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BSc in Economics and Business – Major in Management

ARTIFICIAL INTELLIGENCE APPLIED TO FINANCE: ROBO ADVISORY

An industry-specific analysis, comparing incumbents to startups in business model sustainability - MoneyFarm vs YellowAdvice

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Subject

Financial markets and institutions

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Academic Year 2019/2020

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'Banking is necessary, Banks are not'

Bill Gates - 1994

Abstract

Consultancy advise was not highly regulated until recent times, with the creation of multiple central authorities that have the role of supervising the whole process, while at the same time avoiding scams and frauds towards investors. In 2017, the European Directive MiFid II focused particularly on this topic, addressing independent financial advisory and its effects on the industry. The financial advisory process evolved in the last years in various aspects, massively influenced by the technological development which occurred during the so-called FinTech revolution that led to the spread of several services such as Blockchain, Algorithmic trading or Peer-to-peer lending.
Among the main patterns which shaped this phenomenon, Artificial Intelligence hugely affected the financial sector helping to create a new trend that experience large growth since its beginning in 2008: Robo-Advisory financial consultancy.

Strictly related to digital wealth advisory, the start-ups providing this service uses innovative technology that relies on Artificial Intelligence and machine learning in order to advise individuals in the investment process. Disrupting the traditional process, Robo-Advisors have multiple advantages for both providers and users. Firstly, they offer high-level user-experience through professional online platforms and mobile apps, enabling clients to access the service whenever they want to. Deleting up to 90% of physical assets costs, these companies have lower fees and higher transparency when compared with traditional consultancy services provided by incumbent firms. Using modern marketing and user-friendly communication, they gained trust of many investors, arriving to manage more than $200 Billion as their Asset under management. This phenomenon has developed in last years in the so-called Robo-Advisory 4.0, where the advisory process is operated by artificial intelligence, which exploit the benefits of the latest machine learning technologies available.

Focusing specifically on the Italian Robo-Advisory industry, on one hand a stand-alone start-up named *MoneyFarm* has developed a *Pure Robo-Advisor* and is now a global player operating in three different countries. On the other an incumbent bank built *YellowAdvice,* a *Hybrid Robo-Advisor,* to satisfy customers' needs. Comparing the business model sustainability of these two services provides a deep understanding of the current landscape within this industry, still evolving nowadays.

Introduction

The multiple innovative discoveries achieved by technological progress in the last years truly affected the financial industry in many aspects. As introduced in the abstract, focusing on financial consultancy process, this paper aims at analysing the phenomenon of Robo-Advisors, one of the main trends within the FinTech wave which began around 2008 in US, and the role of Artificial intelligence in its development.

In the first chapter the financial consultancy process is evaluated, starting from its beginning and passing through its modern development. Moreover, it is addressed from both a regulative and a psychological point of view, identifying the main features of behavioural finance and cognitive biases related to advisory actions. The second chapter is dedicated to FinTech, from the definition to its latest innovation available, with the objective of describing its products as well as its main core patterns. The Robo-Advisory phenomenon is investigated in the third chapter, describing how the industry developed and classifying it in timeline categories, providing a clear and easy understanding of the whole competitive landscape. Furthermore, studying the pro and cons of the service enables the reader to evaluate the real extent to which Artificial Intelligence had influenced financial consultancy, therefore defining Robo-Advisory 4.0 and the role of machine learning in it. Chapter four considers the Italian Robo-Advisory industry, analysing two of the main players on the market: the start-up *MoneyFarm* and *YellowAdvice*, the Robo-Advisor service provided by *CheBanca*!. Beginning with a specific study about the features of each service, such as business model, cost structure, asset under management and target customers, these are used for a comparison of case studies. Due to a core difference between these Robo-Advisors, namely MoneyFarm born as a standalone start-up while YellowAdvice being part of an incumbent, the discrepancies are evaluated to be highly interesting and potentially significant even to foreign industries. Finally, taking as basis assumption the same hypothetical investment on both Robo-Advisors, the comparison focuses on the total fee that the customer would pay on each service.

In the conclusion, an overall assessment on the comparison is exposed, and the business model sustainability of each service is estimated, with the aim to provide a final overview on Robo-Advisors in general, as well as for the specific Italian industry.

1.The financial advisory process

Financial advisory is intended as for activities related to planning and monitoring financial resources of third parties, that can be both private individuals or companies.
This happens in the absence of adequate skills and knowledge regarding financial monitoring and management of portfolios, with the professional advisor aiming at identifying the best strategy for each specific situation.
Individuals, seeking financial advice when investing savings, often rely massively in the hands of a financial planner, who analyses the expected return of each possible investment and finally evaluates the best way to act.

1.1. Traditional patterns of financial advisory

Thanks to the analysis of the investment time horizon, the expected return and constant monitoring of customized control parameters and due to the possibility to access dedicated tools for risk assessment, financial advisor guides the client through the full process of the investment, earning a fee depending on the type of contract they sign. The relationship between him and the client should be characterized by great professionalism and should be oriented towards client's interests, being fairness as one of the key features of these affairs (CONSOB, 1998).
Trying to achieve the best solution in terms of financial balance, both companies and private investors invest their savings since the establishment of these procedure, dating hundreds of years ago.

1.1.1. Historical development and study of the Italian case

The phenomenon of financial advisory dates back to early 20th century, specifically when the American Security and Exchange Commission published the Investments Advisers Act in 1940.
"*Investment adviser means any person who, for compensation, engages in the business of advising others, either directly or through publications or writings, as to the value of securities or as to the advisability of investing in, purchasing, or selling securities, or who, for compensation and as part of a regular business, issues or promulgates analyses or reports concerning securities*" (Investment Advisers Act, 1940).

Even if quite vague at the beginning, the definition of financial advisors has been updated several times since that year on and was more precisely defined by the College for Financial Planning in 1971.
For the first time, it was required to pass an exam to become officially a financial advisor, moreover candidates had to do an internship period, adding barriers to enter this occupation.
Consequently, there was a huge increase in financial advisors providing a more objective service, avoiding any conflict-of-interest when planning investments. However, many continued with a merely commercial approach, since they were still tied to a revenue model based on sales commissions, therefore it limited their professionalism towards customers while reaching a massive gain.

Taking as example Italy, even if the Italian national commission for society and stock market CONSOB was established in 1974, until 1980s financial advisors did not require any type of exam or enablement to carry out financial planning and monitoring services, furthermore they were not specified under any specific law or regulation.
Specifically in 1983 (law n. 77/1983 in Italy) it was decided that the only subjects authorized to provide the service of placing financial instruments were the ones who were enrolled as agents and commercial representatives, intended also as registered in the national register of insurance agents or the ones with specific professional requirements.
However, an official initial regulation from the Italian supervisory authority began to have a specification regarding investment advisory activities only around the 1990s.

The official legal recognition was 1991 with law No. 1, which regulated brokerage firms, known also as SIM *Società di Intermediazione Mobiliare*.
Therefore, these activities were reserved to those subjects, enabled under release of specific authorization.
Furthermore, the official name of "promoter of financial services" was created, which had to mandatory register in an appropriate register controlled by CONSOB.
Now, financial advising can be provided with different modalities by SIM, SGR (*Società di Gestione del Risparmio*), banks and consultants admitted in the recently published Albo managed by *Organismo dei Consulenti Finanziari* (*OCF*). Banks can, moreover, admit order by customers who don't ask for advises and offer the "execution only" service following customer's instructions.

The whole industry had benefits from the establishment of this register since it avoids the presence of "part-time" advisers, often inexperienced and so becoming dangerous for investors.
Before 1991, financial promoters were conceived only as a means placing investments and not even as subjects who could advise the saver in a return-oriented view.
This discipline is organized in order to define the new profession at a legal level, offering greater protection for consumers: thousands of investors and savers were in fact involved in several scams and experienced massive losses in the decades before this law.

1.1.2. Markets in Financial Instruments Directive

After several updates to the law of 1991, Mario Draghi, at that time Minister for treasury in Italy, was chosen as the leader of the commission which published the T.U.F. (Testo Unico in materia di intermediazione finanziaria): this paper was the unique and principal document regarding financial intermediaries and financial advisory process.
This act, also called by many as the Draghi Financial Act, was forced by the government as to be in line with the one related to financial advisory in European Community, namely the Eurosim law of 1996 based on the ISD Investment Services Directive from the EU act of 1993.
The two principles underlying the functioning of the current financial market in the EU were defined by this Act: mutual recognition and home country control.
Therefore, any authorized EU financial advisory investment firms could provide services in any other country of EU, even if subject to the supervision of the home country. In 2004, with the European Directive of Markets in Financial Instruments Directive, commonly known as MiFid (Conti,2007), the development of EU legislation made further steps forward, while repealing the ISD of 1993.
Becoming active in 2007 in Italy, this has been one of the most important changes in the whole financial advisory process since its beginning.

The main objectives of this Act were:

- Greater efficiency and transparency, through crucial supervision by governmental authorities

- The integrity of the markets, guaranteed by honest, fair and professional behavior of the operators
- Protection of savers, as financial advisory should only aim at investor's interests
- The strengthening of competitive mechanisms, favored by several factors such as the creation of new trading venues and the European passport
- Improving the governance systems with control of conflicts of interest

In Italy, the abusive exercise of one or more investment services was punished with the imprisonment from six months to four years and with a significant fine in *Lire*, from four million to twenty million.

Below we find an analysis of the regulations related to MiFid I regarding the current situation in Italy, developed by PwC in 2016.

MIFID I

Regulation	***Description***
Conflicts of interest (Art.18)	Conflicts of interest may also arise within different Robo Advisory models. It is important to take into account the distinction between independent and not independent Robo Advisors.
Conduct of business obligations when providing investment services to clients (Art.19)	Robo Advisors shall perform the assessment of suitability and appropriateness as art.19 envisages.
Legislative Decree n.196/2003 Privacy Code Informativa (Art.13)	Italian Robo Advisors shall comply with the Privacy Code and provide, in the Privacy Policy document, all the information described in art.13.
Treatment through electronic devices (Art.34) "Banking provisions and traceability of banking operations" Del.192/2011	It is not directly addressed to Robo Advisors but suggests some best practices that can be applied to Robo Advisors if it is integrated in a bank.

Source: PwC, 2016

From a structural point of view, it was organized on the *Lamfalussy procedure*, which divided his approach on four different levels, starting to clearly establish the relationships and roles of governments and European Union, as well as several other specific commissions involved within these services.

Furthermore, MiFid differentiated customers classifying them into three categories, depending on the amount of protection they have:

- *Retail customers* – high protection needed; they basically are clients who are not professional customers and so enjoy maximum protection in terms of transparency and regarding the obligations that intermediaries must observe towards them.

- *Professional clients* – medium protection needed; are clients having decent competences necessary to make investment decisions and rationally take risks.

- *Eligible counterparties* – low protection needed; are commonly considered as crucial operators of the markets, with the highest knowledge and consequently they need the lowest protection. Examples could be investment and insurance companies, pension funds and central banks.

1.1.3. MiFID II and its consequences on the industry

The outbreak in the United States of the bubble on subprime mortgages, followed by the bankruptcy of Lehman Brothers (2008), has led to a huge financial crisis that has influenced markets globally.
From 2009 onwards, the European commission start working on updating the MiFid, aiming at balancing the financial issues of those years with new regulations.
The new MiFid II, active from 2018, regulates the financial markets of the EU and took place of the previous European regulation, the already mentioned MiFid: the final objective is to operate on the transparency of European financial markets, moreover it was included also in the list also Liechtenstein, Iceland and Norway.

Its ultimate aim, or the true background on which European legislators acted, was the protection of savers and small investors, as said before not fully defended by scams under the previous regulatory system.

In order to increase transparency in the markets, MiFid II has imposed new rules on banks, brokers and asset managers, especially with reference to products and services.
Regarding financial intermediaries, MiFid II improved transparency through the development of innovative methods for acquiring information from customers.
Moreover, the main features of this acts in the financial advisory process are analyzed in this work.

First of all it created a common definition of independent consultancy, intended as fee only financial advisors which do not receive any type of remuneration from financial intermediaries, furthermore they do not have access to the client's assets, that remains on deposit with his traditional intermediary. Another important aspect deals with the fact that independent financial advisors are obliged to keep a compliance manual, a book of regulatory and supervisory obligations, consequentially dealing with an annual compliance review: a report related to compliance requirements to be drawn at the end of each year.

Another principal new characteristic of this provision was the one related to product governance, aiming at anticipating the adaptation of the product to the target customer: intermediaries are so required to make a specific assessment on risks associated with products. Product Governance, marking a decisive step forward in the evolution of disclosure on financial instruments, transformed the process:

Product > Portfolio > Customer → *Customer > Portfolio > Product*

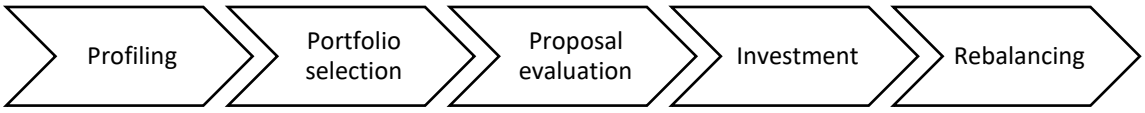
If on one hand beginning from the product means to communicate through a technique that follows the markets and specialists, seeing in portfolios a simple support by means of reports and "refined" graphs, on the other starting from the customer instead means offering an analysis of needs and objectives, selecting adequate products and portfolios consistent with risks, ambitions and time horizon related to that specific investor.

This system relies on considering investor's interest, moreover the obligation to verify the risks associated with the products issued is responsibility of the distributor intermediary, who ensures that the security is distributed to customers within their target market.

The third key point of MiFid II is the introduction of product intervention powers attributed to European Securities and Markets Authority ESMA.
This institution has powers which mainly consist in the possibility of limiting or eventually even prohibiting the sale of financial products in order to avoid scams.
The control activity of ESMA prevails over any measures previously adopted by a competent authority, furthermore there is also the possibility for both the domestic supervisory authorities and European ones to impose specific prohibitions.
The industry of financial advisors grew exponentially since those decades, in fact the number of financial advisors is estimated to be around 300,000 units (Cerulli Associates, 2018). These advisors, according to a study by Boston Consulting Group in 2018, manage globally more than 75 trillions of dollars as AUM Assets under management.

1.1.4. Partitioning the process in several phases

The financial advisory process can be described as divided into 5 main phases: customer profiling, portfolio selection, evaluation of the adequacy of the proposal, investment and rebalancing.



Customer profiling, also known as client profiling, is a procedure imposed by MIFID which tends to detect the client's risk appetite, his degree of knowledge of financial concepts, his investment objectives and the articulation of his assets. In fact, the MIFID directive did not ban any type of product but instead introduced the concept of adequacy for retail customers. A very risky investment can be suitable for a client with a highly skilled profile, extensive assets and long-term investment objectives.

Actually, the concept of product governance was recently introduced, which in some cases provides that some products are banned from the retail public regardless of the suitability assessment.

The evaluation of the adequacy of the proposal occurs through an accurate analysis of the proposed financial investment, moreover it refers to the main action made by the financial promoters when studying the appropriateness of the strategy chosen.

The investment phase is the most technical one, where the proposed financial service is actually purchased, furthermore this is the period in which the savers' money are exchanged for securities, according on the strategy planned by the financial advisor.

The selection of the portfolio must always respond to investment differentiation logics in order to limit losses in the event of shock on the course of a specific financial product.

Finally, the periodic rebalancing allows to guarantee the adequacy principle by changing the asset allocation in the event of changes in market conditions.

1.2. Behavioral finance

Standard finance models assume investors to behave rationally, arriving to choose the best option among the proposed ones through a process of optimization of profit. Processing any information quickly and taking into account specific preferences, the investor is assumed to carry out a rational information scanning process.

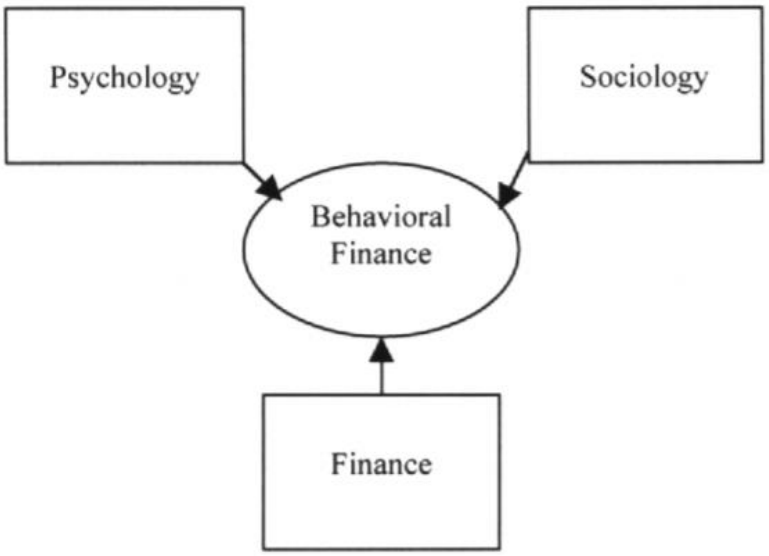
Behavioural Finance instead assumes these standard investors to act not rationally. These individuals, suffering from biases that alter their decision making, may over or under react to new information. Moreover, they can incur in problems when evaluating a situation being too optimistic or pessimistic, thus leading them to behave in an irrational way and to not exploit opportunities.

As from the book "*Behavioral Finance: finance with normal people*" (Statman, 2014), we can define this phenomenon as:

Behavioral finance substitutes normal people for the rational people in standard finance. It substitutes behavioral portfolio theory for mean-variance portfolio theory, and behavioral asset pricing models for the CAPM and other models where expected returns are determined only by risk. […]

Behavioral finance expands the domain of finance beyond portfolios, asset pricing, and market efficiency.

