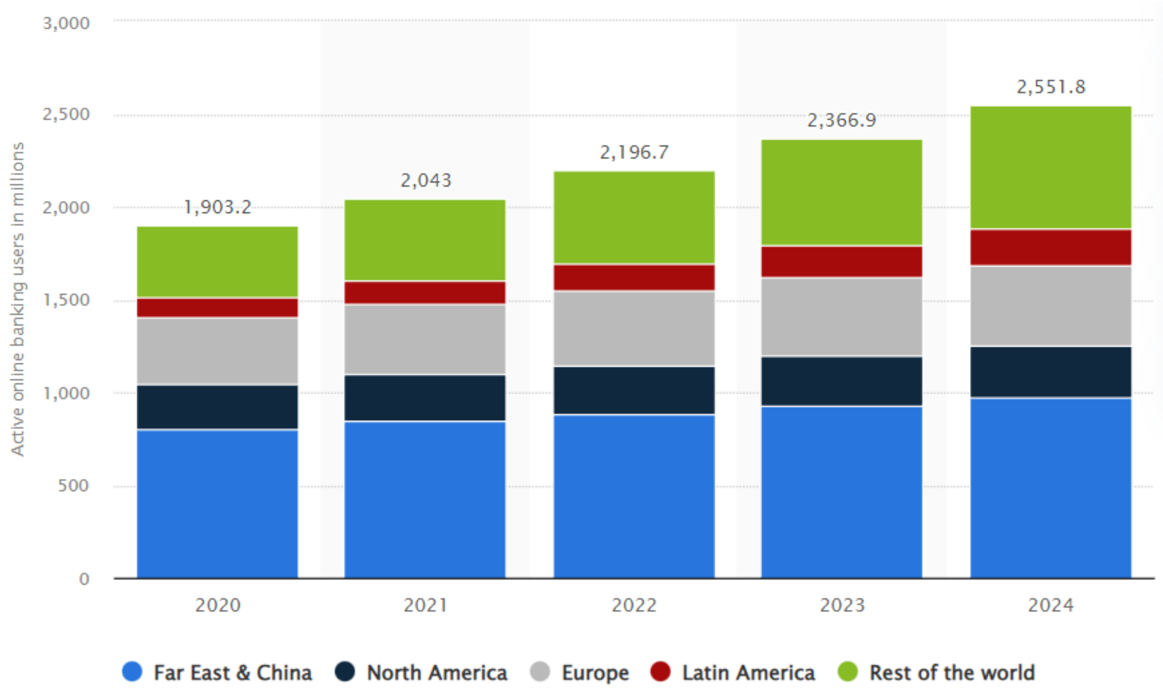
Another use that can be done with Big Data is trough database, in particular there are some tools that with the creation of a big data storage propose a strategic analysis that can be useful in order to choose the right investment.

One big synergy that Big data has, is machine learning, which can become a really important tool to help forecast the changes in the market and to understand which trend will be the most important in the future; in particular this machine learning approach can be really useful for someone who follows the value investing strategy, since thanks to Big Data and ML it's easy to predict the value of an investment.

Chapter IV:
Pros and Cons of Digitalization

Digitalization has recently changed the way the individuals get financial information and the investments that the individual can made, as seen in the previous chapters; the event that changed everything was the born of internet.

Basically, every financial aspect of the life of a person has been influenced by digitalization; digital platforms, in fact, are being preferred day by day for these services; for example, a recent study by Statista showed how more than 70% of the UK population has preferred online banking to the traditional one, especially using their smartphone; basically in every continent this number has increased and it will increase in the future, as it's visible in the next picture.



Picture 27 – online banking users (resource 24)

Digitalization cannot be seen as only a negative thing or a positive thing , but it has both pros and cons.

PROs:

- Financial choices can be done at any time

Nowadays that everyone has always a device connect with internet, there is a huge amount of platform that lets you manage your money on the go, there are tons of sites and application where one investor can choose how to invest its money; in the last few years many platform that let you trade stock really easily are born.
This is really a pro especially for people who work long hours and have unusual time windows to analyse and manage their finances, or maybe people that have daily commute or are just in travel, they can optimize the time analysing their investment in the meantime.

Also, this influences the communication between places that have different clock time; for example, in stock exchange there are many difficulties in the communication between nations like Japan and USA that have more than 10 hours of difference in time clock.

- Rapidity and easiness of use

The digitalization has made the management of our finance and our investment instantaneous; in fact, if you needed to book an appointment with an investment firm or maybe just go to the bank to make choices about your finances, now you can do everything online in just some click, this has saved a lot of time to every person.
Rapidity is not a pro only on the client side, but also from the point of view of who managed the transactions, nowadays a lot of transactions are done instantaneously; some applications like PayPal let you transfer money to another person into a blink of an eye.

Also, the easiness of use has become an important factor, in fact often online platforms for investment or also online banking applications are really simple to understand; this is different than the past; you hadn’t direct access to the platform that managed your investment, and the paper were much more complex than the apps available today.
Easiness of use refers also to the fact that with the application today you can manage your money better, there are a lot of tools that let you divide every

expense you have and understand if you're over budget or under budget; also some applications set you limits on the money you can use every time period, helping you to manage your money better .

