UNIVERSITA' DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI "M. FANNO"

CORSO DI LAUREA MAGISTRALE IN ECONOMICS AND FINANCE

TESI DI LAUREA

"Covid-19 effects on investments funds' portfolio structure: a comprehensive analysis and a focus on ESG funds"

RELATORE:

CH.MO/A PROF./SSA CINZIA BALDAN

LAUREANDO/A: ERIKA DOSS

MATRICOLA N. 2007722

ANNO ACCADEMICO 2021 – 2022

Dichiaro di aver preso visione del "Regolamento antiplagio" approvato dal Consiglio del Dipartimento di Scienze Economiche e Aziendali e, consapevole delle conseguenze derivanti da dichiarazioni mendaci, dichiaro che il presente lavoro non è già stato sottoposto, in tutto o in parte, per il conseguimento di un titolo accademico in altre Università italiane o straniere. Dichiaro inoltre che tutte le fonti utilizzate per la realizzazione del presente lavoro, inclusi i materiali digitali, sono state correttamente citate nel corpo del testo e nella sezione 'Riferimenti bibliografici'.

I hereby declare that I have read and understood the "Anti-plagiarism rules and regulations" approved by the Council of the Department of Economics and Management and I am aware of the consequences of making false statements. I declare that this piece of work has not been previously submitted – either fully or partially – for fulfilling the requirements of an academic degree, whether in Italy or abroad. Furthermore, I declare that the references used for this work – including the digital materials – have been appropriately cited and acknowledged in the text and in the section 'References'.

Firma (signature) ...*Erika Ross*......

Alla mia famiglia e ai miei nonni.

INDEX

Index of Figures

Index of Tables

INTRODUCTION

The pandemic due to Covid-19 has had devastating consequences on health and economy in the whole world.

A situation of such uncertainty has created panic in the markets, questioned the choices of investors and modified the existing market trends.

The spread of the virus and its consequences, such as lockdowns, restrictions, but also economic support and vaccination campaigns, have had a strong impact on the financial markets. This impact is still present, both because the future of the virus is still uncertain, and also because, due to the outbreak of the pandemic, new trends and tools that have been developed might have changed the financial market permanently.

This thesis aims to provide a portrait of the investment fund market, its main aspects and rules, and to analyse the effects the pandemic, both the outbreak and the ex-post outbreak, on the fund industry.

We focus on the fund market situation predominantly in Europe and USA, being the two geographical area where the fund market is the most developed.

The existing literature that focuses on the effects of the pandemic on the investment funds market is not very rich, however there are some studies that analyse the resilience of sustainable financial instruments to crises, Covid-19 recession included.

The scope of this thesis is indeed to support this theory, demonstrating that in times of uncertainty ESG funds are the most secure option for the investors instead of conventional funds. Moreover, this elaborate tries to describe the effects of the pandemic in the financial markets in general, considering the effects not only of the spreading of the virus, but also of all the measures put in place by Governments trying to contrast its diffusion. The aim of the overall elaborate is on the whole to provide an overall view on how Covid-19 and its consequences affected the fund market and specifically funds' returns.

The thesis is structured in 4 chapters. The first one presents a general overview about investment funds, dealing with the description of IFs, their regulation, classification and their main characteristics. Chapter 2 investigates in general the effects of Covid-19 in the financial market and in particular the effects in the fund market. Chapter 3 is dedicated to a review of the literature about the topic and Chapter 4 is about the asset allocation of investment funds during the pandemic and contains an empirical analysis conducted on funds' returns over the pandemic period.

In detail, Chapter 1 provides the definition of investment funds, an overview on the regulation about IFs in EU and USA and the necessary documentation that each IF needs to have.

Afterwards, the history of IFs is analysed, from 1700s onwards, describing the first typologies of funds ever created and the countries where the fund market first developed.

Subsequently a classification of IFs is proposed, breaking down IFs by type of investment companies, type of the management, type of fund, nature of the investment and others.

In addition to that, a focus on what "sustainable funds" mean is highlighted, describing the terminology on the topic and the main characteristics of these types of funds.

Lastly the actors, the structure of IFs and the advantages and disadvantages of IFs are listed.

- As for the funds' structure; both the structure of a fund and the one of asset management companies are described.

- As for the pros and cons of IFs; among the disadvantages, the main costs, namely the main fees and commissions, are listed.

Chapter 2 describes initially the main stages of the pandemic, defining the period of the Covid-19 outbreak and the main announcements about the pandemic.

It deals also with the economic impact of the pandemic, meaning the economic disruption due to closures and lockdowns and the GDP reduction suffered by most countries.

Firstly, a business point of view is adopted and afterwards a households' one, in order to see the consequences of the virus and its spreading for both economic agents.

Furthermore, all the measures to contrast Covid recession have been analysed, specifically the ones taken in place by central banks that arranged effectively targeted programs not to let the economic crisis become also a financial one.

The main financial markets variables are then examined, observing how they moved during the years of pandemic, starting with equity indices, following with 10-year government bonds, credit spreads, market volatility, inflation trends, general government debt to GDP ratios and the commodities market. Lastly, an analysis about the behavioural biases detected during the Covid recession has been conducted. These biases may explain why investors behaved in certain unexpected ways and how consequently some financial market variables have been affected.