It explores the behavior of investors and managers in direct and indirect ways, whether by examining brains in fMRIs or examining wants, errors, preferences, and behavior in questionnaires, experiments, and the field. […]
Behavioral finance explores saving and spending behavior […].
And it explores financial choices affected by culture, fairness, social responsibility, and other expressive and emotional wants.
(Statman, 2014)



Business, Education and Technology Journal, 2000

Furthermore, behavioral finance is commonly seen as an aggregate of three individual disciplines, namely psychology, sociology, and finance, as it was represented on the graph on Business, Education and Technology Journal.

Financial intermediaries have an ability to exploit the biases of customers, as it happened in the US subprime mortgage market. Hence, a deeper understanding of how investment and saving decisions are made and why people make repetitive errors when choosing financial services is a key factor to achieving successful protection for financial consumers.

The emerging FinTech innovations can strongly affect those behavioural biases.

From a positive point of view, technologies offer an opportunity for customers to reduce their mistakes using easy online product comparison, free financial tools and even automated investment services such as Robo-Advisory.

On the other side of the coin, the same technological disruptive innovations have risks embedded in their user-experience product orientation: in fact, many of the new services provide an easy and fast way to buy and sell financial securities and assets, which can turn out to be damaging the customer that is not expert in these activities or just simply not used to technology enough to deal with the service. (Rossi, 2017)

The main factors affecting this topic are listed below, as the ones identified in Business, Education and Technology Journal from a work by Ricciardi et Al (2000).

- *Anchoring*
- *Financial Psychology*
- *Cascades*
- *Chaos Theory*
- *Cognitive Bias*
- *Cognitive Dissonance*
- *Cognitive Errors*
- *Contrarian Investing*
- *Crashes*
- *Fear*
- *Greed*
- *Herd Behaviour*
- *Framing*
- *Hindsight Bias*
- *Preferences*
- *Fads*
- *Heuristics*
- *Manias*

- *Panics*
- *Disposition Effect*
- *Loss Aversion*
- *Prospect Theory*
- *Regret Theory*
- *Groupthink Theory*
- *Anomalies*
- *Market Inefficiency*
- *Behavioral Economics*
- *Overreaction*
- *Under-reaction*
- *Overconfidence*
- *Mental Accounting*
- *Irrational Behavior*
- *Economic Psychology*
- *Risk Perception*
- *Gender Bias*
- *Irrational Exuberance*

Fundamental features related to this topic are based on several theories regarding stock prices and the so-called Random Walk theory (Kendall, 1953), moreover a key point is the evaluation of an Efficient Market, namely with the EMH (Fama, 1970).

1.2.1. Efficient market hypothesis

The efficient market hypothesis (EMH) is often been associated with the concept of "Random walk": a term widely used in the finance literature and that has characterized the capital markets in the last decades.

This idea (Kendall, 1953) refers to the concept of stock prices following a random walk, becoming unpredictable to forecast. Furthermore, the Random Walk Theory assumes that successive price changes on securities are not dependent of the movement in the price of another security.

Consequentially it is not possible to outperform the market without bearing a higher risk related to the previous one. The best strategy is to use a "buy and hold" technique, investing in a selection of stocks representing the overall market, as specified by Burton Malkiel, a professor at Princeton university considered as one of the most influential individuals regarding Random Walk theory (Malkiel, 1973).

Efficient Market hypothesis relies on the same implication as the previous ones, moreover it assumes that any information relevant to stock prices is shared among investors, freely available for all.

This concept is attributed to Eugene Fama's research made around 1970 and summarized in his book *Efficient Capital Markets: A Review of Theory and Empirical Work (*Fama, 1970), considered as a milestone for EMH.

Two of the main assumption of this theory is that there are no possibilities of arbitrage and, as one of the most important, all investors agree on how the available information impacts on the current and future price of each security.

Taking directly from Fama's definition of EMH *"in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value".*

The main conclusion is that, given trade at fair market value for each security always, then it is impossible to buy undervalued securities or sell overvalued securities for arbitrage. Given the recommendation to have a strategy to "buy and hold" has for the Random Walk theory, then the only way individual investors can gain superior returns is by bearing greater risk.

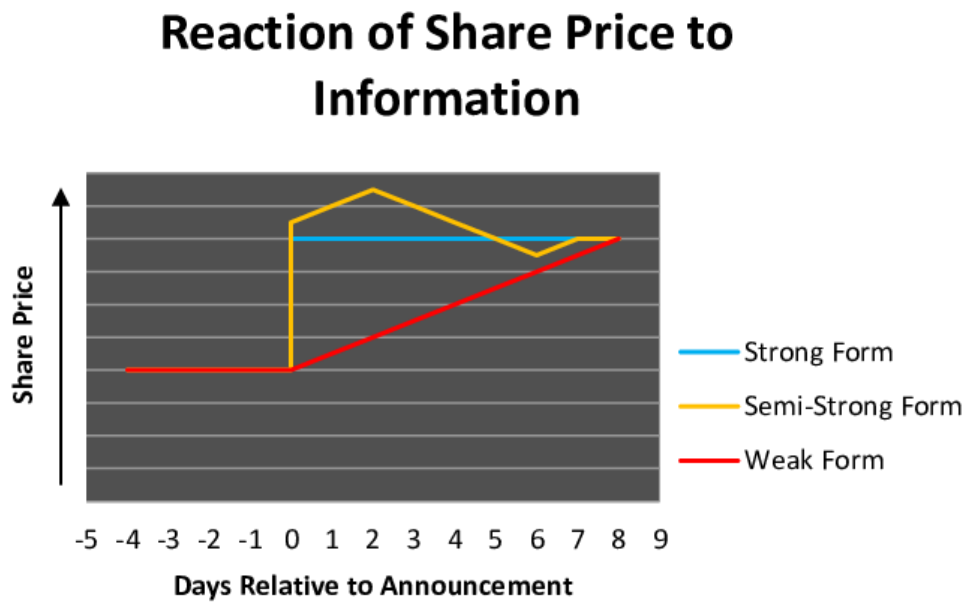
This hypothesis is divided in three different categories, depending on the respective market efficiency level: Weak form, semi-strong form and strong form (Illiashenko, 2017).

In weak form, future price depends entirely on random factors and are not predictable using historical price. The prices on traded assets such as bonds or stocks already reflect all past available information, it is not possible to use technical analysis to gain profits, even if fundamental analysis may still be useful.

The semi-strong form relies on the weak form assumptions, expanding them by perceiving that prices adjust to any new public information publicly available. Consequentially fundamental analysis is not able to predict anything about future price movements, given any security such as stocks or bonds.

Finally, the strong form assumes that prices always reflect and react to any information, both public and private. Even not public information and hidden ones can be used to earn superior returns, anyway that information cannot enable investors to gain superior profits from investments on the markets.

As from the chart provided on the Journal of Finance in 1970 regarding the efficient market hypothesis, the share price is affected by information awareness and each of the three forms (weak, semi-strong, strong) are influenced in a different way.



Source: Journal of Finance, 1970

1.2.2. Cognitive biases in decision making

Regarding the rationality of investors, there are numerous studies about the presence of cognitive bias, intended as not applying Bayes' laws during decision-making process. Even if the debate is still going on, many scholars tried to identify the most common biases related to decision making.

Jay Ritter, professor at University of Florida, analyzes the most common cognitive bias to be (Ritter, 2003) those of heuristics, overconfidence, mental accounting, framing effect, representativeness, conservatism, disposition effect.

Entering in details of some among those bias, heuristics are rules of thumb, which allow to solve and simplify complex problems, strictly correlated with availability and anchoring.

Overconfidence, being one of the most common bias among investors, can be expressed in several different ways. As proposed in the study by Barber and Odean (2001), men tend to be more likely to this bias than women: these individuals, which have a relatively higher level of overconfidence, are the evidence that even gender is a reliable influential factor when addressing the cognitive bias issue. Moreover, the study also found experience as an influencing feature as based on those results, the more an investor traded, the worst the trading outcome and rate of return. Other interesting patterns are the herding behavior, which explains why people often tend to imitate the actions made by large groups, and loss aversion: intended as the unhappiness perceived from the event of losing an amount to be worse than the happiness to win the same amount.

Finally, many evaluating it as the most important, the framing effect: this bias, massively related to marketing and communication skills, happens when something is presented in a way and not in a different one. It is about perceiving the same product, namely in our case securities or stocks, differently depending on how it is presented and other factors that influence our perception of the product.

1.2.3. The investor sentiment

Investor sentiment is described by investors as bearish or bullish: security prices decrease during the time bears are in control, while instead these prices rise if bulls are the ones in control.

Emotion is often one of the main driving factors of the security market, therefore investor sentiment is also known as market sentiment and is not always the same as fundamental value. Fundamental value is about business performance, investor sentiment instead refers to the emotions and other features.
Many scholars are trying to measure this emotion, in order to see if it is possible to predict the security prices based on market expectations.

The principal indexes to measure this sentiment are:

- the "Fear index", also called VIX (Volatility IndeX), which is based on option prices and measures the volatility of the options in Chicago Board Options Exchange and the S&P 500 Index. The price value of the VIX reflects a volatility measure in percentage terms, therefore its value is between 0 and 100.
- the BPI (Bullish Percent Index), that evaluates the number of securities with bullish patterns using charts and graphs. This index is computed as the ratio between the number of stocks that provided a bullish signal and the total number of stocks on the market.

1.2.4. Noise traders vs rational traders

Firstly proposed by Fischer Black in 1986 (Black, 1986), the definition of noise traders refers to those traders making decisions evaluating noise as if it was a crucial information. As in this view, the market can be divided into two types of agents: on one hand rational investors and noise traders, which can act in order to gain profits through arbitrage, and on the other the non-rational investors.
A noise trader is an investor who trades not on the basis of rational thought but rather on information useful to predict future fundamentals, such as earnings for example.
As already analyzed in this paper, non rational ones suffer cognitive bias that influences their perception of risk associated with securities.
Their non rational choices will therefore be not efficient and consequently create extra-profit opportunities for rational investors.
Exploiting this situation, arbitrageurs are able to rise the price towards the fundamental value, this happens thanks to the sale of a perfect substitute security, while at the same time gaining profit without bearing any risk at all.

2.Living the Fintech revolution

The digitization development process is everyday affecting multiple aspects of our society, the sector of financial services, historically open to accept the use of innovating technologies, is one of the industries that are majorly changing due to this revolution. The recent rise in investments related to IT techniques on one hand and a considerable pace of innovation on the other, have increased a controversial phenomenon, defined by many (Mariateresa Paracampo, 2017; Roberto Ferrari, 2016; World Economic Forum, 2017; Alexandre Birry et al., 2017) as revolutionary and disruptive, known as FinTech.

FinTech can be located at the intersection between the industries of financial services and the IT sector, it is a set of businesses among which a large number of start-ups offer innovative (Susanne Chishti et al., 2016) services and products that had historically been provided by the traditional financial companies, mostly by banks, private institutions or governments.

2.1. Understanding the phenomenon

In order to understand the full scope of this phenomenon, we need to analyze the reference perimeter, to get a clear and deep definition of it.

FinTech, coming from Financial Technology, is a term with a broad meaning (Fabio Panetta, 2018) which refers to the use of several advanced technologies in the financial sector.

2.1.1. Definition and meaning

However, a univocal and generally accepted notion is still missing also at a regulatory level, crucial to the whole financial industry.

Each Institution or organization that contributed to the exploratory path of FinTech, studying its main patterns and characteristics, has tried to provide its own definition, differencing the one to the other in which aspect to be considered as the most important.

CONSOB, the main italian financial regulatory institution, states (CONSOB, 2020)

"The term Fintech generally indicates financial innovation made possible by technological innovation, which can translate into new business models, processes or products, and also new market operators".

The European Securities and Markets Authority, recognizes (Patrick, 2016) FinTech as:
"a type of financial innovation that relies on Information Technology to function, e.g. internet, cloud etc and that can result in new business models, applications, processes, products or services with an associated effect on financial markets and institutions and provisions of financial services ".
The Financial Stability Board (FSB,2017) defines FinTech with the statement
"a technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services".
If asked to provide my own definition, I would define it as:
"FinTech is the word that represents a wave of innovation correlating IT, business entrepreneurship and the banking and financial services".

In a dynamic context as the financial one, the term FinTech became related to a never more extensive meaning, including any type of firm that uses technological systems or processes, aimed at making the financial system more productive or at providing innovative financial services.

2.1.2. Evaluation of customer awareness

This movement grew unexpectedly in last years, affecting customer interaction as well as business plans and structural models for firms, catching almost all stakeholders not prepared on consequences related to the market.
The FinTech revolution influenced the financial life of any individual, from consumers to financial and credit institutions, consequently creating several opportunities for providers and final users.

As from the data (Global Fintech Adoption Index 2019) we can easily seen from these key findings how big is the impact on consumers of this revolution, which will likely affect the whole financial services industry in the next few years.

Source: Global Fintech Adoption Index 2019

For many years technological progress has been one of the main ways to faster the evolution and development of finance, achieving great progress such as for double-entry accounting and Robo financial advisory, that were key steps for this development.

If in those years progress needed a wide time span to be reached, nowadays innovative processes take place at a massive faster speed: IT has in fact undergone a dramatic progress due to development of digitization and communication technologies, while both private companies and institutions keep investing in R&D related to innovating processes. Only time will tell us to which extent technological innovation will change processes in the financial sector; however, is sure that banks, private investors and insurance companies will necessarily evolve, more or less rapidly, in response to the challenges they are about to face.

2.2. Industry products study: identification of macro categories

Including a wide range of products, many fields have been added, even if in different years and by different institutions, to the FinTech set of services.

The innovations related to technological applications can be divided in the following macro-areas (Janos Barberis et al., 2015): investments and financing services, risk management, payments sector and management and acquisition of Big data.

2.2.1. Investments and financing services

Including the alternative channels for financing, the most common firms operating in this area are related to several types of Crowdfunding, P2P Lending, Algorithmic trading and the complex phenomenon of Robo-Advisory, which is analyzed in detail later on in the paper. The key word of this processes is disintermediation, its main factor of benefit being that it necessarily leads to a simplification of standard procedures.

2.2.1.1. Peer-to-Peer lending

Peer-to-Peer lending is an innovative form of loan between individuals.

This service can offer a huge reduction of waiting times for obtaining a loan, an aspect that satisfies all main actors of the Social Lending procedure.

Keeping all the traditional features of the loan, its unique characteristic lies in the detail that the loan is provided by a private individual and in favor a private as well (Economic Times, 2018).

The parties involved contact each other through online authorized platforms which are supervised by the regulatory authorities, as in the Italian case for CONSOB, according to the specific country or state in which they operate and offer the service.

2.2.1.2. Crowdfunding

Crowdfunding is a collaborative process between a group people that decide to allocate their money, usually small sums, to support a project, which can be organized by both private citizens and companies or public entities (Brunelli, 2014).

The organization launching a crowdfunding campaign promises to participants rewards in exchange for their financial contribution. These benefits can be digital, material or even shares of the company; this process is used majorly by start-ups or new firms for a project with very high expected returns, for which investors hope to make a profit in the long-run period. However, crowdfunding is common also among no-profit entities and numerous social activities are related to this phenomenon, as their ultimate goal is to finance charitable projects.

2.2.1.3. Algorithmic trading

Intended as financial trading executed through an algorithm, these tools are seen as more efficient and able compared to humans in discover arbitrage opportunities and to exploit those possibilities, increasing the portfolio investment performances.
More recently, the development of high frequency algorithmic trading has taken place: operators have developed systems capable of entering millions of orders in thousandths of a second, executing only a minimal part of them, those which are advantageous for the situation, consequently maximizing profits.

In order to reduce the so-called 'latency time', meant as the time required to place the order, these players have located their offices near the trading venues trying to minimize the distance from the servers of the markets themselves, aiming at maximizing any aspect of this service, which can easily complete millions of orders at the same time, while monitoring them all.

Source: Franklin Templeton, 2019

Reaching more than 50% of transactions in the US from 2008 onwards, (Franklin Templeton, 2019) High Frequency Trading has provoked a debate that has highlighted two positions, dividing many brokers and scholars about this topic.

If on one hand the former considers these behaviors (placing millions of orders to influence expectations and executing only a few units) as a way to mislead other operators, the second, on the other hand, considers HFT positive due to the increase in liquidity on the market. From a regulative point of view, many corrections have been introduced to discourage the entry of unexecuted orders and contain the phenomenon, still under debate by some scholars.

2.2.2. Risk management sector

Services aiming at reducing compliance costs and procedures within the risk management industry, becoming a reliable alternative to traditional financial risk management services traditionally provided by Banks or other financial Institutions. The main players within this industry are InsurTech and RegTech, which are evolving and improving their usefulness every year in multiple possible applications.

2.2.2.1. InsurTech

The word coming from the union between Insurance and Technology, this is how the innovative wave is affective the insurance sector. Improving the efficiency of the process, the development of IT has in fact made it possible to access, analyze and share a huge amount of personal data, allowing insurance companies to offer specific products for customers (Susanne Chisti, 2018).

Able to make more accurate predictions about the risks and the expected return on each Insurance contract, many startups were created in this industry in last years.

The leader among these newly established firms is *Zhong An*, the Chinese startup in partnership with *Alibaba*, which reached a market capitalization of more than 37 billions, as on last *Bloomberg* Report (Bloomberg, 2020).

Moreover also the italian industry has developed in InsurTech very rapidly, as an example could be the Italian Startup *Insoore* , which raised more than 1 million in fundraising to develop an innovative InsurTech service (Startup italia, 2020).