- Security

Online platforms are, generally, very safe, since they have to respect many standards in order to be running to the clients.

Also, in order to access the data, you need to have different methods of authentication; the essential ones are an ID, which is a unique set of character that identifies you and a password, which lets only the individual that have it to access the platform.

In the last years security has become always a more important thing, in fact a lot of other ways to secure your authentication were born, like a pin linked to the app on your device or an OTP password, which stands for One Time Password and it's a password that it's given on your device, such as your smartphone that let you type the password and enter the account; also pre determines security question are a tool that It's often used. Another important tool is the 'captcha' , which is an instrument that generating a random text or a random pic, proves that you are human and not a bot, which usually is a tool that hacker uses in order to force the accounts.

- Trackability

With digitalized platform, every time some money is moved from an account to another one, this transaction is registered into a ledger, not allowing people to hide their transactions; for example, this could help a lot of tax evasion, which is a very big problem in many countries, with Italy as one of the most problematic one.

- Cost

Usually, costs are cheaper through online apps and platform, a lot of companies are developing method that let you trade money with your peers with no fee or sometimes very low fee; lately an Italian company has launched Satispay, which it is a service that lets you give and receive money with no fee.

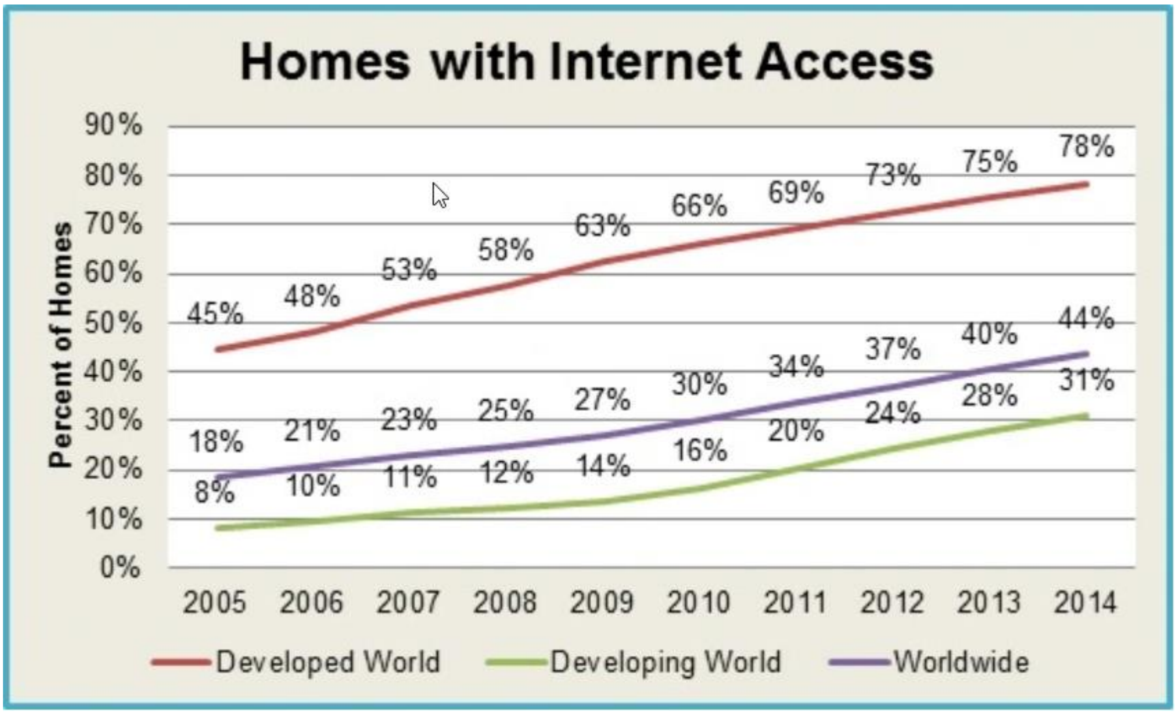
There are many ways digitalisation has helped reducing cost, for example the operation cost of digital transaction has been decreasing a lot, coming near to zero for the customers. In many countries, like China (resource 42), almost every payment is done electronically nowadays, since it's not only cheaper but it's also more efficient. There are many empirical proves of this cost reduction, for example a report by The Economic Times(resource 44) joint with one of the biggest consulting firms found that many developing countries, India specifically, could reduce the transaction cost up to 50 % if they redesigned their systems digitally.

There are also other types of benefit for the digitalization, like reduced queue lines in banks and reduced physical documentation (resource 45).

- Democracy

Access to investment possibility and, in general, any economic activity, has been until some year ago an activity limited to a niche, not everyone was able to do it; there were many people who had not the possibility to join this world, mostly due to lack of accessible information, lacking the tools and due to discrimination.