The last topic of this chapter deals with the pandemic impact on IFs, dividing the analysis first for Europe and later for USA. For both geographical areas, the diffusion, distribution, characteristics of funds owners, market trends and sustainable funds market are analysed.

The Third chapter deals with the literature about the discussed topics and the main reports, articles, books and other sources analysed to write the current thesis.

The fourth and last chapter is dedicated to an analysis of the changes about asset allocation during the pandemic, proposing an exercise about the rebalancing of IFs towards countries and industries less affected by the pandemic.

Subsequently, this chapter deals with sustainable rebalancing, analysing sustainable fund market in detail and its characteristics such as the ESG scores.

Lastly, we conduct an empirical analysis, analysing the funds returns and applying the Fama and French 3 Model Factor.

Research Questions

The regression model is implemented in order to see the relation between the response variable, corresponding to the IFs excess returns from risk free rate, and two main other variables: one representing the severity of the spreading of Covid-19 and the other representing the measures put in place to contrast the virus.

The research questions that we tried to give an answer to are:

1) How have investment funds returns been affected by the spreading of the virus?
2) Have also the measures undertaken by governments to contrast Covid-19 had an effect on funds returns? Have they affected returns negatively or positively?
3) Has the so called "ESG effect" (meaning the fact that the considered fund is a high-ESG-rated fund) had an impact on the effect of the pandemic on funds' returns?

We are able to give answers to these research questions in an analytical way conducting a panel data analysis and multiple regressions with MATLAB.

Research Approach and Objectives

The empirical analysis considers only funds domiciliated in countries of European Union and USA and those funds with a positive ESG score.

First, the returns of the selected funds are computed, distinguishing those funds with a high ESG score from those with a low ESG score in order to understand if they behave differently during the crisis.

With the returns and the calculation of performance measures it is possible to prove that sustainable funds performed better during the pandemic rather than the funds with a lower ESG rate, considering also the volatility in the market.

The research objective is indeed to demonstrate that ESG funds are more resilient during the Covid recession and this is proved also by the regression model constructed that shows how high ESG rated funds have been less affected by the pandemic compared to low ESG rated funds.

CHAPTER 1: INVESTMENT FUNDS

1.1 The Definition

There is not a general accepted definition of investment funds (IFs), it may be different among countries or depending on the regulation considered, therefore there is not even a proper classification of them. This is also due to the fact that there are a lot of investment fund types and also that they are financial vehicles that are constantly in evolution, both in terms of structure and regulation.

Terminology varies from country to country, which could be misleading. For example, investment funds are often referred to as simply funds, or investment pools, collective investment undertaking, CIS (collective investment vehicles), collective investment schemes or managed funds.

For the definition, this elaborate refers to the Regulation (EU) No 1073/2013 (ECB/2013/38), concerning statistics about the assets and liabilities of investment funds and defining the standards that are used to collect and to comply investment funds (IF) statistics in all the euro area.

This Regulation has been in force since 27th November 2013 and it defines an IF as *"a collective investment undertaking that:*

> *(a) invests in financial and/or non-financial assets, within the meaning of Annex II, to the extent that its objective is investing capital raised from the public; and*
>
> *(b) is constituted pursuant to Union or national law under:*
>
> > *(i) contract law, as a common fund managed by management companies;*
> >
> > *(ii) trust law, as a unit trust;*
> >
> > *(iii) company law, as an investment company;*
> >
> > *(iv) any other similar mechanism or legal form."*

To comply with this definition, an investment fund has to be "collective". It is relevant to notice that the undertaking is considered in any case collective even if there is only one investor, and concurrently, if there is also the possibility to have more than one.

From this definition it's possible to resume three important aspects of an investment fund:

1) An IF origins from a pool of capital raised from investors;

2) The objective of an IF is investing this capital in order to compose a portfolio of financial instruments that will recompensate the investors;

3) There are different types of investment funds, being subject to different laws. A fund can be either a pool of money managed by an asset management company or a company itself (an investment company or a trust).

1.2 The Regulation

Figure 1 - Main EU and USA Regulation

EU Regulation	USA Regulation
UCITS Directive	Securities Act
AIFM Directive	Securities Exchange Act
EuVECA Regulation	CEA
EuSEF Regulation	ICA
ELTIF Regulation	Investment Advisers Act
MMF Regulation	ERISA
	IRC
	NSMIA
	Dodd-Frank Act

Source: author's elaboration

1.2.1 In EU

The European Union enacted the following regulation related to IFs:

The **UCITS**, that stands for Undertakings for Collective Investment in Transferable Securities, are regulated by the UCITS Directive 2009/65/EC. It is an EU directive that allows funds to be marked in any member state, after a single authorization from one member state. It is possible for the EU member states to have additional regulatory requirements for the benefit of investors.
The UCITS Directive covers around 75% of all collective investments in Europe (ECB, 2022), including mutual funds and ETFs.