2.2.2.2. RegTech

Contraction of Regulation and Technology, it involves all the technologies aimed at supporting companies to be in compliance with the multiple existing regulations, consequently making organizations themselves more efficient (Anagnostopoulos, 2018). The most power features of this service are the ability to manage data and the integration of these data between several business units, furthermore it is crucial to assess the massive analytical capacity that these systems have to process the information available and so to extract important reports.

In addition to representing a critical service for firms, RegTech solutions can be a useful tool for supervisors to verify compliance with the regulations. As we can see by the Italian supervisory authority case of CONSOB (CONSOB, 2018) that makes explicit mention to RegTech as a product instrumental to financial activity, dealing with technology itself as a productive and stimulating factor for financial services.

The RegTech applications had been listed (European Banking authority, 2018) by the European Banking Authority in 2017 and see several activities.

-*Automated Compliance and dynamic-compliance*: meant as the control of compliance requirements carried out through IT innovative protocols and in the context of automated real-time monitoring;

-*Identity Management and Control*: automated procedures in the perspective of customer profiling: KYC / AML / etc.;

-*Risk Management*: tools aimed at making the process of risk management more effective while less expensive, based on analytical, AI and advanced data analytics;

-*Regulatory Reporting*: automation of the reporting activity with cost savings and timeliness, all related to a digitalization of the whole process;

-*Transaction Monitoring*: auditing and carefully monitoring real-time transaction;

-*Trading in Financial Markets*: conducted through innovative procedures to increase the accuracy and the cost-effectiveness;

2.2.3. Payments sector

This sector is characterized by contactless technology and online payments that can be provided through mobile apps and online services. Due to the development of new communication technologies, billions of people have the possibility to use their mobile phones and computers to access a wide range of financial services, with a consequent significant reduction in transaction costs.

The most common services within this scope are online payments, digital money and cryptocurrencies, aiming to create value for customers and to achieve a better performance in doing these currency exchange related actions.

2.2.3.1. Online payments

This service uses advanced technology to allow private parties to sign contracts digitally and so to carry out a legally valid transaction. While ensuring privacy and protection of sensitive data in both parties, the transaction is executed when specific requirements are met, such as the purchase of an asset at a certain price.

Multiple startups are raising huge amounts for the development of this services and consequently increasing their number of clients, taking as example the Italian case of *Satispay* (Bitfeed, 2020) which just reached one million users some months ago.

2.2.3.2. Digital money and cryptocurrencies

Digital money is intended (CONSOB, 2020) as a type of currency available exclusively not physically but instead only digitally. These currencies allow their users to make instant transactions, transferring their digital coins anywhere in the world, to receive or make a digital payment individuals use specific technological online wallets, in which they can store any amount exactly as for the physical ones.

One of the main features of these currencies is that they can be centralized or decentralized: if on one hand they are controlled by a central authority, on the other instead the transactions are recorded through the Blockchain technology.

Cryptographic transactions occur instantly and are known throughout the network, moreover these transactions must be confirmed to be accepted. Any of these transactions are not falsifiable after being confirmed nor they can be revoked, assuring a high-level of privacy and security for the whole process (Libertex, 2018).

2.2.4. Management and acquisition of Big Data

Since digital giants such as Facebook, Alibaba and Google are entering the financial sector, the industry is changing rapidly, evolving as the services evolve in time.

Big data used to be a technical issue, while instead now it can be seen (Russom, 2011) as a business opportunity for corporations, which went from being not able to manage big data to investing massive amounts for collecting them nowadays.

Using big data enables high-level managers to decide on the basis of data, rather than intuition, they can use data-driven decisions and increase the productiveness of those decisions. This can allow CEOs and their companies to gain competitive advantage even in few months, given a good amount of data and a competent analytical team to analyze it professionally (Andrew McAfee et al., 2012).

Regarding these services with tens of applications, artificial intelligence and the blockchain procedures are by far the most widely used, due to their huge efficiency and security.

2.2.4.1. Artificial intelligence and machine learning

The term artificial intelligence was used for the first time in 1955 by John McCarthy, a professor teaching at Dartmouth. From that day on, thousands of predictions and claims have been made about this phenomenon, still seeking a common view for all scholars up to today. Artificial intelligence is strictly related to Machine learning systems: IT advanced systems that are not only replacing algorithms, but are now better at multiple tasks that were once done by humans.

The co-founder and co-director of the MIT Digital School, Andrew McAfee, considered as one of the main researchers in the field of emerging technologies, defines the AI situation as very interesting.

In fact he states in his paper (Andrew McAfee et al., 2017) on Harvard Business Review that once AI-based systems surpass human performance at a given task, it is likely that will spread quickly.

Multiple evidence (David Silver et al., 2017) are supporting this thesis, such as for AlphaZero Artificial Intelligence, a machine learning algorithm developed by Google DeepMind and which is currently able to exceed human performances at Chess game, with only about four hours of training, as results published on Science Magazine on 2018 (David Silver et al., 2018).

2.2.4.2. Blockchain technology

This technology, also known as *distributed ledger*, allows a register to be kept, validated and updated with high security and privacy through a network of users, each having the same authority themselves, rather than by a centralized authority.
Any of the changes applied to these registers, using difficult cryptography tools, cannot be altered or deleted without leaving a trace of the previous data to the decentralized (Satoshi Nakamoto Institute, 2008) network.

The main features of this technology make it immune to cyber-attacks, since to hack the system they should attack all copies of the database simultaneously.
One of the most known applications of Blockchain are cryptocurrencies such as Bitcoins, in which the decentralization is one of the main characteristics.

2.2.5. Aggregation of these services in the Bitcoin model

To conclude this brief presentation of the multiple services offered by the FinTech industry, we can take as an example particularly Bitcoin.
Being one of the most know cryptocurrencies, it aggregates numerous of the applications of FinTech such as Blockchain, Peer-to-peer systems, decentralization of authority, massive privacy tools development, secure transactions, no need for a intermediary, high-level cryptography (Satoshi Nakamoto Institute, 2008) and many others.

2.2.5.1. The Bitcoin *manifestum* paper

The following paragraph is directly taken from the paper *Bitcoin: a peer-to-peer electronic cash system* published by Satoshi Nakamoto in 2008, the nickname used by the still unknown founder of Bitcoin model.

This paper contains the main patterns of this decentralized network and being one of the easiest ways to understand several aspects of the FinTech revolution we are living.

"We have proposed a system for electronic transactions without relying on trust.
We started with the usual framework of coins made from digital signatures,
which provides strong control of ownership, but is incomplete without a way to prevent double-spending.
To solve this, we proposed a peer-to-peer network using proof-of-work to record a public history of transactions that quickly becomes computationally impractical for an attacker to change if honest nodes control a majority of CPU power.
The network is robust in its unstructured simplicity.
Nodes work all at once with little coordination.
They do not need to be identified, since messages are not routed to any particular place and only need to be delivered on a best effort basis. Nodes can leave and rejoin the network at will, accepting the proof-of-work chain as proof of what happened while they were gone.They vote with their CPU power, expressing their acceptance of valid blocks by working on extending them and rejecting invalid blocks by refusing to work on them.
Any needed rules and incentives can be enforced with this consensus mechanism."

Source: Bitcoin: A Peer-to-Peer Electronic Cash System Satoshi Nakamoto Institute, 2008

2.3 Common features among FinTech services

Analyzing this changes from a practical point of view, there are various benefits for end users, such as transferring costs being reduced or an increase in easiness to access credit and investment for several segments of the population.
Fintech services have multiple advantages for their customers, as interestingly analyzed by EY in 2019 (EY - Global fintech adoption index, 2019).
Among these benefits the ones perceived as the most important are the range of functionalities and innovative features (66% of surveyed), as well as the availability of services 24 hours a day, 7 days a week (55%).
Furthermore, given the ease and flexibility of the service is said as crucial by more than half the individuals (53%), people also evaluate as very important the rates and fees required for the usage of FinTech services (39%).

2.3.1. Competitive advantage and benefits for customers

A main factor to be taken into account is the change in user habits and in the customer experience standards. Internet being in everyday working routine on one hand and the thousands of possibilities of online products and services offered by big tech companies such as Google or Amazon on the other, are resulting in giving new shape to the individual consumer.

People are no longer a passive recipient of the services that are offered, but are themselves value seekers, searching for offers of new products comparing their features, moreover it is easier to detect any hidden contractual conditions or fraud, particularly for young people. Using innovative channels such as internet landing pages or mobile devices, many FinTech startups allow the user a highly interactive and personalized experience: millennials have grown by having access to customized solutions, designed for their specific needs. Furthermore, these services adopt massive cost-effective strategies, by lowering costs they can invest an higher amount for marketing.

A low dependence on physical infrastructures and a large use of IT staff allows also to apply lower fees for the service provided, in fact many FinTech offer the same or even a better service to customers while charging less than the traditional ones provided by Banks or financial institutions.

Time is another crucial advantage for FinTech firms, many of them provide real time operations through the exploitation of internet connection and innovative products. Taking as an example the payments sector, while the banking traditional service takes about 3 days to deliver money with a commission of few euros, startups such as *Satispay* or *PayPal* provide an immediate transfer of money totally for free.

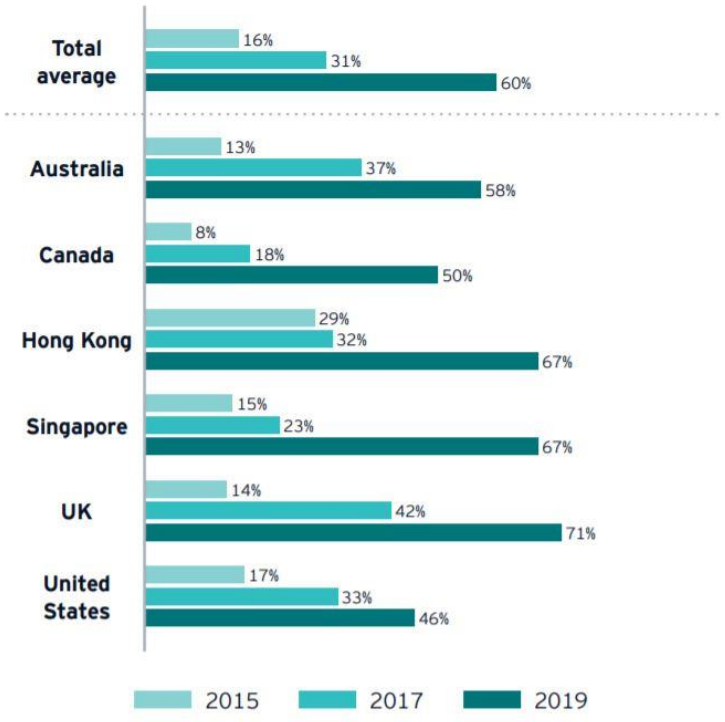
Simplification is a key feature of this developing industry, being designed for customers and structured for their specific needs, providing a lean business model easy to understand.

Using a decentralized structure, not tied to a rigid infrastructure as the traditional one, they are only partially subject to the regulatory requirements to which banks are subject, enjoying many financial benefits.Regarding the market share that Fintech firms are reaching, we can analyze an heterogeneous percentage share among the different fields of the industry.

In particular, these innovative services are subtracting from the traditional financial institutions, the incumbent ones such as largely established Banks or Private Funds, a quite significant market share, reaching even above the 20% of total market in Online Payments or Lending Services (Marcin Kotarba, 2016).
These multiple benefits and advantages for both customers and providers are the basis to understand the rapid expansion of this phenomenon.

2.3.2. Analyzing user adoption rate

A clear evidence of the Fintech revolution can be found in the Adoption rates published by the Global FinTech Adoption Index 2019, provided by EY.
The first survey analyzed six different markets - Australia, Canada, Hong Kong, Singapore, the UK and the US - and indicates a 60% adoption rate, a massive rise if compared with last two years where we had 16% in 2015 and 31% in 2017.
These case studies are an perfect sign of the maturation and globalization of the industry over the course of the past four years: analyzing the adoption rate, it is growing faster than how it was expected to do.
96% of consumers worldwide know of at least one FinTech service as alternative to the traditional financial ones that is available to help them transfer money, making payments easy, cheap and secure.



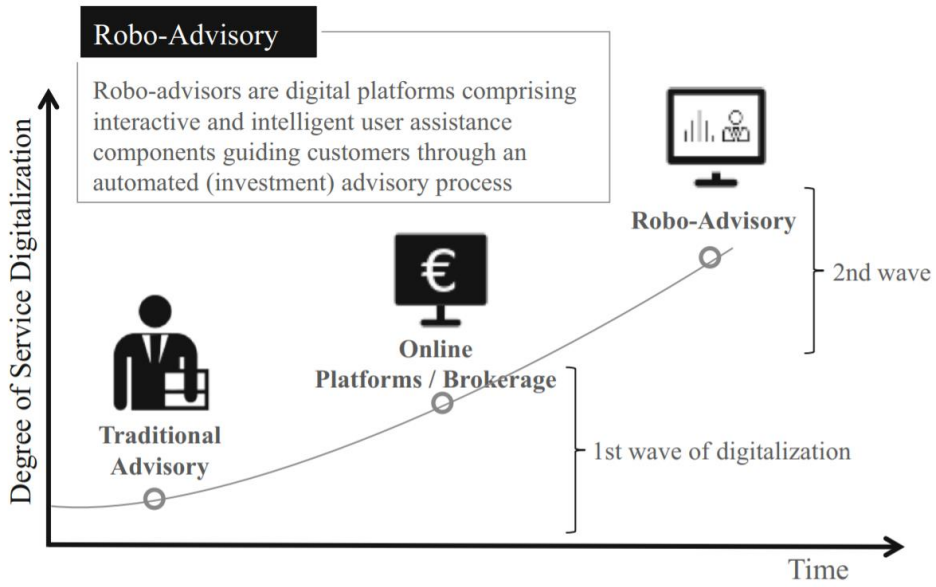
Source: Global FinTech Adoption Index 2019

3. Analysis of Robo-advisory industry and the role of Artificial intelligence

Robo-Advisors, defined as "*an online portfolio management solution that aims to invest client assets by automating client advisory. Encouraging self-management of financials, Robo-advisory provide necessary information in a totally different way that doesn't require a deep financial background*" (Deloitte, 2016), are considered by many scholars as one of the most innovative and disruptive trends of the FinTech era, which will probably radically change the way financial industry works.

3.1. The Robo-Advisory industry

Robo-advisory is a management service dedicated to the financial advisor process, using a whole or partially online preparation and management of personal asset. Offering recommended investment advice, based on algorithms to create an investment portfolio that fits the individual client's characteristics, this service allows potential investors to receive investment advice and to build a customized portfolio directly via online platforms and without a traditional consultant acting as financial intermediary.



Source: Sironi, 2016

3.1.1. Literature review – Study of the industry

A definition of Robo-advisors is given as the following:

"D*igital platforms comprising interactive and intelligent user assistance components*" (Maedche et al. 2016).

This definition has been better specified as platforms that use

"*information technology to guide customers through an automated advisory process*" (Sironi 2016; Ludden et al. 2015).

As reported by Hayes (2019), in June of 2010, the first Robo-advisor was a start-up called Betterment, launched with the aim of disrupting the traditional mode of financial planning. Robo Advisors like Betterment hope to achieve interests of their clients and, at the same time, money.

Moreover, they hope to make those outcomes accessible for all. Since 2010, the number of Robo advisors has grown to more than three hundred worldwide, including numerous start-ups as well as from large incumbents like Vanguard, Schwab, and TIAA building out their own Robo-advisory service.

Robo-advisory, automated web-based investment advisory, promises many advantages for both banks and customers, even if consumer adoption rate has been slow so far in its early stages. Recent studies suggest that this might be due to a mix of low trust in banks, high expectations of transparency and general inability or unwillingness to engage with investment questions.

Research in decision support and guidance shows customers' willingness to interact with a decision support tool depends greatly on its usability.

Through this literary report, aiming at analyzing the researches already published on the phenomenon, I evaluate the main sectors and fields that has been studied so far up to 2020. Splitting this analysis on several different aspects and dealing with once each time, I try to figure out the characteristics and patterns of the Robo-advisory industry, an event still under development nowadays.

3.1.2. Digital wealth management

Innovative products regarding the digital wealth industry enable firms to offer new services and to automatize financial services, creating many challenges for the incumbent traditional financial players of the sector.

Within this context, is interesting to analyze the opportunities created by the newly established tech firms, in order to get a deep understanding regarding the innovations they are offering.

IT companies started to increase the range of services provided in recent decades, also due to the financial crisis that resulted in loss of clients' trust for traditional established financial institutions such as banks. If on one hand classical wealth management companies focused on the regulatory requirements, on the other several start-ups exploited the opportunity to leverage their high-tech innovative features, building cheaper methods of financial advice assuring a clear and easy service.

Often supported by business angels and venture capitalists, these companies are starting to change the wealth management competitive landscape, being able to define alternative and innovative business models, extending the boundaries of this phenomenon. Digital registered investment advisors, also known as RIAs, try to provide simplified financial services through innovative and sophisticated IT online platforms, mostly eliminating any need of a face-to-face human relationship.

These startups, whose teams aggregate software engineers, user experience experts, business academics and also financial operators, can be divided in two major sub-categories regarding wealth management advisors: Fully automated digital wealth managers and Advisor-assisted digital wealth managers (EY Global Financial Services Institute, 2015).

Fully automated digital wealth managers: this fully automated investment services offers the client a diversified investment portfolio, taking into account various data related to each situation and customized on the specific customer, without any type of direct supervision from a financial human advisor.