With the digitalization more and more people have access to internet , so it's easier for people to get info financial choices, plus almost everyone can access online platforms nowadays, reducing the social and economic gap between people from different part of the world; before this in a lot of regions of the world you had no possibility to become economical active and more financial conscious, the so-called 'non-bank' people. In the last years the homes equipped with Internet Access are increasing a lot, as showed by Brookings Institution in the picture below (resource 32).



Picture 28 – homes with internet access (resource 32).

One of the most important tools that was born in these years is the crowdfunding; there are many sites that allow you to post online a business idea and basically trying to ask to random people that believe in this idea to finance it.

In particular one of the most successful platforms for crowdfunding is Kickstarter, where basically people that have an idea for a project post a video about how their product or their service should work and try to give the best reason to catch some funds.

Linked to democracy, the digitalization has facilitated also the globalization of small firms; in fact, with the nowadays technology a lot of small firm can have access to global market, giving them much more opportunities than previous years, as analysed by International Institute for Applied Systems Analysis (IIASA) in a research (resource 31).

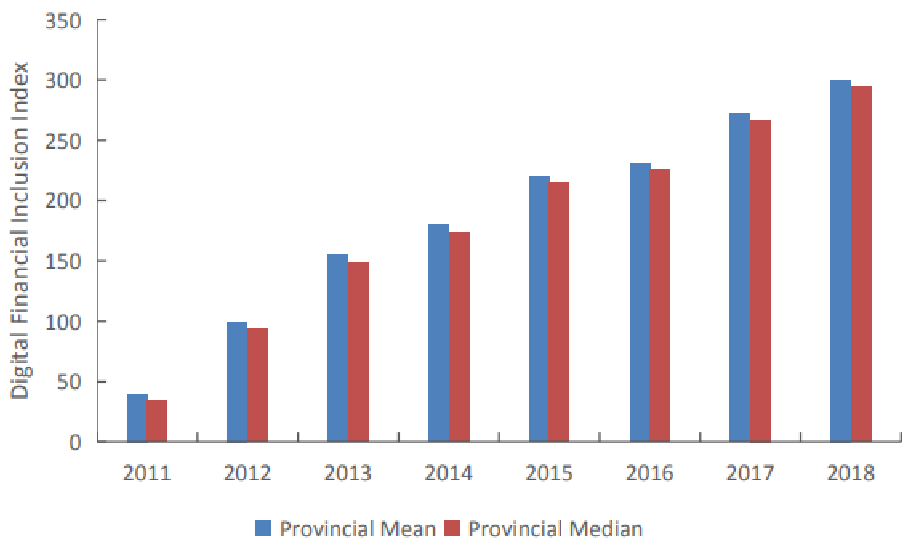
Another point that IIASA analysed about the democratization of the digitalization is that the ICT price has been reduces in the last year, helping small investors and small companies to invest in resources that can be consulted online.

The Democracy factor is one of the most important for developing economies, like China that is having a insane growth in these years. There are many papers that analysed this event, in particular resource 38 and resource 40 analysed some index that studied the digital inclusiveness of the finance in China, in particular comparing China Family Panel Studies (CFPS) and Peking University Digital Inclusive Finance Index of China (PKU_DFIIC), studying in different test groups how the growth of the Chinese households' incomes were correlated with the increased digitalization level of them.

From the analysis of the statistics(resource 39) of this paper, it emerged that two were the most important factor in the digitalisation revolution: internet increased the group of people that could work with it and, on the other side, increased the work time done on internet per individual.

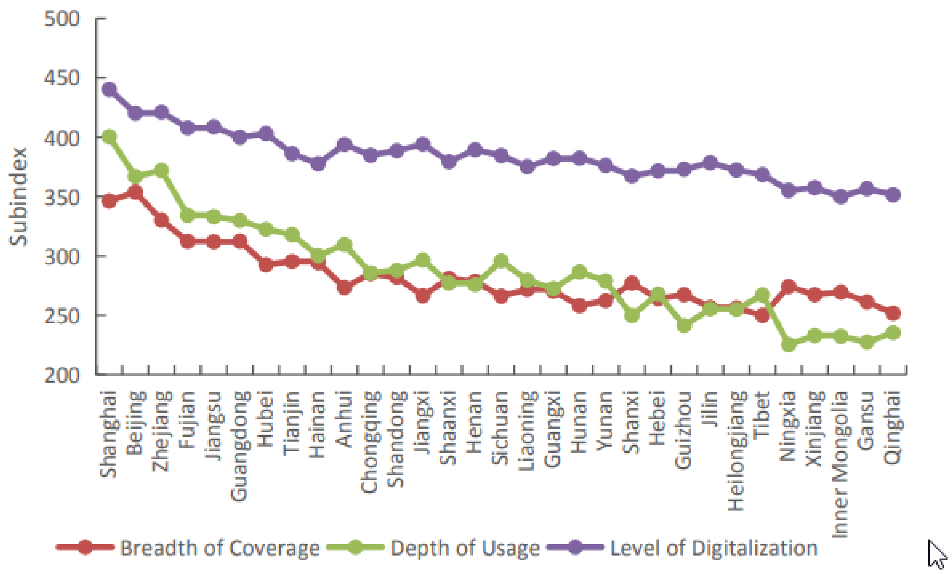
Furthermore, in this data it was analysed that with an increase of 1 unit of digitalization level (based on coverage, depth and degree of digitalisation), the households had an increase of income by 0,71%.