The **AIFMD** (the Alternative Investment Fund Managers Directive) is the directive 2011/61/EU that manages all alternative investments that are not regulated by the UCITS directive, such as hedge funds, private equity funds, real estate funds and other institutional funds.

EuVECA (European Venture Capital Funds) Regulation is the Regulation (EU) No 345/2013 that covers venture capital funds only.

EuSEF (European Social Entrepreneurship Funds) Regulation is the Regulation (EU) No 346/2013 related to social enterprises, meaning those companies that address social objectives and not only aim to maximize profits. These funds receive public support aimed at promoting their growth.

ELTIF (European long-term investment funds) Regulation is the Regulation (EU) 2015/760, which regards closed-end funds that make investments in financial instruments of small and medium-sized European companies, that focus on specific asset classes of real economy (such as infrastructures or real assets).

The **MMFR** is the regulation on money market funds, it is apart from the rest of the funds' regulation, because MMFs are an important source of short-term financing for many companies, financial institutions and even governments. The related regulation is the Regulation (EU) 2017/1131, applicable from 2018.

1.2.1.1 Relevant Documents

The EU legislation has introduced the right for the investor, the moment when she/he subscribes a fund, to receive an informative documentation about the fund. This documentation is made up mainly by the following two documents:
- KIID (Key Investor Information Document), that is the document that, in only two pages, summarizes the key characteristics of the fund. It is required for all types of investment funds, insurance-based investments, retail structured products and private pensions. It consists in four parts:
    a) investment purpose and policy;
    b) risk-return profile;
    c) costs;
    d) historical performance.
- The Prospectus, whose contents must be approved by the regulatory entity. It is a document that must be given to the investors, free of charge, before they invest. It is required also by SEC. It contains all the information needed to inform the potential

investors about the risks connected to the investment. This document lists the characteristics of the fund (such as the name, duration, modality of participation in the fund, etc…) and indicates the manager and the custodian of the fund, defining their tasks and regulating relations between them and the fund participants.

After the subscription, any information about the change of the NAV (which is the Net Asset Value, namely the assets minus the liabilities of the fund divided by the number of shares outstanding), the returns earned, or any modification of a characteristic of the fund must be made immediately available to the investor.

1.2.2 In USA

The main regulations related to investment funds in USA are:

- The **Securities Act** of 1933, that it sets rules to any public offering of securities. Since the shares of mutual funds are publicly traded, they are subject to the provisions of this regulation.
  Regulation D and Regulation S of the Security Act relate instead to hedge funds.
- The **Securities Exchange Act** of 1934, which has the same aim of Securities Act, that is to regulate the exchange of publicly traded securities. In addition to that, it has the objective of providing governance on the trades in the secondary market. This regulation created the SEC (Securities and Exchange Commission), that was created after the Crash of 1929 with the goal of regulating the securities market and protecting investors.
  For investment funds, the 1934 Act appointed requirements and rules to follow mainly for the distributors and the transfer agents of mutual funds, as well as the requirements for a fund in order to be defined as an hedge fund. In addition to that, it regulates the listing of ETFs.
- The **CEA** (Commodity Exchange Act) of 1936, that governs fund sponsors and advisers of the funds that trade commodities-related products.
- The **ICA** (Investment Company Act) of 1940, which is the most relevant source of applicable law for IFs as it is focused on investment companies. Its main goal is to protect the investors and prevent abuses and it achieves that by regulating:
  - the registration of investment companies (IC);
  - the transactions between an IC and its affiliate;

- the trades of IC shares;
- the responsibilities of the IC's directors or trustees.

Moreover, it imposes requirements about funds' organization. Section 5(a)(1) deals with open-end funds, Section 5(a)(2) and 23 with close-end funds, Section 26 with UITs (unit investment funds).

- The **Investment Advisers Act** of 1940, that defines requirements and limits to be applied to contracts between advisers and funds (e.g. the need for any organization that provides investment advisory to mutual funds to register with the SEC, with the exception of banks, that have specific banking statutes).

- The **ERISA** (Employee Retirement Income Security Act) of 1984, which regulates the Private industry pension plans by setting minimum standards for private retirement plans.

- The **IRC** (Internal Revenue Code) of 1986, which defines rules about taxation of investment funds.

- The **NSMIA** (National Securities Markets Improvements Act) of 1996, that aims to make the regulation between states and the Federal Government more efficient. It affects the management of mutual funds and also concerns the regulation of investment advisers.

- The **Dodd-Frank Act** (2010), that brought impactful changes in financial regulation of the whole financial industry. The most drastic changes relate to hedge funds, and, specifically, to the registration requirement for hedge fund advisers under the Investment Advisers Act.

1.3 History of Investment Funds

Investment funds have a long history, and it is different, sometimes opposite, considering one investment fund type or another. Also, it varies regarding the country considered, because investment funds may be a financial concept that is very consolidated in some parts of the world, but still is very undeveloped or totally unknown in other geographical areas.