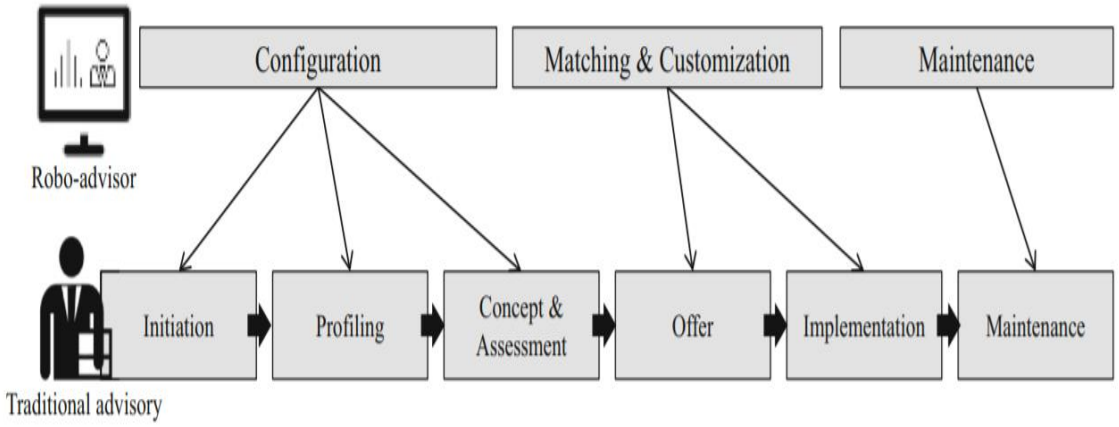
Customers must carry out a questionnaire about their situation and they risk degree willingness, so they receive a portfolio that best fits their requirements. This strategy of investment is often composed by low-cost ETFs (D'Acunto et Al, 2020), namely exchange-traded funds, and fully optimized on their specific needs. Cases of fully automated digital wealth managers are Betterment or Wealthfront, which are achieve huge increases in their revenues every year since their foundation.

Advisor-assisted digital wealth managers: having a digital client online portal, aggregated with a virtual financial advisor, these services were born with the main objective to provide easy financial planning or recurrent financial reviews through the smartphone. Since their creation, these services have developed every year and now play a key role in the digital wealth advisors' industry, we can take as examples companies like LearnVest or Future Advisors.

3.1.3. Traditional advisory vs Robo Advisory process

Human advisory services are structured in four (Cocca, 2016) up to six major phases. Several scholars (Nueesch et al. 2016, 2014; Kilic et al. 2015; Nussbaumer et al. 2012) suggest to define the human advisory process as divided into the following three phases of Robo-advisory: Configuration, Matching and Customization, Maintenance (Jung et al., 2018).

1. *Configuration*: in this phase (initiation, profiling, and concept and assessment phases of human advisory) can be reduced the information asymmetry between customer and advisor (Kilic et al. 2015).
2. *Matching and customization*: in the second step information is transformed into an investment recommendation: customers receive recommendations that fit their needs, based on specific algorithms, and then choose the better offer.
3. *Maintenance*: finally, this phase allows Robo advisors to revise the difference between the actual needs and the recommendation needs, and rebalancing (reconfigurations of the product) has to be initiated in case of a substantial deviation due to economic developments or changes of customer needs.



Source: Jung et al., 2018

3.1.4. Asset under management and future predictions

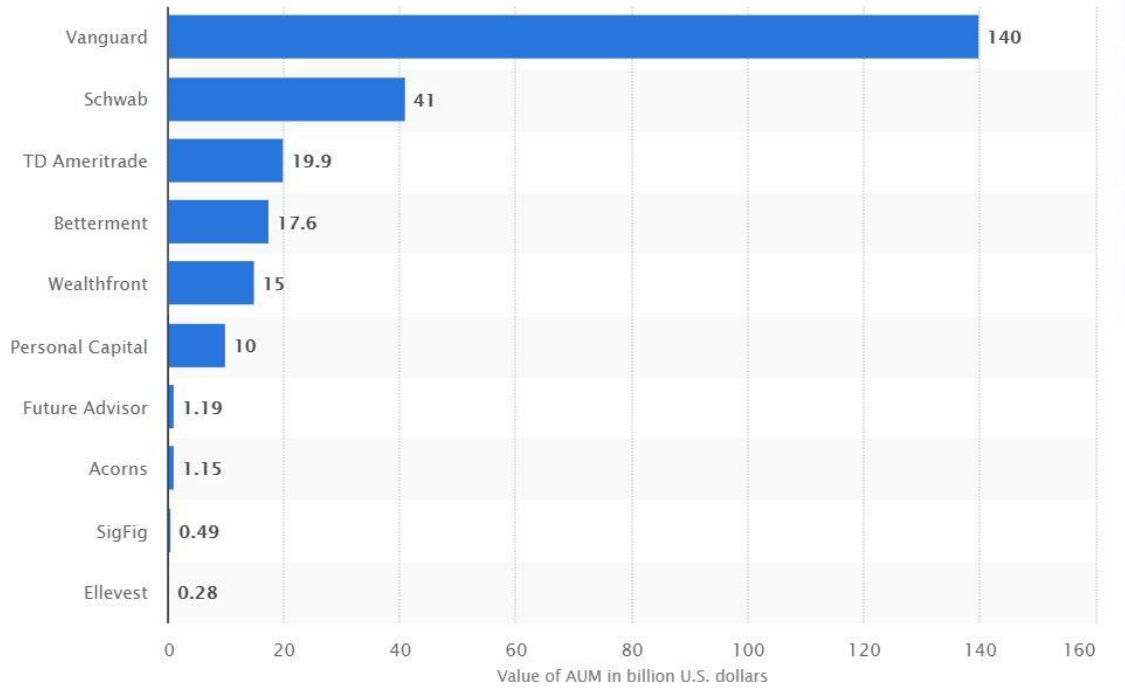
The volume of asset under management of Robo-advisors has been estimated in $20 billion (Vincent et al. 2015; Epperson et al. 2015).

Optimistic forecasts predicted that Robo-advisors will manage 10 percent of the whole wealth management industry by the end of 2020 (Kocianski 2016).

A more recent study from Juniper Research (2018) has found that Robo advisor platform revenues will reach $25 billion by 2022, up from an estimated $1.7 billion in 2017. The study found that this could improve total assets under management related to these services to $4.1 trillion in 2022 (from $330 billion, estimated in 2017).

According to Hayes (2019), this is not the case of a niche phenomenon at all: this author states that in the US, they manage three-quarters of a trillion dollars of client money (8.3 million users). His forecasts up to 2020, show a growth to more than $2 trillion, and by 2025 it is predicted to be around $7 trillion. This amount would be more or less 15% of all retail investment, as noticed by other scholars studying the same sector (Srinivas and Goradia, 2015).

As it can be easily seen in the graph, the Asset Under Management AUM of the top ten best Robo-advisors is huge, managing over 200 Billion of Dollars in their portfolios (Statista, 2020)



Source: Statista 2020

3.2. Innovative traits from the traditional process

Robo-advisory introduced in the advisory industry several innovative aspects, mainly with the aim to simplify and make the process easier. Moreover these newly established firms offer competitive prices and fees, making the service even more attractive to customers: even if the benefits associated with the automation process are tens, the major ones can be identified to be cost-effectiveness, excellent transparency, innovative marketing and optimal user-experience.

3.2.1. Literature review – Analysis of researches

Previous research mostly focuses on the design of portable or mobile financial advisory: Nussbaumer and Kilic (Kilic et al. 2015; Nussbaumer and Matter 2011; Nussbaumer et al. 2012b) provide design knowledge for establishing a required level of transparency in a dynamic advisory context, they identify transparency as a key requirement of Robo-advisors.

Kilic et al. (2015) examine how process rigidity during the information collection phase affects the relationship between the customer and the advisor. Nussbaumer et al. (2012a) investigate transparency issues in context of supported financial encounters, which are crucial in the first two phases of the process.

The study shows that 'process', 'information' and 'cost transparency' are relevant design factors for an IT artefact, and that a highly transparent design leads to improvements in customer satisfaction and willingness to pay.

Based on previous research, Ruf et al. (2016) derive design principles for a prototypical mobile advisory application, focusing on the three main design requirements: 'quality of the service', 'trust building' and 'balancing of information asymmetries'.

The evaluation of the designed artefact is carried out in focus groups with experts and shows that the investigated principles have mainly positive influence on the service quality (Ruf et al. 2016).

A paper from Nueesch et al. examines how the human advisory process can be complemented with mobile services like tablet-supported advisory (Nueesch et al. 2014, 2016). Ruf et al. (2016) identify customer-based design requirements for digitalized advisory services, validating them in the context of an iPad-application. Their findings

suggest that especially quality, trust, and information asymmetries are key factors in the design of Robo-advisory.
In another study related to the context of mobile advisory, the same authors identify the key factors of proactivity of the advisor service, social presence, access to experts, and privacy concerns (Ruf et al. 2015).
D'Acunto et al. (2019), analyze the main promises and pitfalls of the automated advisory process. In their work, investment choices are evaluated from a short-term and long-term view, including retirement plans and short-term investment opportunities related to the main Robo-Advisory services.

The study carried out by D'Acunto et al. (2020) examines this phenomenon proposing a so-called taxonomy of Robo-Advisory addressing it from four main dimensions:

- Degree of human interaction.
- Individual's involvement within main financial choices.
- Discretion to deviate from the automated advisor.
- Personalization of the advice service.

Moreover, the authors of the paper published by Munich Society for the Promotion of Economic Research (D'Acunto et al., 2020) focus on saving and investing behavior, analyzing both investment choices and allocation of financial resources.

Taken together, their findings indicate that intuitive and trustful communication with the advisor is at least as important as the offered investment recommendations.
Bahatia et al. (2020) argue that Robo-advisors still need to mitigate investor's biases while performing risk analysis and profiling the investors, they suggest that Robo-advisory platforms are not yet comprehensively self-sufficient to accurately perform risk analysis for retail investors.

3.2.2. Cost reduction for both providers and customers

To define price discrepancies between Robo-advisory firms and current online investment platforms or traditional financial institutions, we should highlight two main components: on one hand customers face low barriers to entry and a low fees for the service, on the other a cost-effective management of the whole advisory process.

Firstly, the minimum allowable balance is different among advisors but is never high, also remembering that the common client is a young individual, which are more likely to have relatively low amount of assets to invest.

The following Robo advisors require very low entry barriers for customers to start using the service and moreover their maximum barrier, namely around $10,000, is even very affordable and client attractive if compared with many entry barriers required by largely established Banks.

As remarked by a study (Friedberg, 2019), some Robo-advisors even allow customers to access a trial platform and so provide a "zero minimum balance" service to clients, as for example Wise Banyan. However, the industry main players are all focused on a very low initial minim balance, in order to be more competitive on the market, while assuring a first trust empathy with the new user, as it can be seen in this data regarding the barrier to entry of the main Robo-Advisors in US:

- *Folio investing* [$0]
- *Wise Banyan* [$0]
- *Acorns* [$1]
- *Betterment* [$1]
- *Ellevest* [$1]
- *Fidelity Go* [$1]
- *Hedgable* [$1]
- *Wealthsimple* [$1]
- *Wisebanyan* [$1]
- *Stash* [$5]
- *SoFi* [$100]
- *M1 Finance* [$100]
- *Wealthfront* [$500]
- *SigFig* [$2000]
- *E-Trade Adaptive Portfolios* [$5,000]
- *Schwab Intelligent Portfolios* [$5,000]
- *TD Essential Portfolios* [$5,000]
- *Future Advisor* [$10,000]

Apart from the initial investment required, another key advantage of Robo-advisors are low fees, which can guarantee them to be often the most competitive alternative if compared with a classic financial advisor.

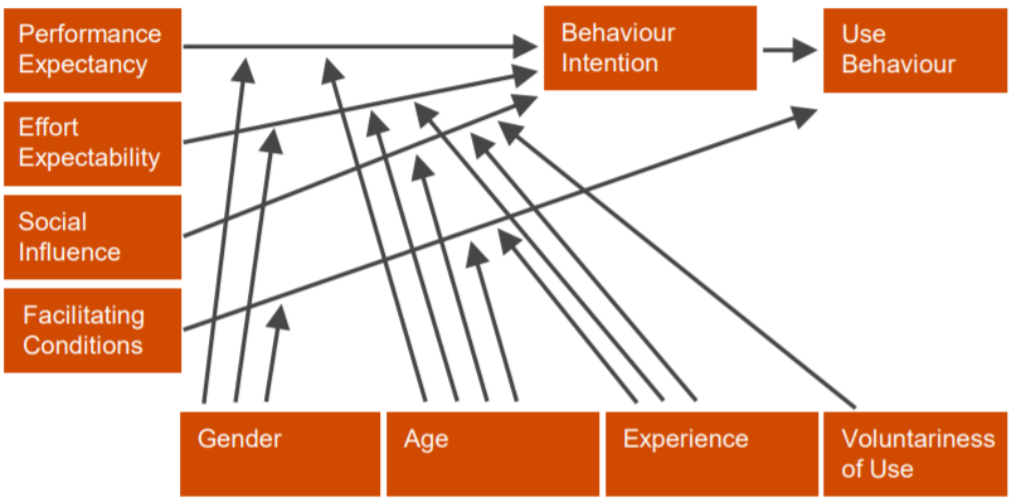
Although most existing incumbent companies earn a fee that equals more than 1 percent on assets under management (AUM), digital entrants leverage controlled Exchange Traded Funds and single-stock investment portfolios. Providing this type of service, these startups can offer much lower pricing for diversification of assets: in fact, the average fees of Robo-advisors are around 0.25% - 0.50%, being often more than twice cheaper when compared with traditional financial advisors.

3.2.3. Greater transparency and trust

Not only charging lower rates for their services, these startups also provide greater transparency by revealing how much users are going to pay and when it is going to happen. This structure basically implemented the traditional payment services, where customers faced complex fee schedules offered by many companies such as banks, therefore making it difficult for the customer to understand exactly how much they will pay.

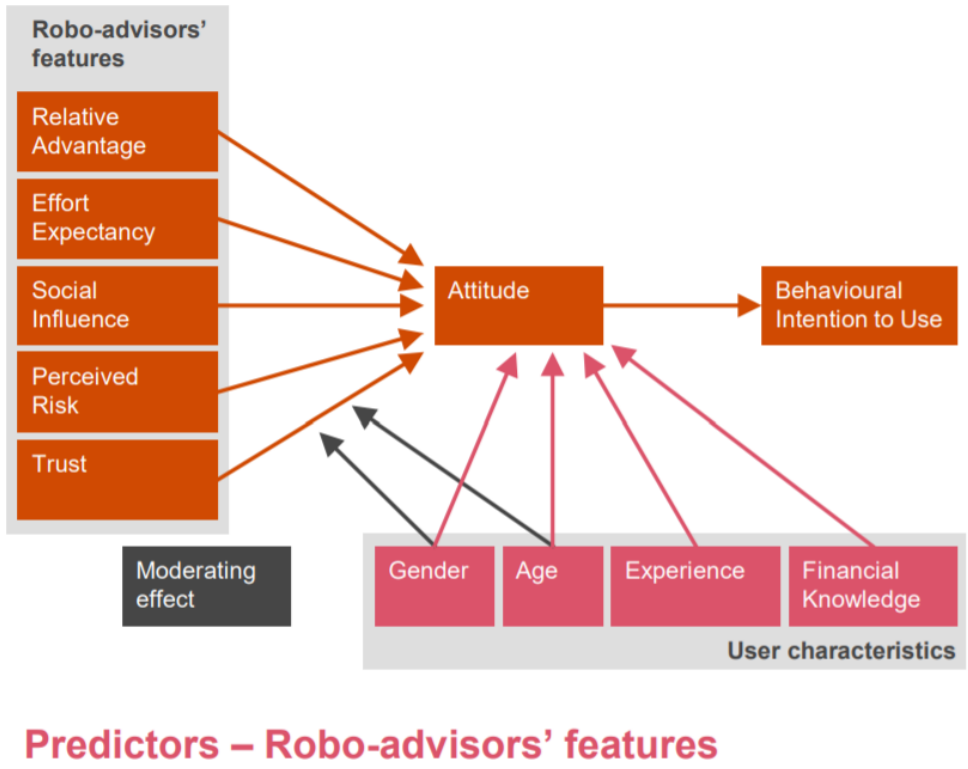
Often Robo-advisors earn fees that are explained through online fee analyzers and clear notifications, confirming the already said focus on user experience.
Being one of the largest networks of advisors in Italy with more than 236,000 professionals dealing with legal-assurance and consultancy (PwC, 2020), PricewaterhouseCoopers PwC analyzed the phenomenon of Robo-advisors in Italy in a specific study (PwC, 2019).

The study used an Ordinary Least Squares regression, based on 635 Italian staff members of the company, to test the study's hypotheses. These hypotheses were based on an conceptual model adapted from the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), introducing new variables on FinTech adoption considered to be important by many scholars, as already defined in the Fintech chapter in this paper.



Original Unified Theory of Acceptance and Use of technology - Source: Venkatesh et Al., 2003

This research focused on how this industry is perceived by individuals, specifically using a regression method in order to evaluate the various factors. The research analyzes the multiple perceptions and behaviors influencing investors' attitudes, the principal contribution of this analysis is to describe the strengths and limitations of Robo-Advisory services and how those are perceived by Italian investors specifically.



Model of UTAUT adapted on Robo-advisory context for the OLS Regression - Source: PwC, 2019

The study found many key metrics and industry-specific indicators related to several variables used, as from the key finding identified below (PwC, 2019).

The perceived relative advantage is positively correlated with the attitudes of individuals towards robotic advisors. Moreover, it was found that people who view robotic consultancy services as difficult to use are less likely to achieve optimistic attitudes. Furthermore, behavior of individuals towards Robo-advisory was found to be positively correlated to social effect regarding Robo-advisory adoption: when someone close to them supports the use of the service, people are more likely to develop favorable attitudes towards Robo-advisors.