The level of this index has been increased steadily since 2011, as it's visible in the next Picture.



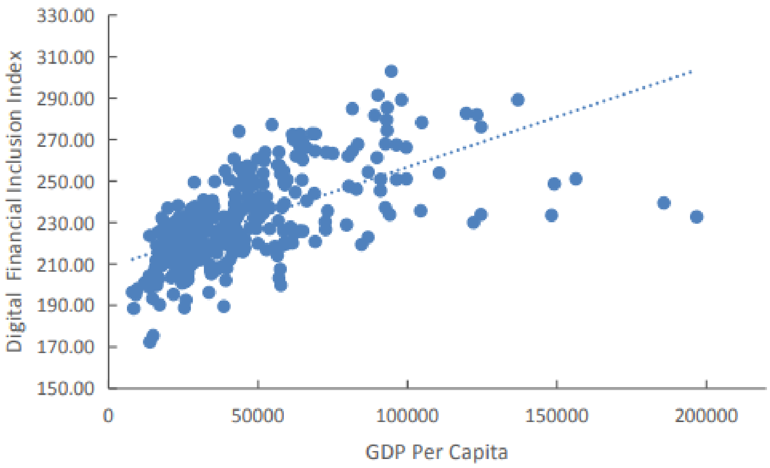
Picture 29 – level of Digital Financial Inclusion Index(resource 40)

In the end, this studied confirmed what already was forecastable with Europe, the digital transformation has a good impact for every worker in all the economy, but especially it has a very high impact on low skill workers, basically the ones in the first two sector of the economy and workers in the less developed area(resource 41); richest region in China remain the one with the highest level of the index, as showed in the Picture below.



Picture 30 – level of Digital Financial Inclusion Index with Subindexes in 2018, divided by region(resource 40)

Even if there are some outliers, the positive correlation between the index and the GDP Per Capita is clear and visible in the Picture Below.



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Picture 32 – level of Digital Financial Inclusion Index and GDP Per Capita (resource 40)

Furthermore, there are several papers (such as resource 43) that insist on the possibility for the digitalisation to reduce the poverty and the gap of the households' income power; this study not only wants to demonstrate the possible poverty reduction that digitalisation brings, but also it enlightens how many possibilities of financial investment the householders gain, impacting also on the social equality of the society.

Transparency

Even if this is not a solved problem today, digitalization has brought more controls and more laws to respect in order to propose a financial investment to an individual; in the past in fact there were many firms that had questionable behaviour, one of the most famous event was Panama Papers, where a lot of famous political and economic people were involved in the trading of shady financial assets.

A lot of tools have been created in order to analyse the financial instruments, plus, the online banking platform have almost a total transparency over the proposed investments.

- Flow of money

This is probably the most important factor, since it affects the economy the most. Since digitalization has led to a cheaper and easier way to invest and to trade money a lot of new people have joined the finance world, increasing the active number of users in this sector exponentially; this has led to a more diversified and especially a bigger economy; also, it gave the opportunity to new kind of products to join the market.

This could help a lot with the rebalancing of participants' age, which is one of the most problematic sides of the household investment management; as it's clearly shown in the Guiso study (resource 9): <<participation in the stock market is limited at all ages and tends to follow a life-cycle pattern>>.

In particular, digitalization could help especially young people to understand the importance of financial literacy, increasing the overall percentage of people that take an active role in investments.

Furthermore, the increased money flow in the finance world is not limited only in investments and money, but it affects basically every other aspect of life, from health to education.

Cons:

- Flow of money

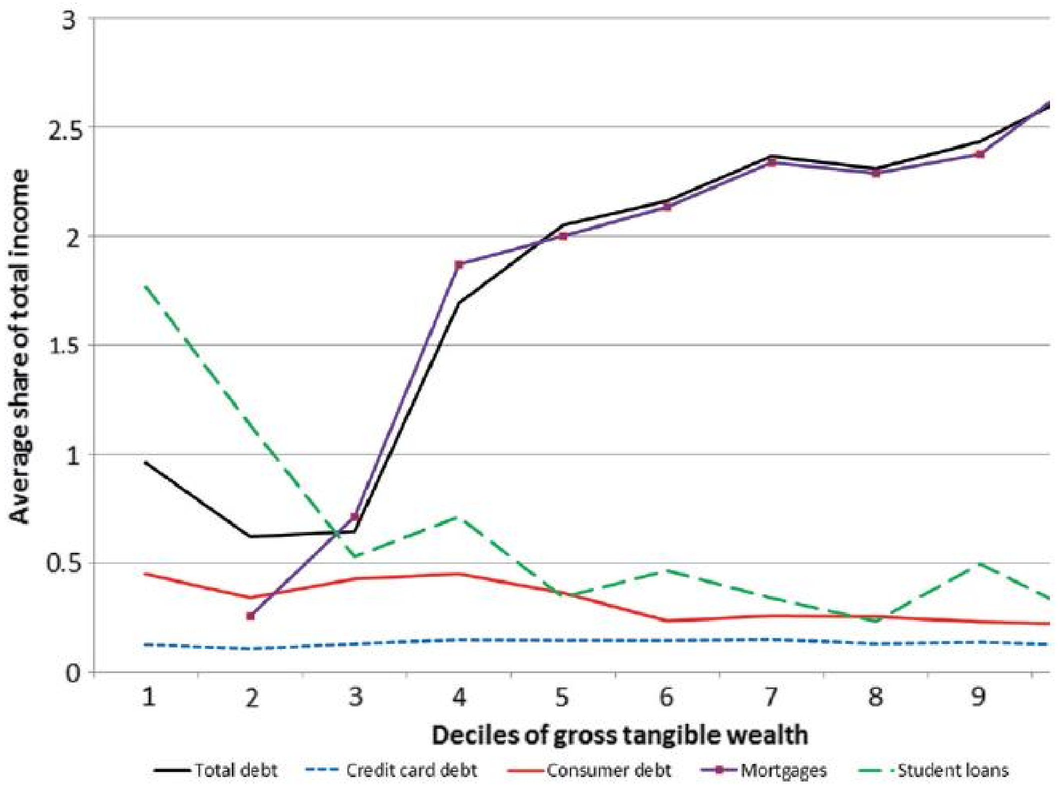
Flow of money is of course a pro, as we saw in the previous part, but it also can represent a huge con; since digitalization has made easier to spend money a lot of individuals who are not financial educate tend to spend more money; for example buying clothes online or other superfluous items can be done in seconds, while before the digitalization you had to go to the physical store and think about if you could afford the item or not; also the fact that the money you are consuming are represented digital and not in physical form give the consumer the impression the that money has less value.

This has been proved by many scientists; one of the most interesting experiments was done by MIT Prof. Drazen Prelec (resource 23); he studied two different group of people that had to pay for the same thing, one group with cash, the other with credit card; he noticed that the group not paying with cash were incline to pay the double as the other group.
Prelec said that: << Neural pathways light up almost like brief physical pain when we part with our money>> and not using physical cash delay this sense.

Higher flow of money is linked also to easier debt; digitalization, in fact has increased this problem; in the last years, for example, the credit card debt of the households has been increasing year by year, becoming one of the preferred way of financing for the householders.

These data are confirmed by Sodini's study (resource 9),that analysed the composition of households' debt and also by CNBC article (resource30) that stated that credit card debt in USA increased more than 45 billion $ from 2008 to 2018.

Another important point that it's visible in the Sodini's study is the correlation between debt and income ratio of US households, as it's visible in the next Picture.



Picture 33 – Ratio of income to debt, US households 2007(resource 9)

-Less human contact

All the digitalization of the financial services brings less interaction with humans; the individuals must not be in physical presence in the bank for example to manage their money; even if some banks prefer the human approach for more delicate questions, like the concession of a mortgage.

Also, many users, especially the older ones or the one that have difficulties in using the today devices could need a more physical approach.

- Cybersecurity

If from one point of view digital investment are easier to do, internet allow a lot of individuals get in contact with investors that are not so skilled in the IT world and could become preys of hackers that have the possibility to invade their banking account or their online wallets.

In a 2022 (VMware, 2022), report , it was reported that a lot of financial companies, are boosting the budget of their cybersecurity department of 20/30 %;

also, in the same report it was seen that 63% of financial organisation received radically more attacks to their systems.

Many organizations are trying to help with this problem, for example Carnegie Endowment for International Peace made a report to protect the financial system from cybersecurity, trying to involve every international organization to cooperate on this problem and especially trying to propose a general law regulation.