The story, focusing on mutual and hedge funds in developed countries, can be summarized in these following points:

Figure 2 - Time Line of IFs
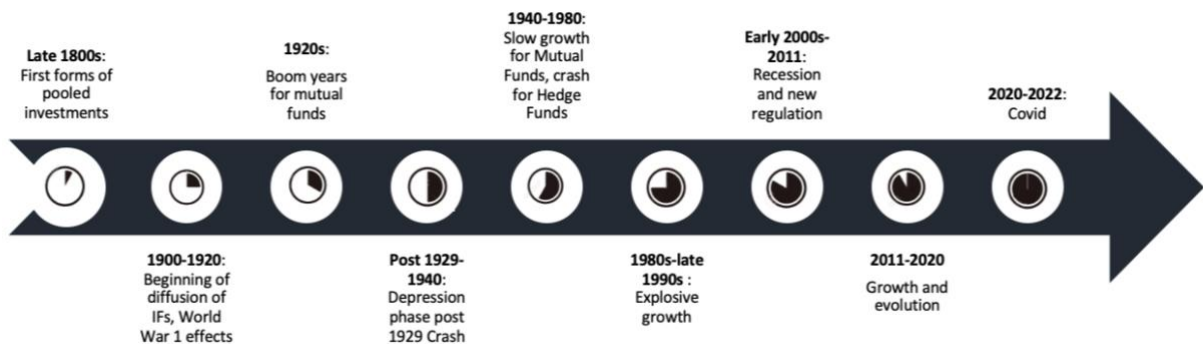
Source: author's elaboration

Late 1800s

The very first forms of pooled investments were created already in the late 1800s. British law in that period generated a favourable environment for pooled investment funds: already in 1868, in London, the Foreign and Colonial Government Trust was founded and it was the very first trust ever created in the Anglo-Saxon world, aimed to pool money from small investors in order to achieve economies of scale (Boston Institute of Finance, 2005).

However, there are proofs that investment trusts were already being present for almost a century before, in 1774, in the Netherlands, when the merchant and broker Abraham van Ketwich formed a trust called Eendragt Maakt Magt, which translates to "Unity Creates Strength" (Rouwenhorst, 2004).

The majority of investment funds in the late 1800s were European, because the United States, back at that time, before World War I, was a debtor nation, undeveloped in the financial field, with little domestic investing with the exception of the presence of few wealthy investors and few vehicles very similar to the British and Scottish investment trusts.

1900-1920

This period corresponds to the beginning of the diffusion of the investment funds (mainly mutual funds). World War 1 had a big role in this process: it destroyed most of all Europe's industrial base, giving the U.S. industry the possibility to expand in new markets, especially in the financial one.

1920-1929

The boom years for investment funds, mainly mutual funds at first, was in the twenties, in US.

As written before, after World War 1, the American economy entered into a strong growth phase and started to develop new financial instruments. It was, indeed, in America that the first proper investment (mutual) fund was created.

The very first open-end mutual fund in the industry was the Massachusetts Investors Trust Fund. It was launched in 1924 by MFS (Massachusetts Financial Services), that is one of the oldest asset management companies in the world.

This fund was created with 50000$ and within a year it attracted 200 investors and in five years it expanded to $14 million in assets (Gremillion, 2005). It was able to survive the 1929 crises (even though it suffered a considerable loss) and nowadays it is still operating and it is currently the largest mutual fund of the United States.

This big expansion phase of investment funds suffered a slowdown with the Crash of 1929 that inevitably caused drastic changes for financial markets.

1929-1940

During this period there were already some types of closed-end funds, but the existing funds were mainly trusts that were nothing more than frauds or Ponzi schemes, operating in a way that nowadays would be considered illegal. The presence of those funds exacerbated the negative effects of the crisis.

These post-crisis years were considered depression years for the investment funds, because the Crash deflated the value of both open-end and close-end funds, especially the latter that declined from an average premium of 47 % above the NAV (net asset value) to an average discount of 25 percent below the NAV, meaning a drop of 72% (Gremillion, 2005).

During this period authorities started enacting several regulations and a whole system of legislation, including, in US, the Investment Company Act of 1940, in order to prevent these types of crises and excessive speculation in the future.

1940-1980

The growth of mutual funds from 1940 until 2003 is shown by the following graph, *Figure 3*, that refers to the US fund industry:

Figure 3 - Mutual funds assets and bank assets (1940-2003)
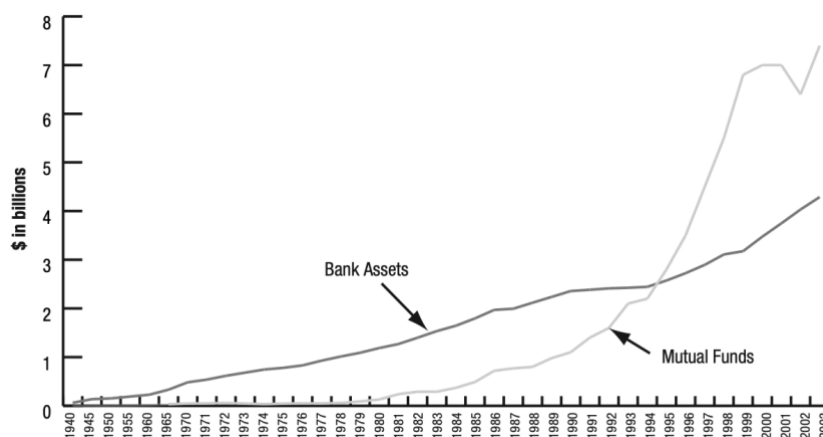
Source: ICI (Investment Company Institute)

Focusing between 1940-1980, comparing the growth of funds with the growth of what Americans invested in banks, we see that the growth of funds is sensitively lower in that period. This highlights the fact that mutual funds were still considered only a way for the modest investor to receive help from professional management to invest in the stock market.