Finally, as the financial key finding of the study, there was no substantial association between financial knowledge and attitude, meaning that the greater knowledge does not affect the attitudes of individuals toward Robo-advisory services (PwC, 2019).

Variable	N	Mean	St. Dev	Min	Max
Attitude	635	9.8	2.4	3	15
Behavioural intention	635	3.9	2.6	0	10
Relative advantage	635	13.1	2.8	4	20
Effort expectancy	635	10.3	3.0	4	20
Social influence	635	13.9	3.5	5	25
Perceived risk	635	8.6	2.5	3	15
Trust	635	6.7	1.7	2	10
Female	635	0.3	0.5	0	1
Age	635	34.6	9.3	18	61
Experience with robo-advisors	635	0.1	0.3	0	1
Subjective financial knowledge	635	5.4	2.2	0	10
Education	635	5.0	1.1	1	8
Financial sector	635	0.4	0.5	0	1
Job position	635	3.2	1.8	0	7
Investing experience	635	4.2	6.9	0	30
Understanding	635	4.0	2.6	0	10
Objective financial knowledge	311	5.5	2.7	0	10
Confidence	311	5.4	2.3	0	10
Overconfidence	311	-0.2	2.1	-6	10
Current use of robo-advisors	55	0.5	0.5	0	1
Willingness to recommend robo-advisors to others	27	6.8	1.8	4	10

Source: PwC, 2019

Addressing specifically the "trust" variable impact, using a sample of 635 workers, this report asked each one to say on how much in a scale from 1 to 10 they agreed with these two sentences:

"*I believe Robo-advisory services would keep my personal information safe*"

"*Overall, I believe Robo-advisory services can be trusted*"

Variable	N	Mean	St. Dev	Min	Max
Trust	635	6.7	1.7	2	10

Source: PwC, 2019

As available from the data in the graph on "Trust", the mean of the answers was 6.7 and a standard deviation of 1.7, an additional evidence to confirm the high trust the customers and the common individual have to this new phenomenon.

The introduction of Robo-advisors could allow more effective supervision of compliance with the adequacy principle since the most common violations concern the compilation of the profiling questionnaire after the investment choice and a forcing of the adequacy assessment. The use of algorithms will allow an ex post control of the procedure followed on the archive of the executed transactions.

3.2.4. Modern marketing and communication

Newly established financial advisory companies changed the way to communicate to customers: in fact, while many traditional firms in this sector defines marketing as to be tied to printed advertisement and old communicational skills.

Instead, new these startups have taken the help of professionals to reach their customer base through modern and personal media material, moreover they focused strongly on the social media marketing, platforms ignored by most of incumbent financial advisory firms until the very last years.

Emphasizing information sharing, these companies promote personal finance awareness and offer valuable content online, enabling mobile devices to be the main actor within their communication. Using tools such as chat-bots and FAQ pages, these firms try to

connect users with their mission, creating a relationship of trust that often was missing in the process within traditional banks.
Focusing on human relations and financial education, through an excellent mobile app or an optimal website, emphasizing on the investor and understanding its needs to convert them in a specific communication, based on trust and commitment.
Using social media marketing and other modern tools such as "*lookalike audience*" on social networks or interactive newsletters or landing pages, this firms target their products to young generations.

An interesting study (Schweitzer, 2019) evaluated the adoption rate of Robo-advisors among the different generation, namely *Generation Z* for around thirty years old and *Millennials* for people around twenty years old.
The results are a clear evidence of how these innovative services are focused on the younger generations, in fact only 9% of investors aged older than forty-seven were using Robo-Advisors. Furthermore, when the investors surveyed were Millennials this percentage increases and results to be 31%, more than three times compared to the other one. Finally, Robo-advisory firms target customers also called "*Mass affluent*", a term used for investors with low or medium amount of assets to invest in their services, generally intended as assets to be in between 25,000 $ and 250,000 $.

3.2.5. High-level user experience

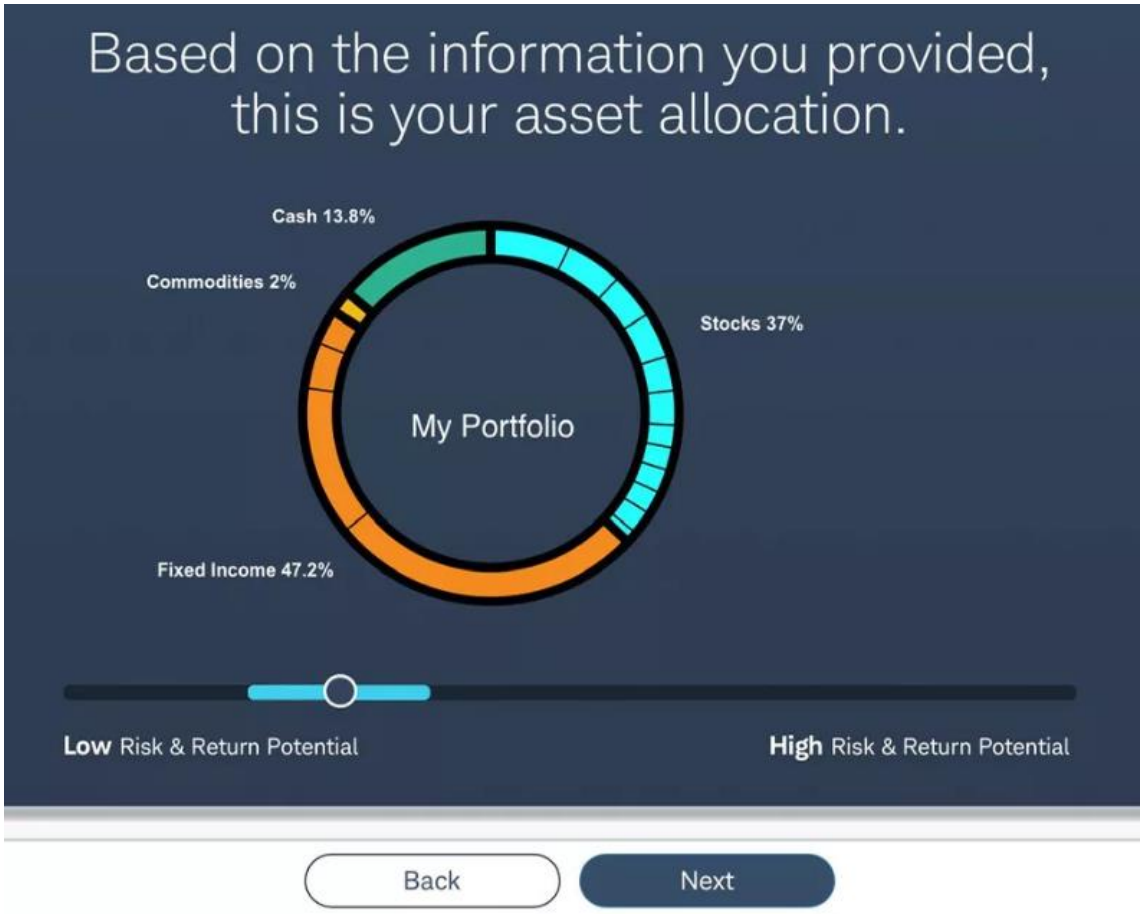
The continue focus on a client-driven structure and constant advancement are a huge innovation in financial advisory industry, moreover the capacity to coordinate them in a consistent way and being able to convey them through a straightforward and instinctive user interface makes it an high level experience for the customer.

If in the classical view financial institutions such as large Banks or Insurance companies evaluated innovation as fundamentally focused for the worker efficiency and administrative productivity, these firms support the contrary thesis: using optimal designed online platforms and easy digital mobile Apps, the technology is seen as client customer centric and aimed at simplifying users process.

Taking a practical example, we can analyze the Charles Schwab case: selected in the TOP 50 world's most admired companies by Fortune Magazine (Bloomberg, 2020), this company provides a service with an excellent user interface. As in the figure below, we can see the step just after completing the main questionnaire about the client's specific degree of risk and evaluation. Completely online, the user can choose on the lower bar the level of risk of the investment, the Intelligent Portfolio proposes the best allocation of securities and stocks: safe and easy, in few minutes the customer can have a clear understanding of how their assets will be allocated on the portfolio.

This process is completely not binding or forced, as it could instead have been in some scam cases, giving the client the perfect control over the whole investment decisions.

Moreover, the site provides for an online chatbot and real-time human assistance in case of need, delivering full aid to the user.



Source: Charles Schwab Intelligent Portfolios

3.3. Identifying the role of AI and machine learning

The whole Robo-advisory process relies on automated technological tools and techniques, ranging from relatively simple computer algorithms that balance the investment portfolio and computes the recommended asset allocations to highly innovative machine learning based procedures.

Many firms and magazine consider artificial intelligence and machine learning as the new disruptive power in many industries, including the financial one.

Anyway, it is a phenomenon still evolving and so not easily predictable, as expressed by Muro et al. (2020) in an interview on Forbes magazine:

"*Quantifying the overlap between the text of AI patents and the text of job descriptions… to identify the kinds of tasks and occupations likely to be affected by particular AI capabilities*."

3.3.1. Literature review – AI and Machine learning

Artificial Intelligence systems are included in some algorithms related to the Robo-advisory process. A recent study estimates the neurons' sensitivity to different input parameters: the author founds that selected hidden units are not only specializing in the reaction to risk, return or risk-aversion level but also they are learning more complex concepts like Sharpe ratio (Semko, 2019).

Fernandez and Gomez (2007) analyzed how portfolio selection can be based on Artificial Neural Networks, developing a method based on Hopfield-type Artificial Neural Network to solve portfolio optimization.

Ko and Lin (2008) introduced multi-layer resource-allocation within Artificial Neural Network to guarantee that portfolio weights summation constrain is hold: they adjusted weights dynamically and modified via learning rate (in contrast to conventional Artificial Neural Network).

As from a study on the specific Italian Robo-advisory industry from PwC (PwC, 2016), scholars identified two main models of services in the Italian market for robo-consultancy:

- An hybrid advisory model, where the user can manage its decisions and investments online, while a human individual advisor helps to solve any issue. In

this model the user can choose to which degree of robo-advisory his portfolio will be influenced and managed.

- An online platform model, with a number of fixed options for investment choices for the user. The client can decide among multiple pre-defined possibilities, with no customization of investment and moreover mostly based on common objectives rather than on the individual or specific ones.

Furthermore, Jupiter Research, one of the leading analyst firms in the FinTech sector, addressed the phenomenon of automated consultancy in a paper by Nick Maynard called *Roboadvisor Platform Revenues to Reach $25 Billion by 2022, As Automation Drives Wealth Management* (Maynard, 2018).
The report identifies the great importance of artificial intelligence and machine learning, as well as for automated technologies, for the industry of robo-advisors, as it explained directly the author of the research:

"The technologies powering Robo-advisors will mature to such an extent that they move from their current human supervised role to being utilised in a fully automated way. This will be aided by track records of performance automated Robo-Advisor systems are establishing."

Nick Maynard (Jupiter research, 2018)

3.3.2. Evaluating the impact of artificial intelligence

Artificial intelligence affected the industry in various aspects, each time differently, and consequently Robo-Advisory was completely changed during the last years. Analysing the industry and evaluating its main features, it is possible to create several models to differentiate the hundreds of firms within the ones who provide modern financial advisory services with the aid of AI and machine learning.
There are three main categories (PwC, 2016) within this industry, differing on multiple characteristics, starting from the role of artificial intelligence and machine learning in them: *Pure Robo-Advisors*, *Hybrid Robo-Advisors (*which comprehends both *Segregated Robo Advisors* and *Fully integrated Robo-Advisors)* and *Robo-4-Advisors*.

3.3.2.1. Pure Robo-Advisors

Pure Robo-Advisors; these advisors provide a Business to consumer service, directly addressed to the retail client, in which the automation characterizes each step of the consulting and process, fully cancelling the involvement of the human element into the management procedures. Pure Robo-Advisors, also called stan-alone Advisors, are legal entities with the highest level of independence among all these different models: their independence allows them to provide independent advice according to MiFid II.

The independent Robo-Advisor itself has to specify all policies, such as anonymity and privacy, suitability, processes, and risk management. Risk factors for these firms include the operating costs, the expense of recruiting clients and higher standards for compliance. Potential model innovations include provision of portfolio management services, creation of financial planning services focusing not only on selling investment products, but also on retirement options.

3.3.2.2. Hybrid Robo-Advisors

Hybrid Robo-Advisors; based on a business to consumer model, it includes *Segregated Robo Advisors* and *Fully integrated Robo-Advisors.* Being at an intermediate level and combining human and digital component in one or more phases of the service supply, moreover their service allows the intervention of a human consultant if the investor needs aid.

In this model, also called "assisted model", the investment managers have a main importance in the sales process while at the same time the user has the possibility to manage his investments using digital services, in order to review portfolios.

Hybrid Segregated Robo Advisors; this term refers to an advisor collaborating with a banking group but not totally integrated in it. The bank can hold distribution agreements with the provider of the product, namely the manufacturer, so in this category the key issue concerns the Robo Advisor's degree of freedom.

It is possible the creation of two different situations within this model, in fact the bank can hold the inducements or not, consequently changing the effects on the advisory process.

The Robo-Advisor is independent, if the bank does not hold inducements, and moreover the advisor can be seen as the Wealth Management Division of the bank, while the bank offers investment advice and order transmission only through the Robo-Advisor.
When instead the bank holds inducements consequently the Robo-Advisor is not independent, now intended as a financial advisory division, and the bank, while retaining inducement as a distributor, offers portfolio management through the Robo Advisor.

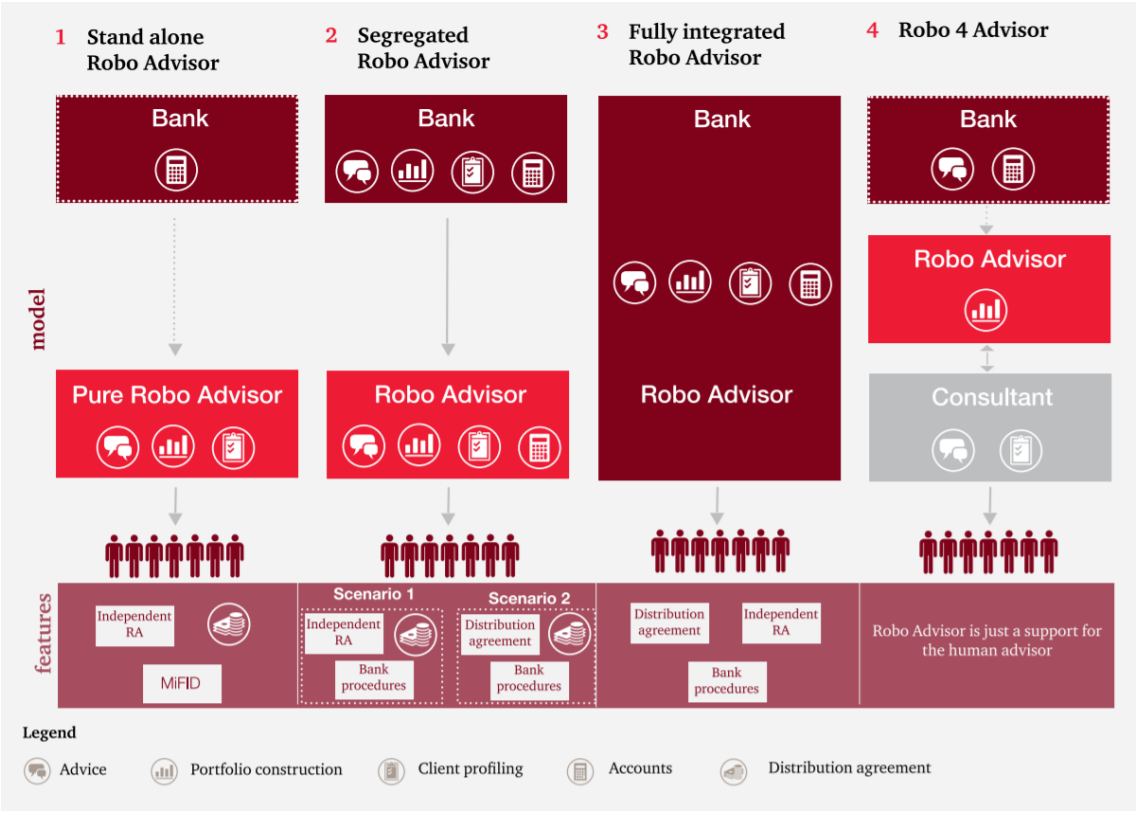
Hybrid Integrated Robo Advisors; in this case the Robo-Advisor does not exist independently, being neither an independent company nor a separate legal body: the Robo-Advisory service is a part of the business model of the bank.
The Hybrid Integrated Robo-Advisors is actually only a part of the bank's online services, in this way the users of Robo-Advisory services become Bank clients.
Given that the advisor is part of the bank, it does not need any further authorisation to provide portfolio management. It is closely linked to the bank and relies on bank decisions for its independence, in fact it is autonomous only if the bank decides to provide autonomous advice power to the Robo-Advice.

3.3.2.3. Robo-4-Advisors

Robo-4-Advisors; characterized by a business to business model, it is not addressed to the end client but to the manager, who uses it to improve his consultancy activities for the end-customer. Able to increase the efficiency of the consultancy process without making fundamental changes to the client's experience, this solution remains mainly a direct face-to-face contact and the bank could gain a higher income by using technological and automatic tools for financial advisory.
Robo Advisors' platform is only a supporting tool used by a human advisor who makes the investment recommendations: the advice is not completely automated, because the consultant is the advisor, not the platform itself. In this case the Robo Advisor is actually acting as a portfolio manager, its proposed portfolio may not be approved, and there is no compulsory relationship between the bank and the Robo-Advisors. The human financial advisor, that is who earns the fee commission, is the one who guarantees the suitability of the advice.