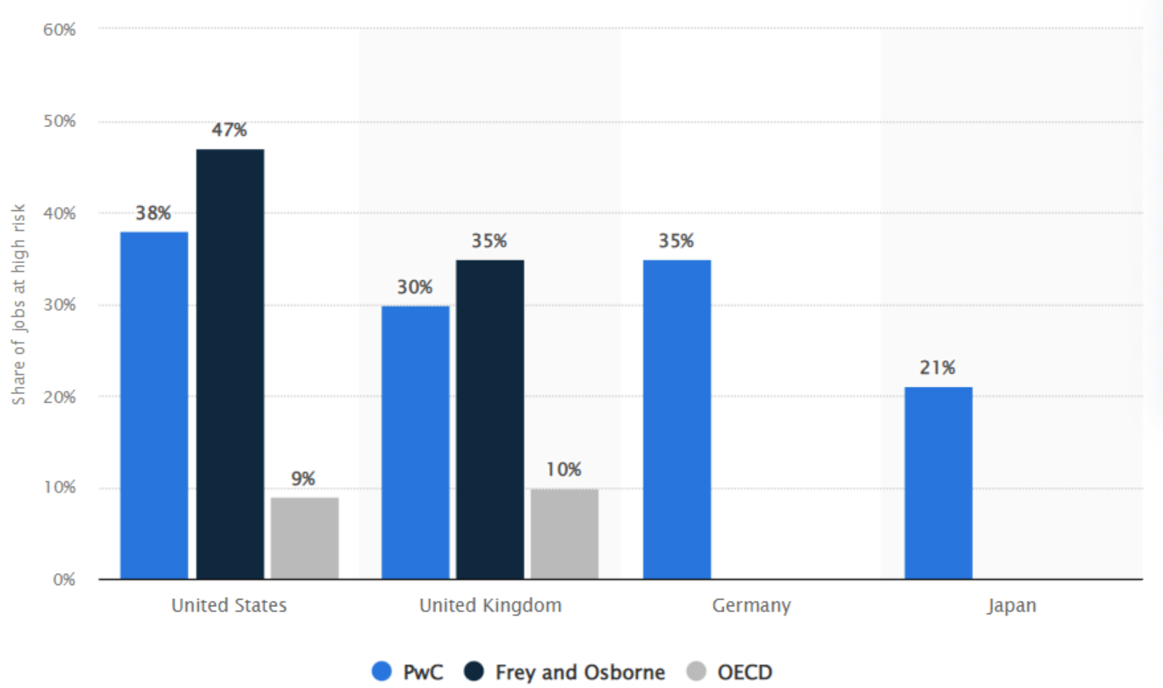
- Loss of jobs

Every time the technology level increases, some people will lose their job , which becomes obsolete after a while; but if this is true from one point of view, it's also true that with the digitalization of these services new jobs will arise.

However, this it's not only in the financial sector, human labour will be less useful day by day, replaced by robots and algorithms.

There are many studies that analysed the effect of digitalisation on the market job, for example INAPP in an article(resource 34) analysed that studying more than 700 different job categories, almost 45% of them is in risk ; also, ILO – International Labour Organization has confirmed this number about north American market.

Also, big companies, such as PwC, confirmed that there are many jobs that risk being automatized; the effect seems stronger in USA and Europe than Asia, as it's visible in the next picture.



Picture 34– Percentage of jobs at risk of automation by 2030 (resource 35).

-No privacy

All the data that are being used are for the most personal info, from the job of an individual to its physical features; there are applications like Google Maps that track every move you do in the day and insert all this info in a database, that it's in the hand of a company, that can use it as it likes; most of these info for example are sold to other company to target better their clients. There have been many scandals already in the last years, the biggest one was probably the Facebook one in 2010, data from millions of Facebook users were collected by Cambridge Analytica, that sold that info for political purpose.

Some countries have emanated several regulamentations on the privacy, but some other are totally ignoring it; for example, a lot of Asian countries, including China, are implementing in the day-to-day life a social score, which essential a score attached to the individual, that based on the info the system has on you, such as bank deposit, tax paid or mortgage currently active on your account, divide the individuals in several 'class', preferring the richest one to the poorest one.

This is an awful system to use the data of the individual and it seems to bring a utopistic future where the government control the individual in every possible aspect.

In Europe many acts have been made in order to protect the individuals' privacy, in particular, European Union with General Data Protection Regulation (GDPR) set particular standard to be respected about transferring personal data, as analysed by Center for Strategic and International Studies (CSIS) in a research (resource 33).

Also, USA moved in this way, with Cross Border Privacy Rules(CBPR) establishing international laws to follow for personal data exchange.

- Discrimination

Even if Democracy effect is stronger, digitalization could also bring some discrimination, in fact in order to join the digitalized world you need a working device, internet connection and electricity; even if it's true that the internet users are increasing day by day and the cost of low level technology is decreasing, there are still some parts of the world where internet is considered a luxury and not a commodity.

This could lead to an even bigger gap between first world countries and developing ones.