Nevertheless, in this slow but steady growth period, the first hedge fund and pension fund were established.

The first hedge fund was created in 1949, when Alfred Jones, an Australian investor and sociologist, started an investment partnership that is remember for being the first hedge fund ever created (LSE). Jones investment strategies and fundamental ideas are still important in the actual industry of hedge funds.

However, at that time, Jones' investment success incentivized new hedge fund managers with lack of experience to follow his path. They didn't obtain his same results, also due to the bear market in the 1969-1970 that led the Dow Jones and the S&P 500 to lose about half of their value causing the first hedge fund crash.

Hedge funds suffered heavy losses and many hedge fund managers lost their jobs. That was a very dark period for hedge funds, but after that hard time a period of recovery began.

As regards pension funds, the first forms of pension funds were established always in the second half of the 19th century. Initially they were only for insured police officers, teachers and civil servants, but later they expanded to the rest of the public.

1980-1990s

The explosive growth period of investment funds, both for mutual and hedge funds, went from the 1980 to the whole 1990s, in this period many other types of funds were created,

differentiating from each other by different investment strategies or different structures or management.

The beginning of the phenomenon of sustainable funds dates back to this period. In 1984, in UK, a fund called the Friends Provident's Stewardship Trust fund, known to be the first ever SRI fund, was launched. The founder was John Wesley, who pressed his supporters to avoid investing in "sin stocks" that obtained profits through alcohol, tobacco, weapons or gambling.

However, only in the late 90s socially responsible finance has made real success and became a fundamental part of the world of investments and finance.

Moreover, in that period, thanks to The Tax Reform Act, dated 1981, each American with an income was able to set up an IRA (individual retirement account). This had as a result a significant flow of money going into mutual funds.

At the end of 1999, 38% of mutual fund assets were represented by retirement savings (Gremillion, 2005) and hedge funds evolved from having only long and short equity positions to cover a larger group of asset classes and investment styles.

Early 2000s-2011

According to ICI (Investment Company Institute) data, from 1980, when 1 in 20 U.S. households was the owner of minimum a mutual fund share, the industry grew reaching to the point when over 1 in 2 households was a mutual fund shareholder in 2000 (Rouwenhorst, 2004). As for European countries, that are now members of the EU, mutual funds increased their assets from USD 1 trillion in 1992 to 2.6 trillion in 1998 (Fernando, et al., 2003).

The data of that period demonstrate how the IFs market in the early 2000s, especially in America, was prospering, and that conditions of financial markets, especially for riskier assets, were constantly improving, reason why a bubble developed.

Securities markets became more volatile and started to be perceived as too risky with lack of transparency. In that period several negative revelations about mutual fund industry were revealed, including allegations of abusive market timing, insider trading, conflicts of interests and trading scandals.

Moreover, in the 2007/2008 with the Great Recession, the whole industry stopped growing and most people still have nowadays difficulty on trusting financial markets.

Consequently, new regulations to protect investors were enacted, especially for hedge funds, both in Europe (AIFMD) and in USA (Dodd-Frank).

2011-2020

Once the crisis ended and the overall economy started to recover, another phase of evolution and growth for the market of IFs began, also thanks to the diffusion of new types of funds, such as the ETFs (exchange-traded funds). These made a big impact on the investment industry. About $4 is trillion now invested in these funds (Kaissar, 2021) and most of this capital has been invested starting by the end of the 2008 crisis.

All of this lasted until a new crisis arrived creating again turmoil and uncertainty in the financial markets: the Covid crisis.

2020-2022

The Covid crisis affected the whole industry, highlighting aspects of the investment fund market, limits and opportunities, and causing changes in IF composition and structure, that are going to be analyzed in this elaborate.

1.4 Classification of Investment Funds

Investment funds may be categorized in numerous different ways and the continuous evolution of new types of funds makes the classification even more complicated.

For example, in 1970 ICI tracked five categories of funds, that became 33 categories in 2005 (Gremillion, 2005).

In this elaborate the IFs are classified considering the type of investment companies, the type of the management, the type of fund, the nature of the investment and finally a residual further breakdown. The funds that are considered in this analysis are summarized in the following table:

Table 1 - Classification of IFs

TYPE OF CLASSIFICATION	TYPE OF INVESTMENT COMPANIES	TYPE OF MANAGEMENTT	TYPE OF FUND	NATURE OF INVESTMENT	FURTHER BREAKDOWNS
IFs INVOLVED	● Open-end fund ● Close-end fund ● Unit Investment Trusts (UITs)	● Active management ● Passive management	● Mutual Funds ● ETFs ● Hedge Funds ● Pension Funds ● PEF and VCF	● Equity funds ● Bonds funds ● Mixed funds ● Index funds ● MMFs ● Funds of funds ● Specialty funds	● By the type of investors ● By availability and access ● By investment horizon ● By their target (geographic regions, investment strategies…)

1.4.1 Classification by type of investment companies

The fund can be structured as an investment company. This investment company can have different legal forms, it can be a corporation (with its own legal personality), a partnership, a business trust or limited liability company (LLC).