3.3.2.4. Overview of Robo-Advisory categories

As it has been clearly identified by the figure below (PwC, 2016), the landscape of Robo-Advisory is complex and still evolving nowadays, creating challenges as well as opportunities to traditional financial advisory companies.



Source: PwC analysis, 2016

3.3.3. Robo-Advisory 4.0: machine learning in financial advisory

Being a dynamic industry and still in development, Robo-Advisory has been hugely affected by the advent of Artificial intelligence algorithmic software that are able to gain from experience, also known as Machine Learning Intelligence.

These effects consequently led to four different phases of the Digital Advisory phenomenon, starting from the Robo-Advisory 1.0 which began around 2008 and arriving at the one common nowadays which is strictly related to machine learning, namely Robo-Advisors 4.0.

3.3.3.1. Robo-Advisor 1.0 – Digitalizing the process

After answering a questionnaire to select suitable choices, customers obtain single-product proposals or portfolio allocations based on the listed investment products. This recommended investment service is provided using mobile apps or in the first years the internet, furthermore the execution of this investment, when it is chosen by the client after the proposal, occurs without any bank involved in it.

3.3.3.2. Robo-Advisor 2.0 – Automated Rebalancing

Starting from Robo-Advisors 1.0, this phenomenon evolved with many new features: the assets distribution is executed by human managers, highly qualified in the financial sector and that manually controls the investments operations.

Using various questionnaires is possible to map the client range of risk in order to allocate portfolios in the best way possible, in fact the investments occurs through semi-automatic algorithms that are set up by the investment manager. Then the artificial intelligence does a portfolio rebalancing operation, the whole process is controlled and supervised by a human advisor in charge of managing the whole process.

3.3.3.3. Robo-Advisor 3.0 – Predefined Investment strategies

This version of Robo-Advisors is similar to the former one, indeed it begins from the client profiling after the survey and proposes the investment strategy that is the best one for that single customer. The artificial intelligence here has the role of creating predefined investment strategies and then to recommend the one that fits in that specific situation. Investment decisions are based on algorithms which track and satisfy the client needs, finally a qualified fund manager have final oversight over the situation.

3.3.3.4. Robo-Advisor 4.0 – A Machine learning advisory

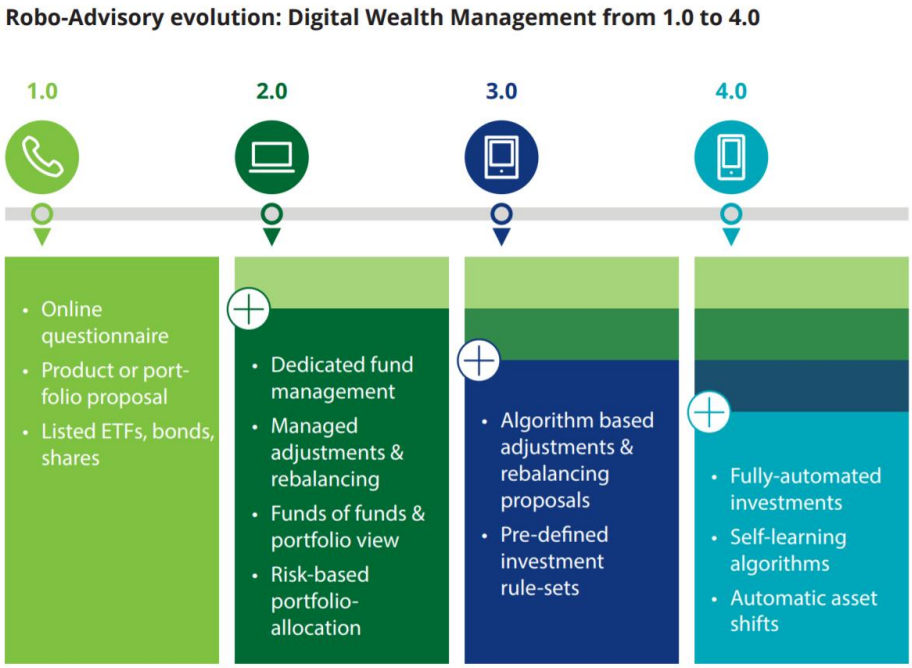
In the last years, the Robo-Advisory industry highly developed many of its technological aspects with the use of Artificial Intelligence, which has strongly improved using an advanced machine learning tool which can disrupt the whole financial industry.

McKinsey & Co defined machine learning as: *"Machine learning is based on algorithms that can learn from data without relying on rules-based programming."*

The main characteristic of this new technology is that it improves its knowledge of a given task the more it performs that task, this enables the artificial intelligence to provide excellent performances that are massively better than the ones of a human being. Using this technological tool, the Robo-Advisor lead directly to the investment process without the aid of a human advisor at all: analyzing hundreds of asset classes the intelligence bases its recommended investment on changing market conditions and individual investment needs.

3.3.3.5. Development of the phenomenon

The evolution of the industry from Robo-Advisory 1.0 to Robo-Advisory 4.0 is optimally evaluated in the infographic below, constructed in a specific report about Digital Wealth Management development by Deloitte (2016).



Source: Deloitte, 2016

This automated artificial intelligence process allows to provide multiple services, while keeping any of them to be on a high-level performance. The Robo-advisors with the most valuable AUM currently offer tens of services to customers, with the most common ones being financial planning, Exchange-traded funds ETF, Automated rebalancing, dividend reinvestment, tax-loss harvesting, individual stock purchase, account aggregation, asset allocation and automated deposits (PwC, 2019).

4.Business model sustainability: comparing incumbents vs startups using the YellowAdvice vs MoneyFarm case

4.1. Analysis of MoneyFarm case

MoneyFarm is a company founded by two start-uppers. The president of the company, *Paolo Galvani*, was CEO of an Italian SGR and "deputy-head" of the Private Banking activities of a Bank group abroad. He then moved to London, which he left in 2008 looking for a new business paradigm in the world of financial services, traditionally unwilling to innovate, he then co-founded *Prestiamoci*, an Italian peer-to-peer lending start-up company.

The second founder, *Giovanni Daprà*, is an expert in quantitative finance, together they founded *MoneyFarm* in March 2011 with the aim of offering a financial service aimed at a medium-small investor, for whom it is difficult to find access to independent advice.

4.1.1. Development phases and fundraising

First step: a pure Robo-Advisor without orders execution entering the Italian Market

The company was initially founded in 2011 as SIM authorized by the Bank of Italy to provide financial advisory services. In the first founding round on 1st March 2011, also known as *Seed Investment Round*, the startup raised € 700,000 from two venture capitals who believed in the project, namely *United Ventures* and *Jupiter Venture* (Crunchbase, 2020). In the beginning, the customer had to independently provide for the subsequent execution of orders, client care service was a sort of help for technical problems that raised during the process. On 1st August 2012 MoneyFarm raises € 3,000,000 from the *Venture Investment Round*, from *United Ventures* and *Principia SGR*.

Second step: a pure Robo-advisor with orders execution, moving to the UK market

In a second step, thanks to the partnership with a Bank, *MoneyFarm* has internalized the execution phase alongside the consultancy activity in the field of investments, the receipt and the transmission of orders. The 1st of January 2014 receives € 700,000 from an *Investment Round*, in which took part *United Ventures* and an individual investor, *Vittorio Terzi*.

On July 2015 MoneyFarm receives the approval of Financial Conduct Authority and moves to UK, where he moved its headquarters and offices. On 9th November 2015, with its *Series A Investment Round*, the startup raises € 16,000,000 from *Cabot Square Capital*, a leading investor for financial services in UK.

The service is launched on the UK Robo-Advisory market on February 2016. Following the acceptance of the recommendations by the customers, this process enables the company itself to proceed to execute the orders at Bank, which finally completed them. The customer then had an account in that Bank with securities deposit and customer care service helped people in selecting assets. Some months later, on September 2016, *Allianz X* entered the *Series A Investment Round*, investing € 7,000,000 in the project of the company and becoming a strategic investor.

Third step: asset management player with a blended model and the acquisition of Ernest

Then, following the request by *Moneyfarm*, Consob revoked the authorization to operate as a SIM. Therefore, starting from January 2017, the company can no longer provide investment services and in fact it has modified its business model passing from the advisory service to asset management. The client relies entirely on the manager, who no longer needs to accept the recommendation to operate.

On 26th of January 2017, with its sixth *Venture Investment Round*, the company received financing from *Upscale*, a firm that helps UK Fintech companies to accelerate their growth, with more than 100 active investments made. Furthermore, on October 2017 *MoneyFarm* acquired *Ernest*, an Italian Startup based in UK which is an AI-powered personal banker that combines natural language processing technology with machine learning: the chatbot answers user questions and sends constructive alerts (*Techcrunch*, 2017).

It is a personal financial advisor who uses the data collected from the bank transactions of the user to provide customized statistics and guidance for a better and more effective management of their personal finances by communicating via *Facebook Messenger*.

MoneyFarm aims to completely merge *Ernest*'s technology with its investment-service site, the chatbot technology will integrate with *MoneyFarm*'s advisory process to allow the company to provide even more personalized financial advice built around each individual specific spending habits and attitude to risk.

Fourth step: pension products and the German Market

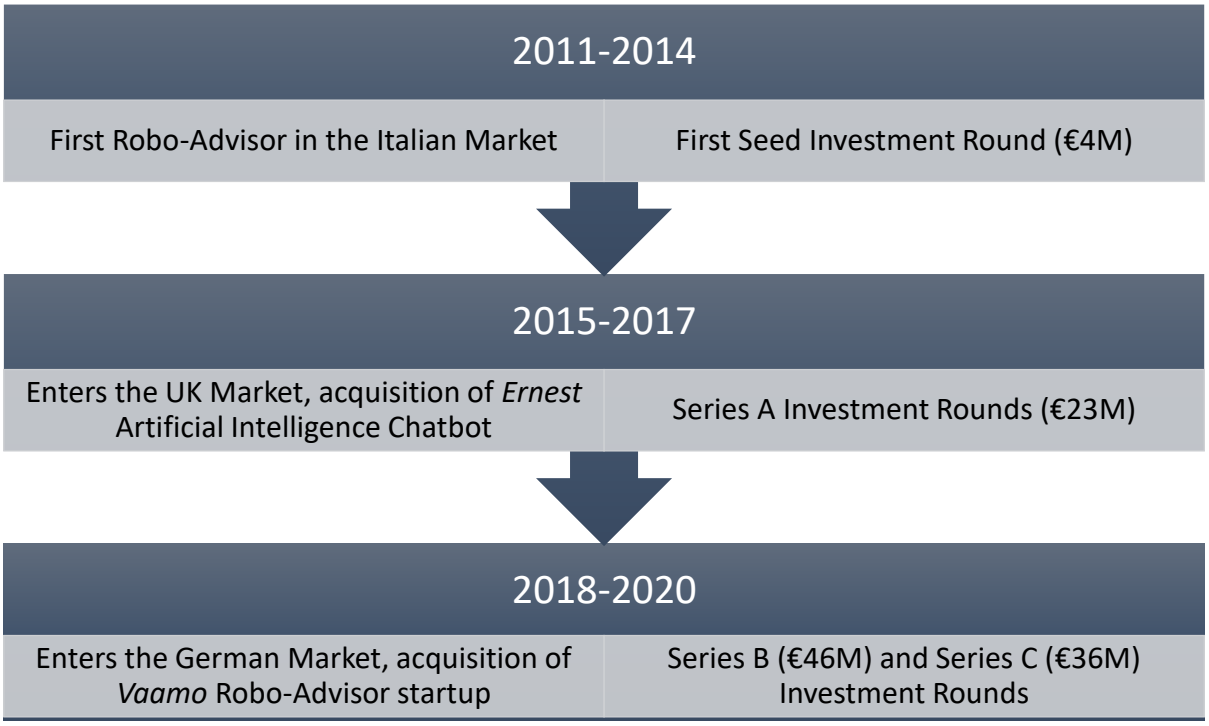
From 2018 onwards, *MoneyFarm* continued to grow and consequently to add products and services to their options, in fact they launched the Pension Product service in that year. Basing their service on "*Pay less tax today and tomorrow: receive up to 45% tax relief on your contributions and enjoy tax-free cash retirement*", the main features of this product are:

- Save on fees
- Easily plan for the retirement you want
- No hidden costs
- Free income drawdown
- Target date approach
- Real diversification
- High security

In the *Series B Investment Round* on May 29th2018, *MoneyFarm* raised additional € 46,000,000 from several investors: specifically *Allianz, Endeavor Catalyst, Cabot Squadre Capital, United Ventures* and *Fondazione di Sardegna*. On November of the same year the company completed a partnership with *Banca Sella*, an Italian prestigious bank, and the acquisition of *Vaamo*, the first online financial advisory firm in Germany and today among the main active Robo-Advisors in the whole country. This operation led *MoneyFarm* to enter the German market of Robo-Advisory, after moving to the UK one in 2015. After entering this new market, *MoneyFarm* raised € 36,000,000 in the *Series C Investment Round* on September 2019, with the main players of *Poste Italiane S.p.A.* and *Allianz*, which became the lead minority investor in the company.

Up to today 2020, the startup received over $127,000,000 of investment and counts more than 40,000 clients in Europe, with an increase of more than 300% from 2018 (MoneyFarm, 2020) and it provides one of the best Robo-Advisory services, furthermore it is active in three different markets: Italy, UK and Germany.

MoneyFarm evolution timeline



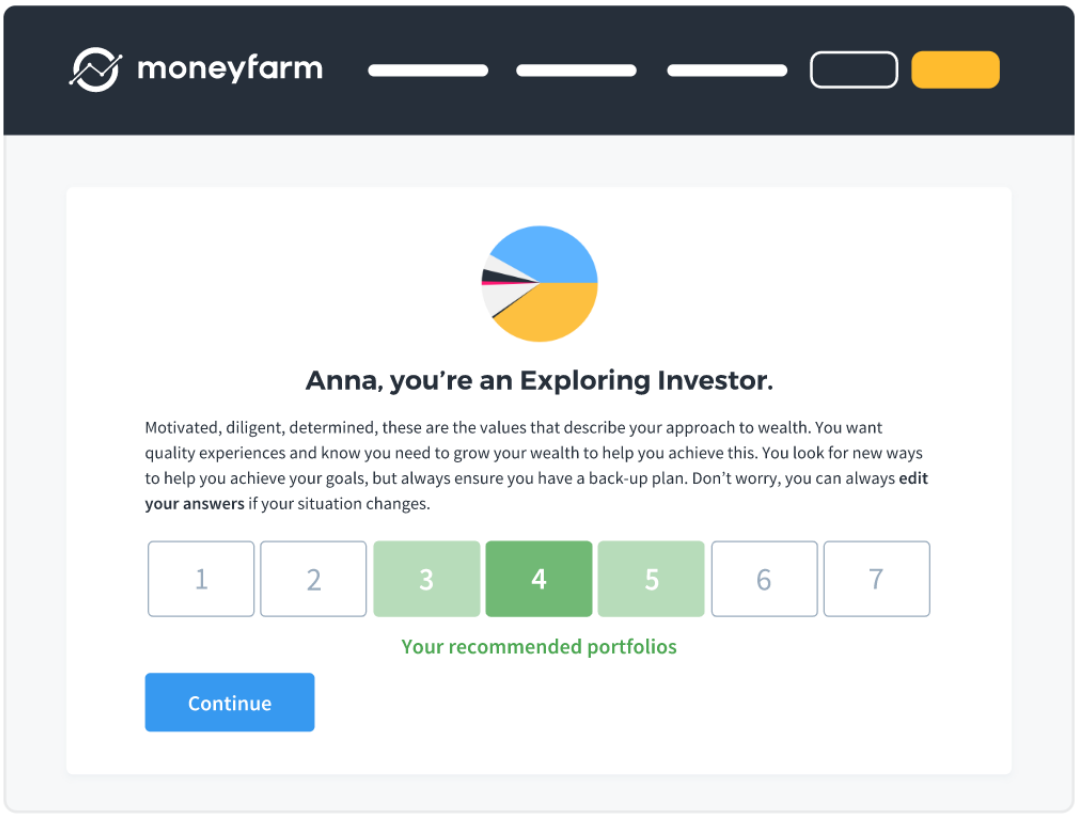
Source: Own Production based on MoneyFarm, 2020

4.1.2. Portfolios and asset allocation

Firstly, the client has to give multiple information to the Robo-Advisor, which we can summarize in three main aspect:

- the financial situation in case of losses
- the experience of the user as an investor
- the degree risk of the client

Starting from these details, the digital investment advice recommends a portfolio and a specific product choice: then the client can re-define these with his personal investment adviser.