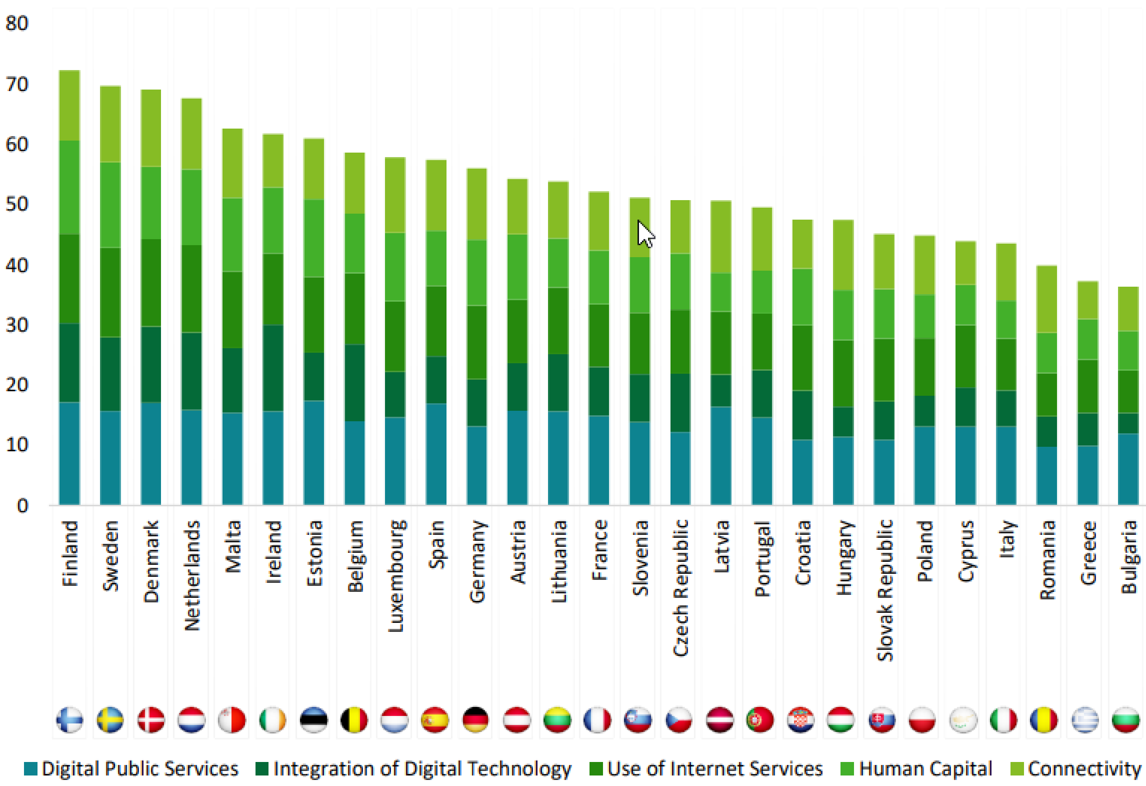
In the end, even if there are some cons, digitalisation has a positive impact all over the economy; one of the most important research that confirm the thesis has been done by Deloitte and analysed by IRPA (Research Institute for Public Administration in Italy), which has found that a positive correlation between technology development and financial growth exists(resource 36)

In particular it has been found out that an increase of the 10 % of the index that measures the tech development of an economy (DESI or Digital Economy and Society Index – resource 37) is correlated with an increase of that country's GDP per person of 0,65%; furthermore, they stated that the increase is significantly more important for developing countries and less important for countries with an already well-established digital economy.

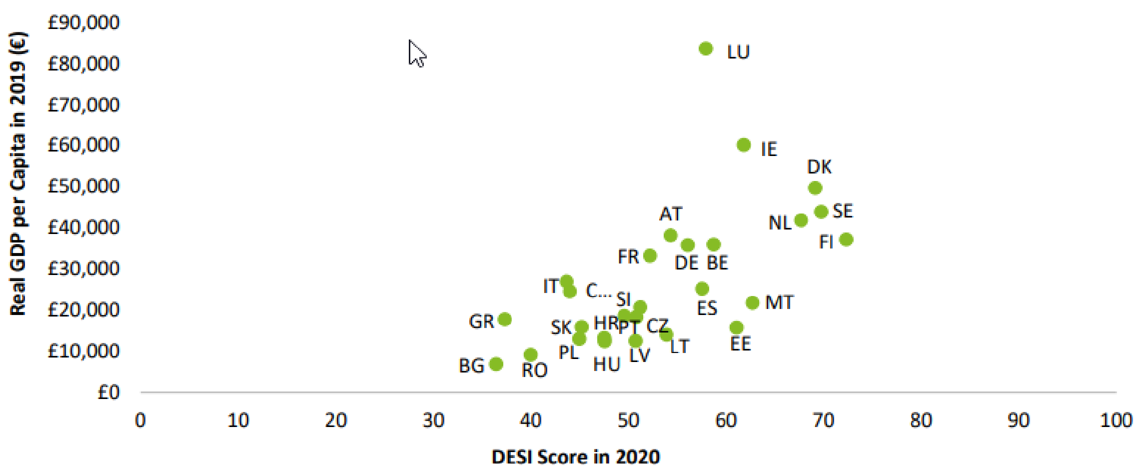
European commission stated that: << The impact of a point increase in DESI on economic growth will vary depending on the starting point of a country. If a country's DESI score is 30, for example, the 10% increase in DESI to deliver 0.65% higher GDP per capita amounts to only 3 points on the overall DESI score.

Comparatively, for a country already at a DESI score of 60, to achieve the same 0.65% increase in GDP per capita they would need a 6-point increase in the DESI score. This highlights the potential role of digitalisation in driving economic convergence across the EU>>.

Hence, countries that have an high DESI are often the most developed countries, like it is visible in the studies done by European Commission in the next Pictures.



Picture 35 – DESI index in 2020 in EU (European Commission)



Picture 36 – Relationship between Real GDP per Capita in 2019 and DESI score in 2020 (European Commission)

Conclusions

The main questions that this thesis proposed at the start have been answered and a logical analysis of them have been proposed, but they will keep evolving day by day, especially the technological level will be increasing faster and faster daily, bringing new type of investments for the individual, new method of managing the finance and new type of learning about these topics.

Finance word is evolving day by day, so financial education must be one of the first priority in the education of an individual nowadays; with the years go by, society will not allow people to be ignorant in this field.