Section 3(a)(1)(A) of the Investment Company Act (1940) provides a definition for an investment company as "*any issuer which is or holds itself out as being engaged primarily, or proposes to engage primarily, in the business of investing, reinvesting or trading in securities*", meaning that an investment company is an enterprise whose main business is trading securities purely for investment purposes (SEC, 2013).

An investment company may also be known as the "fund company" or "fund sponsor" and it is classified into three main types:

- **Open-end IFs** (also known as "Sicav", which means Société d'Investissement à Capital Variable) are defined as investment funds which "sell new shares/units and redeem existing shares/units at the request of investors. The sale of new shares/units provides the IF with additional funds, while the IF pays the investor out of its assets in the event of a redemption" (ECB, 2009). This implies that open-end funds are investment companies that can buy or sell an unlimited quantity of shares, meaning that the capital of the fund, that is represented by investors' shares, can change every day due to the entry or exit of investors.

  The majority of these funds comply with UCITS directive.

  An important implication of this is that shares of open-end funds are traded directly from the primary market (shares are bought and sold directly from the fund) and cannot be traded in the secondary market.

  Open-end funds are priced at a share price based on the NAV.

- **Closed-end IFs** (also known as "Sicaf", which means Société d'investissement à capital fixe) are defined as "IFs with a fixed number of issued shares whose shareholders have to buy or sell existing shares to enter or leave the fund" (ECB, 2013).

  They are regulated by the Alternative Investment Fund Managers Directive (AIFMD).

  A closed-end fund is born with a duration and only at the end of the fund's life, the

subscribers can have their shares liquidated. More precisely, closed-end fund don't necessarily have only an opening date in which subscribers can buy the shares, but there can be more periods of time in which the fund operates.

Typically closed-end funds are created through an IPO (initial public offering) in order to raise capital before starting trading in the open market. The shares of the fund can be bought and sold only in the secondary market and therefore for the investor, to leave the IF, it is required to sell the shares/units to another investor, generally with the help of a brokerage account. The value of a single share is also based on the NAV, but the actual price can be higher or lower than the value of the fund's holdings (determining a discount or premium to the NAV) because it depends on the supply and demand.

Some investment funds may fall somewhere in-between these two definitions, since investors may have certain restrictions about the redemption of their shares.

● **Unit Investment Trusts (UITs)**: SEC defines this other type of investment company, which offers a fixed number of securities (called Units) for a certain period of time, until a specific date, that is determined when the UIT is created. UITs resemble both open-end funds and closed end funds; open end funds because they can be bought and sold directly from the primary market (from the issuer) and shares are redeemable, and closed-end funds because, in some cases, they can also be traded in the secondary market and, in terms of issuance, their offerings are limited.

Rather than an investment company, a fund may be structured as a trust.

Investment trusts are a separate legal entity that owns the fund. It is a closed-end company, with the legal form of a public limited company, listed on the stock exchange.

It has the same aim of an investment company and it is a way for investors which hold a share in an investment trust of investing in a variety of firms. It's a type of company that is very popular in UK and Japan.

It differs from the UIT because UIT is not a closed-end fund, whereas an Investment Trust is. These investment trusts usually hold CIFs (collective investment funds), also known as a collective investment trust (CIT), that are pooled accounts. They differ from the other investment funds because they are not regulated by the SEC.

1.4.2 Classification by type of management

- An **actively managed investment** fund relies on a manager or a management team/company that constructs the portfolio, taking decisions about how to invest the fund's money. This implies that the performance of the fund depends on the skills of the management and this leads to higher costs of the fund because you have to pay a fee for the service of the active management of the fund.
- A **passively managed fund**, by contrast, follows a market index or a benchmark. There is no management team making investment decisions. This type of investment strategy can be implemented replicating the fund with the same securities proportion of the index or benchmark, or only with a representative sample of some stocks in the index.

1.4.3 Classification by the type of fund

Mutual Funds

Mutual funds are open-end funds offered to the public and available for daily trading, in fact the mutual funds are required to price their shares every day.

Each share of the fund represents an investor's proportionate ownership of the fund and this share can be bought or sold/redeemed by the fund itself.

Each mutual fund is structured to match the investment objectives stated in its prospectus and it can be actively managed or passively managed.

They can be classified in turn based on market capitalization (large-cap equity mutual funds, mid-cap equity mutual funds, small cap equity mutual funds, large and mid cap equity mutual funds and multi cap equity mutual funds), investment style, asset class, tax benefits, and other factors.

ETFs

ETFs are generally open-end funds, but they can also be structured as UITs.