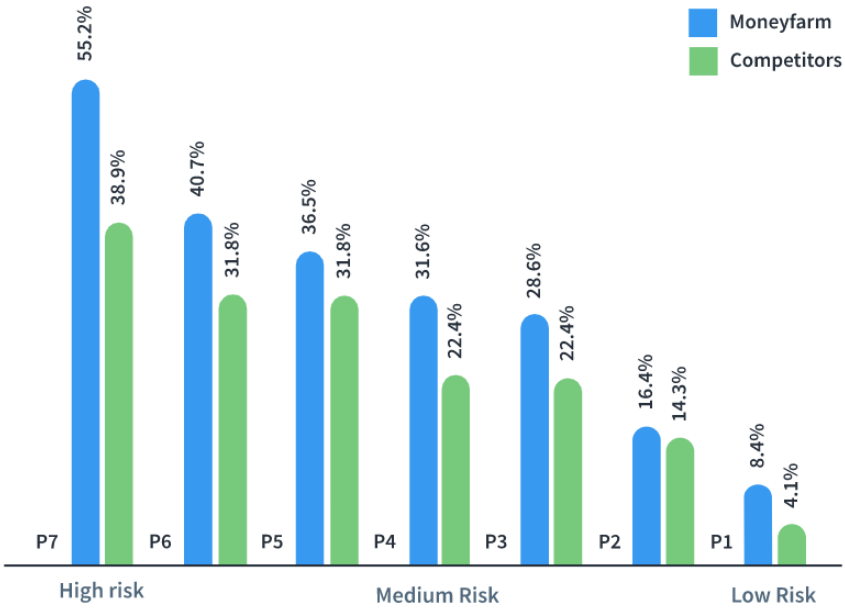


Source: MoneyFarm, 2020

The advisor chooses among seven different pre-defined portfolios, each with his specific risk degree level and a unique asset allocation.

MoneyFarm, in order to provide further degree of diversification, uses selected high-quality ETFs, hoping to help the user shield his portfolio from the ups and downs of individual stocks.

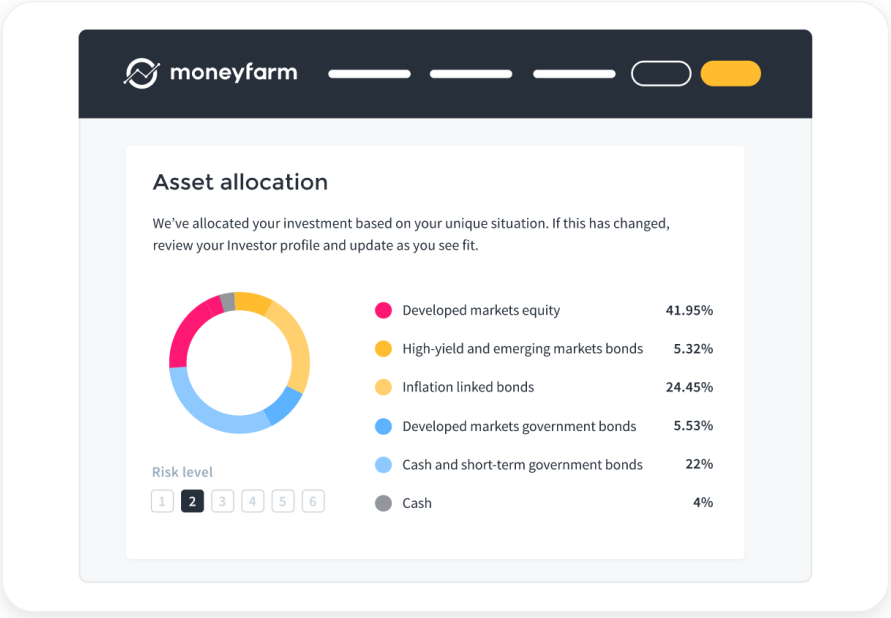
MoneyFarm portfolios, from high risk to low risk



Source: MoneyFarm, 2020

The portfolio is accessible anywhere and at any time, both on the website online or through the specific App, so that each investor can manage it whenever he wants.

By combining different asset types, regions, and currencies that display low correlation (they don't move in the same direction at the same time), the advisory service seek the highest potential returns consistent with the risk degree of that specific customer profile.



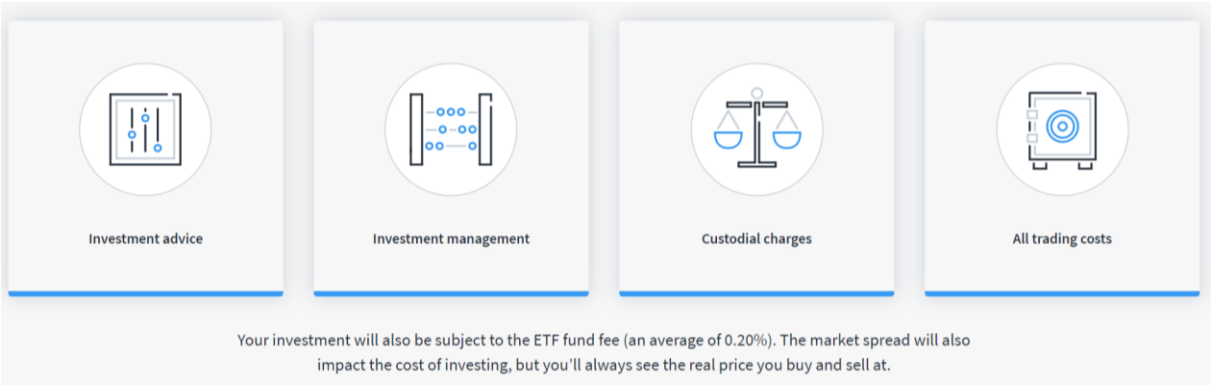
Source: MoneyFarm, 2020

4.1.3. Pricing strategy

Already identified as one of the key advantages of Robo-Advisory, the pricing strategy of *MoneyFarm* is one of the main competitive advantage that the start-up has on the competitors.

The customer costs are in fact very clear and transparent, moreover these fees, which include investment management and advice as well as the custodial charges, rely on three main features:

- No initial fees for opening an account with *MoneyFarm.*
- The client can unsubscribe whenever he wants, no extra-costs hidden.
- The customer is not charged of any commission for making the transactions.



No set up or subscription fees

We never charge you for opening an account.

No trading fees

We never charge an additional commission or fee for making transactions.

No obligations

We allow you to withdraw or unsubscribe from our service whenever you want, with no penalty and at no extra cost.

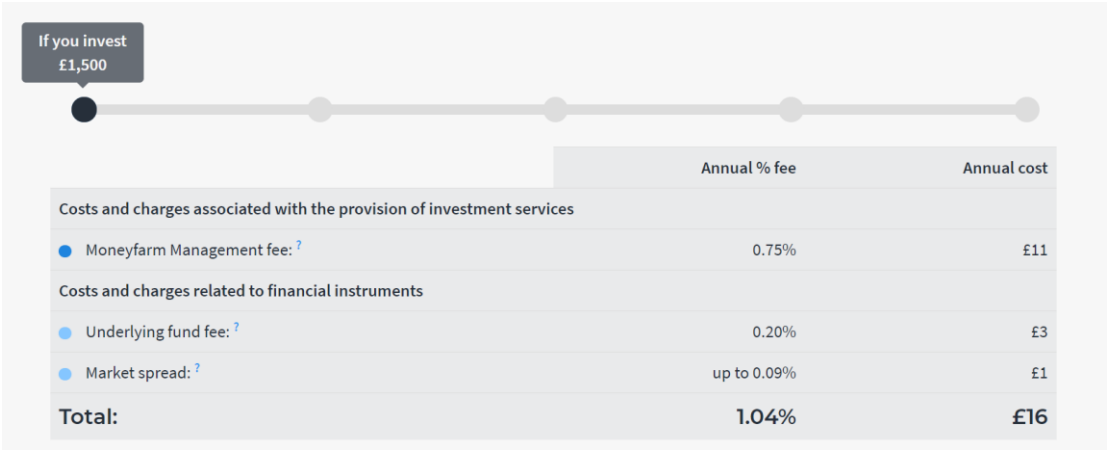
Source: MoneyFarm, 2020

Based on the transparent fees and costs already mentioned (*MoneyFarm*, 2020), let's analyze five scenarios with different hypothetical customers using the Robo-Advisory service provided by *MoneyFarm*:

- Scenario N1 - Customer Investment = £ 1,500
- Scenario N2 - Customer Investment = £ 10,000
- Scenario N3 - Customer Investment = £ 50,000
- Scenario N4 - Customer Investment = £ 100,000
- Scenario N5 - Customer Investment = £ 2,000,000

Scenario N1 – Customer Investment = £ 1,500

Annual Fee – 1.04% ; Annual Cost - £16

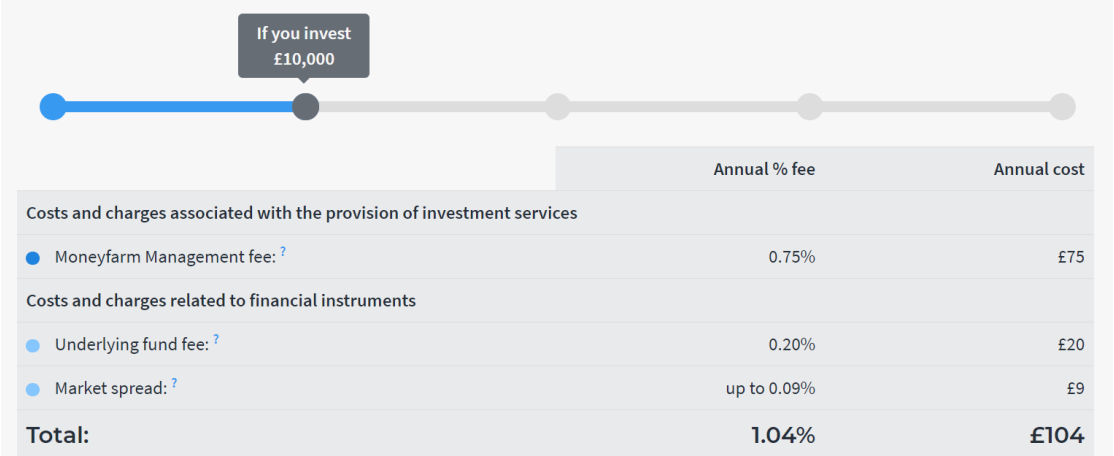


	Annual % fee	Annual cost
Costs and charges associated with the provision of investment services		
Moneyfarm Management fee:	0.75%	£11
Costs and charges related to financial instruments		
Underlying fund fee:	0.20%	£3
Market spread:	up to 0.09%	£1
Total:	**1.04%**	**£16**

Source: MoneyFarm, 2020

Scenario N2 – Customer Investment = £ 10,000

Annual Fee – 1.04% ; Annual Cost - £104

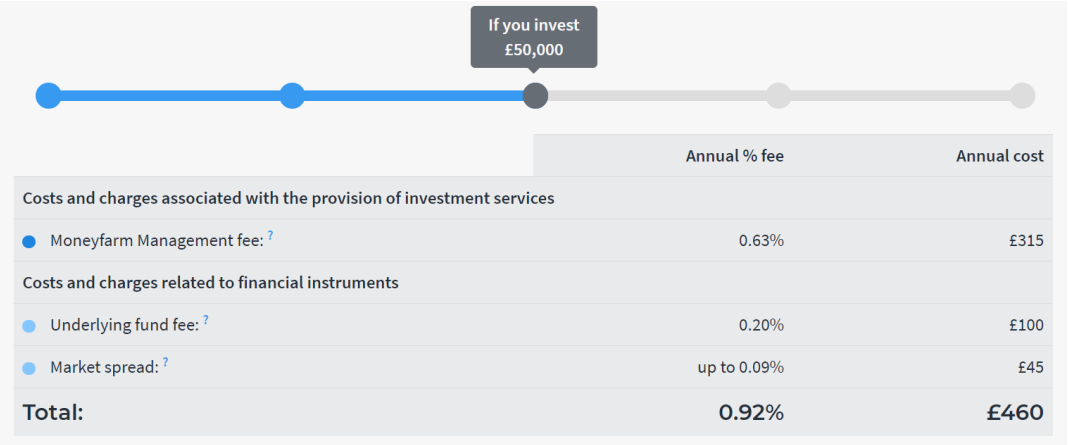


	Annual % fee	Annual cost
Costs and charges associated with the provision of investment services		
Moneyfarm Management fee:	0.75%	£75
Costs and charges related to financial instruments		
Underlying fund fee:	0.20%	£20
Market spread:	up to 0.09%	£9
Total:	**1.04%**	**£104**

Source: MoneyFarm, 2020

Scenario N3 – Customer Investment = £ 50,000

Annual Fee – 0.92% ; Annual Cost - £460

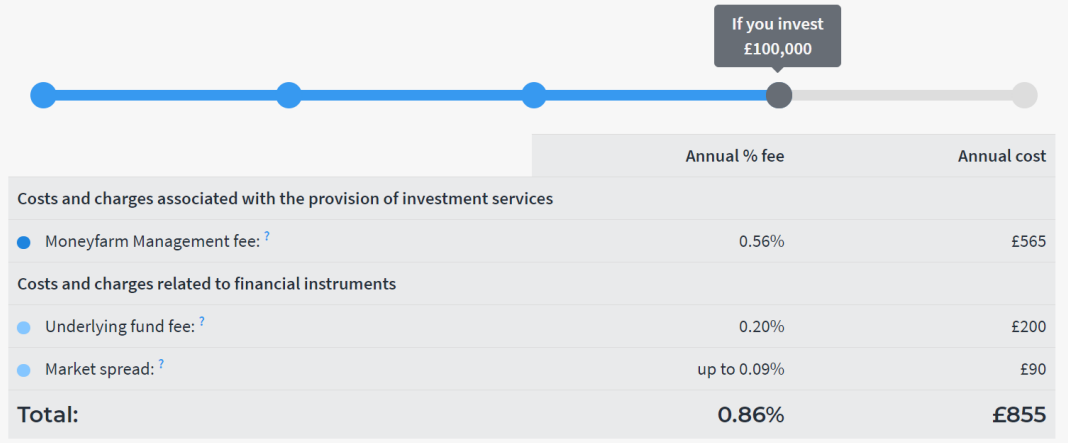


	Annual % fee	Annual cost
Costs and charges associated with the provision of investment services		
Moneyfarm Management fee:	0.63%	£315
Costs and charges related to financial instruments		
Underlying fund fee:	0.20%	£100
Market spread:	up to 0.09%	£45
Total:	**0.92%**	**£460**

Source: MoneyFarm, 2020

Scenario N4 – Customer Investment = £ 100,000

Annual Fee – 0.86% ; Annual Cost - £855

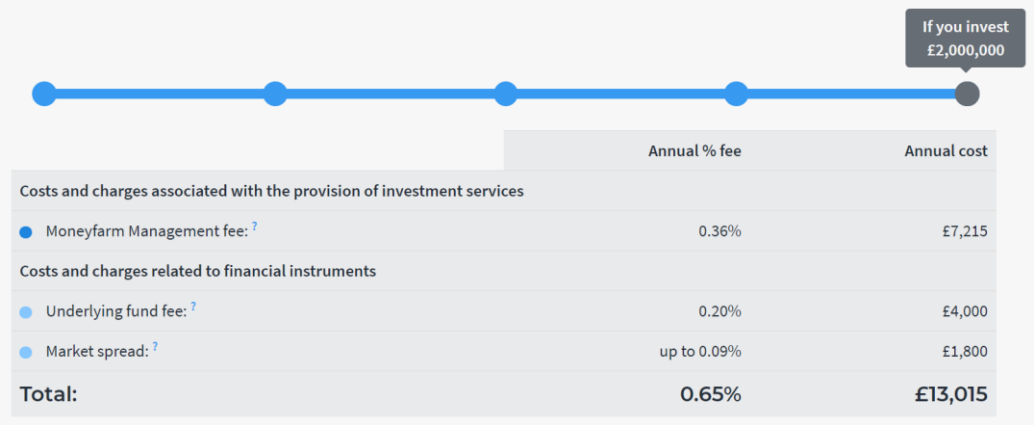


	Annual % fee	Annual cost
Costs and charges associated with the provision of investment services		
Moneyfarm Management fee:	0.56%	£565
Costs and charges related to financial instruments		
Underlying fund fee:	0.20%	£200
Market spread:	up to 0.09%	£90
Total:	**0.86%**	**£855**

Source: MoneyFarm, 2020

Scenario N5 – Customer Investment = £ 2,000,000

Annual Fee – 0.65% ; Annual Cost - £13,015



	Annual % fee	Annual cost
Costs and charges associated with the provision of investment services		
Moneyfarm Management fee:	0.36%	£7,215
Costs and charges related to financial instruments		
Underlying fund fee:	0.20%	£4,000
Market spread:	up to 0.09%	£1,800
Total:	**0.65%**	**£13,015**

Source: MoneyFarm, 2020

4.1.4. Mission, vision and values

The mission of *MoneyFarm* is to revolutionize the field of financial advice by using the web and trying to restore customer confidence in this form of service. The independent consultancy provided by this startup guarantees a diversified and tax-efficient investment in line with its specific aims. A Robo-Advisory solution without physical intermediaries that allows you to provide a service to customers without unnecessary costs and without waste of time, due to the possibility to access your investment at any time.

MoneyFarm's main goal is to ensure clarity, flexibility and simplicity through several features, starting from lowering costs by adopting ETF portfolios and using passive indices, so cutting the costs by 50%. Furthermore, the service avoids conflict of interest, since *MoneyFarm* revenues come directly from the final customer investment and not by the providers of financial services. Finally, the automated algorithm deletes low-return investments, to maximize the rate of return for the investor who uses the Robo-Advisory service.

In order to have a deep and real understanding of the final scope of MoneyFarm, we can rely directly to an interview (Luna, 2018) to the president of the company, *Paolo Galvani*:

"Why are 80-year-olds assigned maximum risk profiles and are awarded securities with a withdrawal in 20 years? This is not a joke, it happened. It happens because independent financial advisory is missing.

It (the traditional financial advisory) is a model that does not hold: because it's all based on placement fees. The financial advisor cashes in different percentages based on the securities packages that convinces you to buy, and he is led to sell you not the most suitable securities for your profile, which may have a very different risk appetite, but those that make him earn more. He is not a true consultant, he is a masked seller and this creates the damage we've seen (refers to the 2008 financial crisis and several scams such as Italian Etruria Bank Bankruptcy of 2016).