Individuals are asked to continuously study this subject to achieve a better financial situation and to contribute to a more economical advanced society.

The digitalization has helped every individual in doing so; even if there are several cons in the digitalization the pros are have more impact; nowadays people can find an infinite source of information about financial choices, and they have the possibility to use many platforms for their finance management.

I would like to thank all the professors who contributed to my education; without you I would not have been able to reach this milestone and form the working method that will accompany me throughout my professional life.

I thank all my friends who helped me and with whom I shared both the hard and great moments.

But most of all I dedicate this milestone to my family, to whom I owe everything I am, who have always supported me in whatever choices I have made and without whom I would never have been able to achieve this goal today.

Resources

1-https://www.oecd.org/financial/education/oecd-infe-2020-international-survey-of-adult-financial-literacy.pdf

2-www.consob.it/web

3-www.borsaitaliana.it

4-https://gflec.org/wpcontent/uploads/2015/11/Finlit_paper_16_F2_singles.pdf

5-https://www.eesc.europa.eu/sites/default/files/resources/docs/qe-02-16-362-en-n.pdf

6-Intrum's 2020 European Consumer Payment Report

7-
https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/220111-financial-competence-framework-adults_en.pdf

8-Corporate Governance and Finance course' slide – Polito

9- Guiso Sodini, household: finance an emerging field, paper

10-https://www.statista.com/statistics/1231300/number-of-private-households-in-the-eu/https://

11- www.statista.com/statistics/751605/average-house-price-in-the-uk/

12-https://www.globalpropertyguide.com/Europe/price-change-1-year

13-https://www.statista.com/statistics/270034/percentage-of-us-adults-to-have-money-invested-in-the-stock-market/

14- https://finance.yahoo.com/quote/META?p=META

15-https://www.statista.com/statistics/825543/returns-on-selected-commodities-worldwide/

16- https://www.bankrate.com/banking/cds/historical-cd-interest-rates/

17-https://www.statista.com/statistics/273704/managed-assets-in-investment-funds-worldwide/

18- https://etfdb.com/etfs/style/growth/

19- https://www.nature.com/articles/s41598-021-00053-8

20-https://www.blockdata.tech/blog/general/top-banks-investing-in-crypto-and-blockchain-may-2022-update

21- https://coinmarketcap.com/it/currencies/bitcoin/

22- https://www.statista.com/statistics/941137/ai-investment-and-funding-worldwide/

23-https://spectrum.mit.edu/winter-1999/the-psychology-of-spending/

24- https://www.statista.com/statistics/1228757/online-banking-users-worldwide/

25-https://www.statista.com/statistics/885518/global-art-market-volume-of-transactions/

26- https://www.statista.com/chart/27405/us-median-home-price-days-on-the-market/

27-https://www.consob.it/documents/46180/46181/rf2021_it.pdf/91b5f47c-cbad-40b4-9d7c-1405a4d72b06

28- https://www.oecd.org/financial/education/Financial-Literacy-of-Adults-in-South-East-Europe.pdf

29-https://www.forbes.com/sites/ilkerkoksal/2020/04/18/how-ai-is-expanding-the-applications-of-robo-advisory/?sh=52812cf055c3

30 -https://www.cnbc.com/select/us-credit-card-debt-hits-all-time-high/

31 -https://www.jstor.org/stable/resrep24555
32-https://www.brookings.edu/blog/techtank/2014/07/16/three-graphs-that-show-the-rapidly-changing-world-of-ict/
33-https://www.jstor.org/stable/resrep26050.6
34-
https://www.inapp.org/sites/default/files/Digitalizzazione,%20automazione%20e%20futuro%20del%20lavoro_0.pdf
35-https://www.statista.com/statistics/716847/worldwide-proportion-of-jobs-at-high-risk-of-automation/
36-https://www.irpa.eu/il-ruolo-della-digitalizzazione-nello-sviluppo-economico-uno-studio-di-deloitte-conferma-la-stretta-relazione/
37- https://digital-strategy.ec.europa.eu/en/policies/desi
38-https://www.hindawi.com/journals/scn/2022/7025375/
39-https://www.hindawi.com/journals/scn/2022/7025375/tab1/
40-https://en.idf.pku.edu.cn/docs/20190610145822397835.pdf
41-"The Impact of Digital Inclusive Finance Development on the Income of Rural Residents in China" (2021YJSS234).
42-
https://www.researchgate.net/publication/335967865_The_impact_of_digital_finance_on_household_consumption_Evidence_from_China
43- https://link.springer.com/article/10.1007/s00779-022-01667-z#ethics – "The impacts of digital finance development on household income, consumption, and financial asset holding: an extreme value analysis of China's microdata"
44-https://economictimes.indiatimes.com/industry/banking/finance/banking/banks-can-halve-transaction-costs-by-going-digital-report/articleshow/51647852.cmss
45-https://www.sciencedirect.com/science/article/pii/S2214845017301503
46-https://www.imf.org/external/pubs/ft/fandd/2021/03/global-cyber-threat-to-financial-systems-maurer.htm
47-https://www.investopedia.com