The have many points in common with mutual funds, but they differ from them because ETFs can be traded intra-day, exactly like stocks, while mutual funds can be purchased at the end of each trading day based on net asset value.

Moreover, ETF shares are traded on a national stock exchange at market prices that differ from the NAV of the shares.

The majority of ETFs are passively managed, but newer ETFs instead of tracking an index, are actively managed in order to achieve a specific investment goal.

Hedge funds

Hedge funds are private funds, meaning that they are available only to a limited group of investors (accredited investors) and not to all the public, as the mutual funds.

Accredited investors are those investors who have a minimum level of wealth to invest in a hedge fund. They typically are institutional investors (like pension funds or insurance companies) and wealthy households.

Hedge funds are known for the higher volatility and risks and consequently for their potential higher returns. Hence, in the prospectus there must be written explicitly that the fund is very risky.

The higher risk is also connected to the fact that these types of funds have not the same regulations that protect investors as the other funds have, for example a manager of a hedge fund (when some conditions are met) is not obliged to file public reports (SEC, 2012).

Hedge funds are actively managed investments and the goal for hedge fund managers is to maximize the absolute returns of the fund under any market condition.

Pension Funds

In a holistic vision, a pension fund could be analyzed alongside mutual funds, ETFs and hedge funds, even though they are types of funds that are substantially different.

Pension funds are a pool of capital administrated, managed and invested in financial markets that earn a return over time, guaranteeing an income to the retirees who invest their wealth.

A pension fund invests its capital into both private and public companies and other funds.

It represents an institutional investor, playing a fundamental role in the equilibrium of financial markets.

Private Equity Funds (And Venture Capital funds)

A private equity fund is a closed-end fund and, similarly to hedge funds, is typically open only to accredited investors. The initial investment amount for this type of investment is often very high.

In this type of fund we have the distinction between GP (General Partners) and LP (Limited Partners).

GPs are the managers of the fund, they create the fund, identify the operations that will be carried out (e.g. venture capital operations), structure the operations and monitor the evolution of the company in which they decide to invest.

GPS are the legal authority that makes decisions for the fund and are professionals that work inside the Private Equity Firm, managing the business. Typically, they search for non-listed companies where to invest the money of the limited partners. They own 1-2% of the shares of the fund and have full liability.

Limited Partners in Private Equities own the 99%-98% of the fund's shares and have limited liability and are considered the investors of the PE fund. Generally, the limited partners are pension funds, insurance companies, banks and even wealthy families.

Specifically, *private equity* refers to companies that already have a consolidated history and need capital to change ownership or to implement a restructuring.

Venture Capital deals with unlisted companies in the start-up phase with high development and growth potential (high grow companies). The investment in venture capital is often carried out mainly by institutional investors.

However, even if you don't invest directly in these types of funds, you may do it indirectly if you participate in a pension plan; this because it's common for pension plans to invest in private equity funds (Invest Europe, 2016).

1.4.4 Classification by the nature of the investment

A possible classification of IFs may depend on the nature of their investment.

Equity funds or Stock Funds

These funds are made mainly by stocks. They are divided into different categories according to: market capitalization, geography and investing style. These investment funds deliver higher returns than fixed income funds but are also riskier.

Bond funds (also called fixed income funds)

These funds invest in securities that pay a fixed rate of return, like government bonds, in order to have regular inflows in the fund.

Mixed funds (also called balanced funds),

These funds are a combination of fixed income and equity instruments. The level of risk will depend on the proportion of each type of instrument on the overall portfolio.

Typically, these funds have a target stock/bond allocation and can be either more "aggressive", having a higher proportion invested in stock rather than bonds, or in the opposite case, can be more "conservative".

Index funds

These funds are the opposite of an active managed fund, they simply aim to track an index, that could be the S&P or any other type of index. The value of each share of the fund depends completely on the performance of the index. They are mainly mutual funds or ETFs.

MMFs

This investment fund category is generally considered as a sub-category of mutual funds. These funds are made up of money market assets, which means assets with short maturity and very high credit quality, such as cash, treasury securities, deposits, REPOs, certificates of deposits and so on.

Money market funds are, therefore, very safe and have a very low volatility, but at the same time they are not very profitable.

They are becoming very popular, also because they represent a very used way of financing for many economic agents. For this reason, as written before, there's the explicit EU regulation 2017/1131 that deals specifically with them.

Funds of funds

Funds of funds (FOF) are funds that instead of investing directly in a security, they invest in other investment funds. They are classified under the category of the fund in which they primarily invest. For example, a fund of funds may be a mutual fund that invests in hedge funds.

Specialty funds

These funds specialize in the securities of a particular sector, industry or market.

Funds that are included in this category are real estate funds, commodities funds or socially responsible investing funds.

1.4.4.1 Focus on Sustainable Funds

It is important to distinguish the different types of funds that are considered "sustainable funds":

- *Socially responsible investing (SRI) Funds* (also called ethical funds) are based on a value-based investing approach that seeks to optimize not only the financial return, but also the extra-financial return, which is the return that has a positive impact on the entire social community. They do so by excluding particular securities or categories of securities from their portfolio.