In this way (with MoneyFarm Robo-Advisory service) the costs are reduced, and we do not earn on what we sell, it is indifferent to us whether you buy product A or product B, rather we should make you spend as little as possible in order to offer you other opportunities."

Paolo Galvani, President of MoneyFarm

(This interview was literally translated by the author from the original one - Luna, 2018).

4.1.5. Users reviews and prizes

The industry of Digital advisory massively relies on a high trust from customers, in the same way as other start-ups, which in case of Robo-Advisory becomes even more important since the main service requires to let the advisor manage clients' savings.

MoneyFarm can be defined as an example of high-level-trust advisory, in fact this is easily seen from the reviews about the advisory service. Based on 739 different customers on *Revoo*, an independent company and world leader in the sector of reviews which managed customer opinions on the service, measured the satisfaction of investors to be very high: 93% would absolutely recommend other to use again the Robo-Advisory. Grounded again on the *Revoo* (2020) measurements regarding the customer care service, 418 out of 431 clients said to be satisfied of the aid received.

As analysed (MoneyFarm, 2020) below this Robo-Advisory service won several prizes during the last years, moreover it is crucial to underline that these were awarded from each of the three countries the services is actually provided, namely Italy, UK and Germany.

- 2019 – Best SIPP Provider conferred by YourMoney.com, Financial UK website defined MoneyFarm as the best solution for the UK market related to retirement Robo-Advisor

- 2018 – Golden Seal for "Best Independent Consultant" conferred by German Institute of Quality and Finance

- 2018 – Best investment Platform conferred by YourMoney.com (UK)

- 2018 – Innovation of the Year conferred by British Bank Awards (UK)

- 2017 – Golden Seal for "Best Independent Consultant" conferred by German Institute of Quality and Finance
- 2017 – Asset Management Innovation prize conferred by Ascosim

- 2017 – Milanese business excellence for internationalization conferred by Milan Chamber of Commerce

- 2017 – Italian business excellence in the UK conferred by Italian Stock Market and Department for International Trade

- 2016 – Golden Seal for "Best Independent Consultant" conferred by German Institute of Quality and Finance

- 2015 – Golden Seal for "Best Independent Consultant" conferred by German Institute of Quality and Finance

4.2. Analysis of YellowAdvice case

YellowAdvice is a hybrid Robo-Advisor owned by CheBanca, which is among the most innovative digital banks in Europe, with 54 stores active, gathering over €10B in deposits and €4B in AUM/AUA.

4.2.1. The evolution of Hybrid Robo-Advisory for bank customers

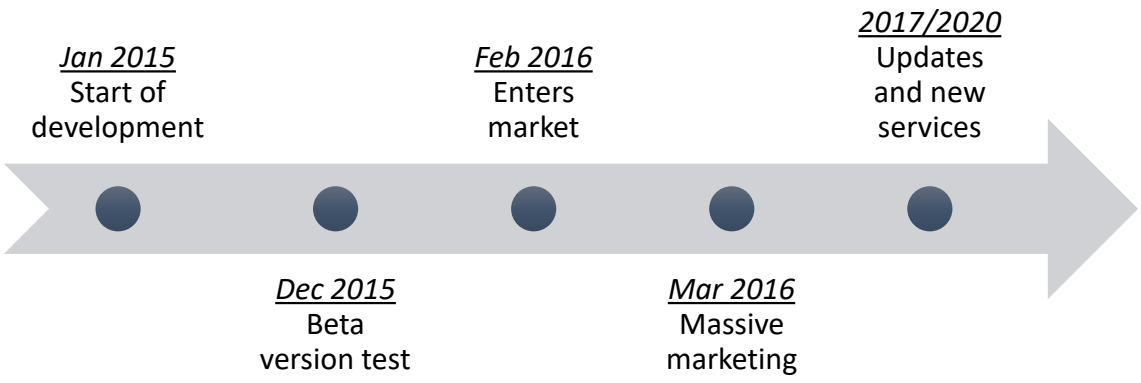
CheBanca! started to develop this service in the first months of 2015, then proceeded with a test for selected customers of the Beta version of the advisory service. The service was available from February 2016, followed by a massive marketing campaign focused on actual customers of the bank.

From 2017 on *YellowAdvice* service had multiple updates, the main ones are related to the creation of *YellowChannel*: a part of the site dedicated uniquely to entertainment for clients.

This part is composed of several services such as:

- *Newsroom*; a specific page for all the news regarding Fintech and its applications
- *You Finance*; where the user can have lectures and make quizzes about Robo-Advisory and technology
- *Yellowpedia*; an online encyclopedia related to different financial topics

This Robo-Advisory project has been developed following these phases:



Source: Own production based on CheBanca!, 2020

CheBanca! built, in the very last years, four strategic partnerships within this disruptive industry, improving its service and the technological component in it:

- *AdviseOnly* (educational content, behavioral tests, quizzes, lessons)
- *Med-Use* (UX/UI design and production)
- *Deus Technology* (a service providing advisory tools and investment comparison)
- *ObjectWay* (asset allocation engines and front-end apis)

4.2.2. Profiling and recommended portfolio asset allocation process

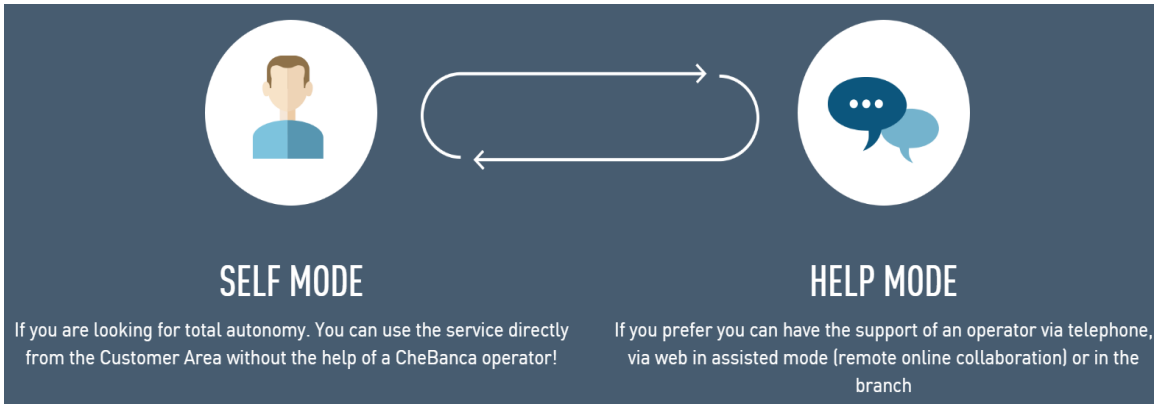
YellowAdvice process is handled very linearly, initially the customer needs to fill out the MiFID questionnaire, a structured questionnaire that seeks to recognize any prior experience with our abilities and financial knowledge.

Defining the financial resources for the investment thanks to the MiFID questionnaire, the goals we set ourselves in terms of the revenue and profit that will come from the investment itself, as well as the risks that we are prepared to take.
Therefore, each goal will be correlated with an optimal portfolio among the hundreds of different ideas, constructed and monitored by the Investment Committee via an algorithm integrating risk degree, time horizon and specific situation.

YellowAdvice counts 42 different pre-defined portfolios, each for specified situation, moreover these model portfolios are regularly reviewed every three months by over 400 human financial advisors of *CheBanca!*.
However, the investment advisory is not fully automatic: since being a mere consulting system, all the buying and selling operations suggested by the Robo-Advisor must then be approved by the customer, action that can be done both in branches or remotely.

As for all the services from CheBanca! YellowAdvice incorporates the ease of remote contact with the possibility of seeking direct assistance from the nearest branch.

This is why the digital advisory from *CheBanca*! provided a double sided service that enables the user to choose between "*Self Mode*" and "*Help Mode*": the first one is to manually operate in the financial service and without the help of a human or robotic assistance, the latter one instead refers to the customers that need an help from the provider, it can be online, via email, chat or even physically in a branch.



Source: CheBanca!, 2020

4.2.3. Cost-effective strategy

The YellowAdvice service is not open to everyone since users face a quite high minimum required balance: every client must spend at least € 20,000, specifically a minimum of € 10,000 for each of the target profiles which the customer will select to run on the platform.

It is easy to calculate that, using the minimum balance required of €20,000, a client can choose between two options, depending on his specific situation and degree of risk:

- Invest all the budget of € 20,000 on one objective, so invest all in one portfolio allocation
- Invest on two separate objectives, and so having two different asset allocations, each with € 10,000

At least for the moment, it is not possible to invest smaller sums or to split the share of investments between many individuals, anyway *YellowAdvice's* service enables to open up to four separate profiles for each individual.

Source: CheBanca!, 2020

There is no fee for opening an account with *YellowAdvice*, as well as there is no penalty for closing it, possible whenever the client wants to. Regarding the fee, on the operation applied to the market value of the services present on the portfolio an annual charge of 0.3% is determined. This cost includes several services such as securities protection, investment management, securities deposit service and an online customer assistance service chat. The service, however, has a maximum fee set at € 2,000 per year, measured on a quarterly basis and paid at year-end.

Therefore, it is a very easy estimate: the fee is the 0,3% to be measured on the capital added and subtracted on an annual basis independently from which the return of the portfolio assets we have selected among the recommended ones.

4.3. Business model sustainability comparison: YellowAdvice vs MoneyFarm

In Italy the Robo-Advisory industry is increasingly becoming a usual reality for investors, especially for the younger age groups, in fact several fintech companies are entering this new market, both start-ups and incumbents such as large Banks. There are multiple differences between start-up companies, such as how MoneyFarm was founded, and Robo-Advisors provided by largely established financial institutions, as for example YellowAdvice.

In order to understand completely the industry competitive situation in Italy, due to many differences in various aspects of the service, it is needed to compare two main players involved in the development of the industry: MoneyFarm and YellowAdvice.
Since these advisors, even if both are in the same segment of the market, have tens of differences, these discrepancies are analysed singularly:

4.3.1. Provider and target customer

First of all, MoneyFarm is started as a stand-alone start-up, which raised funds through seven different investment rounds over more than eight years, accepting as investors many different firms as well as private individuals. YellowAdvice is a service provided and financed entirely by *CheBanca!,* a bank with more than 850,000 clients (*CheBanca*!, 2020) already in their database.

However, *CheBanca!*, having as slogan "the human digital bank", is one of the most active online and was among the first ones to provide a mobile app for their customers. Created in 2008, since 2014 the Bank started to enter the consultancy market, focusing on the *Next Wealth Generation* and the *Mass Affluent customers (CheBanca!, 2020)*. *MoneyFarm* instead has to strongly rely on marketing to find new clients, being one the main sources of costs for the company beside the operational ones.
In fact in the last years, due to increasing investments from *Allianz X* and other firms, *MoneyFarm* started to advertise on tv programs and online, trying to extend their customer base (*MoneyFarm*, 2020).

4.3.2. Independency degree of consultancy in the Robo-Advisory service

If on one hand *MoneyFarm* has its core business in Independent Consultancy, meaning that 100% of company's revenue comes from the customer, on the other *YellowAdvice* lacks of independency from providers of financial services. This can be seen as one of the main differences between these firms, in fact MoneyFarm bases his whole Robo-Advisory service on the consistency of their offered service: the advisor recommends you the best investment strategy possible, aiming at increasing your returns as much as possible, since also MoneyFarm income is dependent on it so the larger the customers' return the better for the company.

For YellowAdvice, the income depends both on the return of the investment and on the commission by the provider of financial services, making it high the risk for conflict of interests.

Technically speaking, *MoneyFarm* born as a *Pure Robo-Advisor*, while *YellowAdvice* is in the category of the *Hybrid* Robo-Advisors, trying to pass from *Segregated Robo-Advisor* to a *Fully Integrated Robo-Advisor* during the last years (for more details these categories are specifically addressed in the study of Robo-Advisory industry in this paper).

4.3.3. Features of financial advisory

Even if both companies provided a similar type of consultancy service, there are some aspects that are different among them. YellowAdvice provides a service where the manager does not have full authority to operate on behalf of the customer, moreover the sale and purchase operations must be authorized by the client. MoneyFarm indeed has a full wealth management power, the advisor does not have to ask the client permission to sell or buy securities or to make other operations within his account.

In both services however, an automatic rebalancing facility on the portfolio assets is included. In other Robo-Advisors, this is manually made by the client by his own account. The main difference regarding financial consultancy process is the choice of financial instruments to invest in: MoneyFarm relies massively on Exchange Traded Funds, consequently being a passive portfolio management, while YellowAdvice has an active portfolio management, identifying in securities and *Sicav* the best instruments to be traded.

Regarding the asset allocation, YellowAdvice has 42 different pre-defined portfolios among which the best is recommended, while MoneyFarm count 7 portfolios, specifically created to fit in each possible customer need.

4.3.4. Minimum required balance

Even if both companies provided a similar type of consultancy service, there are some aspects that are different among them, specifically regarding fees and minimum balance required.

The minimum investment required to open an account on YellowAdvice is, as already defined in the paper, € 20,000; while for MoneyFarm users there is no minimum balance required, you can start to invest with very small amounts, such as for free trials in videogames.
MoneyFarm has in fact the lowest minimum balance in the industry, taking as example other players in Italy such as *Robobox* (required minimum investment € 50,000) or *IB Navigator* (required minimum investment € 15,000).

4.3.5. Costs and fees

The pricing structure of the companies differs in both service fee and portfolio management commission.
The fee for the service in MoneyFarm is dependent on the amount invested: Investing less than € 3,000 is 1.25 %; investing between € 3,000 and € 200,000 is 0.7 %; for any amount invested above € 200,000 is 0.5 %. YellowAdvice has a fixed 0.3% on any amount, taking in mind that the required minimum is € 20,000.

The Commission for managing the financial instruments in the portfolio depends obviously on its specific details, analysing an hypothetical portfolio of 50% equity and 50% bond with the average costs of the instruments are estimated on the basis of a Fida analysis (Corriere della Sera, 2017), the difference seems to be quite large: as a matter of fact the cost for a YellowAdvice customer would be 1.26%, while for a MoneyFarm user 0.33%.

After some computations, analysing an investment of € 50,000 on each of the two Robo-Advisors, the total cost for the client is described as:

- *MoneyFarm,* total cost for the user: 1.03%

- *YellowAdvice,* total cost for the user: 1.56%

Conclusion

Analyzing the FinTech industry, it is possible to evaluate Robo-Advisors as one of the most innovative trends within it. This service enables investors to access multiple benefits at a much lower cost than the one typical of traditional financial consultancy, high level user-experience is combined with transparent fees in order to offer a trusted service, which translates in a very low churn rate. Regarding the specific situation in Italy related to Robo-Advisory industry, the comparison between *MoneyFarm* and *YellowAdvice* proposes multiple interesting aspects to be interpreted.

Being different in various contexts, these companies rely on different core features to provide their consultancy. In fact, MoneyFarm is born with the final objective to democratize the advisory process, its scope is to offer high-ranking consultancy to mass customers. Supplying an independent financial advisory, it shares a common goal of high returns with the investor, indeed this can be the key factor for its successful story, as evidenced by the user reviews analyzed in the case study.

As opposed to this mission, *YellowAdvice* born in 2016, many years later than the real development of the Robo-Advisory phenomenon, and does not focus on the dependence degree of consultancy, continuing to receive a percentage of its income from the providers of financial services it sells to investors. The so-called "*dependent Robo-Advisory"* creates opportunities for conflict of interests that could harm investors, even if this event is constantly avoided by the competent authority *CONSOB.*

Even if given this key discrepancy about possible conflict of interests, a rational investor could predict fees to be lower at *YellowAdvice* than at *MoneyFarm*, nevertheless the incumbent's service is not cheaper than the stand-alone startup, as found out in last paragraph of the case study.

This cost-effective strategy is nonetheless to be addressed with a much larger meaning: while *YellowAdvice* was financed by the *MedioBanca Group* that leads *CheBanca*!, *MoneyFarm* had to proceed with seven fundraising rounds in order to have the possibility to provide such service. Although many start-ups failed in reaching the break-even-point even after several successful years, MoneyFarm could become much more than the average financial start-up.

Being the Italian stan-alone start-up to raise the highest amount ever from a round of investments, exactly 46 Million in the *Series B Investment Round* of 2018, it operates in Italy, Germany and UK, and already completed two different acquisitions, namely *Ernest* chatbot in 2017 and *Vaamo* Robo-Advisor in 2018.
As from the words of MoneyFarm president (Luna, 2018), every fundraising round is full of uncertainty, since the more a start-up is successful the more it is likely to invest and risk:

"These months before the last capital increase were very stressful.
We had to find a lot of money, we saw the interest of the investors, but it is not done until you officially close the investment round.
If we hadn't made it, we would have all (refers to his team) gone home."

Paolo Galvani, MoneyFarm president and co-founder

However, it is hard to evaluate its business model sustainability due to its dependence on multiple non-public information that would influence a hypothetical assessment about this specific case.
Relying on available resources (Barzaghi, 2018), *MoneyFarm* doubled its losses in 2017, reaching €15.7M of year negative balance, which adds up to the €7.3M in 2016.
Furthermore, the strategic company report of 2018 (Colamartino, 2019) revealed losses similar to the previous year, accounting for a negative €14.2M.

Finally, while waiting for the predicted break-even point in 2020-2021 (Luna, 2018), it can be useful to rely and meditate on the question asked by the president of MoneyFarm Paolo Galvani in an interview concerning the future of the start-up:

How to find a balance between speed of growth and economic sustainability?
When will be time to reduce marketing costs to focus on profit?

Paolo Galvani, MoneyFarm president and co-founder

'Banking is necessary, Banks are not'

Bill Gates - 1994

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