  Nowadays, common SRI funds exclude fossil fuel producers and firearms manufacturers or military-weapons involved businesses and usually invest in companies that support environmental stewardship, human rights and diversity.

- *Environmental, social and corporate governance (ESG) funds* are financial instruments that consider ESG aspects in the selection of the assets that compose the fund, creating a portfolio that gives a positive contribution to one of more of the 3 pillars of sustainability. ESG can be considered as an evolution of SRI and ethical funds. These types of funds are constantly evolving, in fact one of the most relevant progress in the sustainable fund industry has been that, from 2015, ESG fund managers started also to compare fund results with the SDGs (Sustainable Development Goals).

- *Impact funds* are those funds that focus on creating positive social impacts, that try also to quantify with some measures (for instance, number of schools built, contribution of economic activity in a poor community or to a reduction of carbon footprint…), nevertheless investors keep the ownership of the asset and expects a positive return.

All of this is different from philanthropy, where the return is only social and for the investor there is no profit-oriented interest behind the investment.

The table of OECD clarifies these distinctions in the following table, comparing philanthropy, social impact investing, SRI-ESG investing and conventional finance investing, underlying the different focuses and return expectations for each (Boffo & Palatano, 2020).

Figure 4 - The spectrum of social and financial investing

	Philanthropy		Social Impact Investing		Sustainable and Responsible Investing[8]	Conventional financial investing
	Traditional Philanthropy	Venture Philanthropy	Social Investing	Impact investment	ESG investing	Fully commercial investment
Focus	Address societal challenges through the provision of grants	Address societal challenges with venture investment approaches	Investment with a focus on social and/or environmental outcome and some expected financial return	Investment with an intent to have a measurable environmental and/or social return	Enhance long-term value by using ESG factors to mitigate risks and identify growth opportunities.	Limited or no regard for environmental, social or governance practices
			Use of ESG metrics and methodologies			
Return Expectation	Social return only	Social return focused	Social return and sub-market financial return	Social return and adequate financial market rate	Financial market return focused on long-term value	Financial market return only
	Social impact	←→	Social and financial		←→	Financial returns

Source: (Boffo & Palatano, 2020)*, p. 15*

Focusing on the SRI-ESG funds, a survey conducted by BNP Paribas helps to clear the magnitude of the phenomenon. Based on an online survey and qualitative interviews, and conducted on 53 hedge funds, whose combined AuM are over half of a trillion USD, the research revealed that 40% of hedge funds incorporate ESG into their investment decision-making processes (BNP Paribas, 2020).

AuM are the Assets Under Management, which refers to the total market value of the assets that an investment fund manages, which is an important indication of the size on the investment fund operations.

As regards SRI mutual funds, a survey of the Forum for Sustainable and Responsible Investment, showed that the AuM increased in less than 10 years (from 1994 to 2013) by 1000% (Mendes & Pereira Silva, 2021) and in more recent years their growth had even a stronger acceleration.

1.4.5 Further breakdowns

Investment funds have a wide range of investment aims and can be classified taking into consideration other characteristics, for example the type of investors (retail funds and institutional funds), the availability and the access, the investment horizon (short-term and long-term funds) or their target, that could be specific geographical regions (e.g., emerging markets, a specific continent or country) or specific investment strategies.

1.5 The Actors and the Structure of an IF

One of the main characteristics to take into account of investment funds is that individual investors cannot make decisions about the fund composition on their own: they simply choose a fund taking into consideration its goals, risks, fees and other factors. The decision of which securities a fund should hold is taken by the fund manager.

A lot also depends on the fund structure. Fund structuring is the configuration of a fund, taking into consideration the characteristics of the fund company (manager requirements), the investor requirements and all the other actors involved.

1.5.1 The Subjects

Strictly related to the subjects of a fund are the activities associated with them. Each person or entity has a specific job and role that has the aim to make the fund as much profitable as possible.

We can group all the activities related to an investment fund in two categories:
- Front-office functions, which relates directly to making investment decisions and trading, that is the activity of the fund manager;
- Back-office functions, which relates to all the other services needed by the front office functions, meaning the administrative, reporting, controlling activities that occur after the trade is made. These activities may be performed by third parties, which are completely different separate organizations, or directly by the management company.

There are also the so called "middle office functions", particularly relevant for the front office functions of the fund, in which, typically the IT department, manages risks and controls that the transactions are correctly executed.

Typically there are the following subjects that carry out these activities in the fund industry:

Figure 5 - Subjects involved in an IF

Source: author's elaboration

- **Sponsor/ Investment Company:** The Sponsor is usually the creator of the fund and the promoter of it. When the fund has the legal form of an investment company, it coincides with the IC.

  The main business of the sponsor is to find capital and define the fund manager (AMC) and the board of directors, but it typically can offer investors a variety of other funds services, that can either be provided by third parties.

- **Fund manager** manages the investment decisions, it is the person or the company (the management company) responsible for implementing the investment strategy of the fund and for managing its trading activities.

  The Management Company is specialized in running investment funds, in fact funds usually do not stand alone, but are part of a family of funds that have been organized by and receive a set of services from a management company.

  This company may be divided itself in different legal entities and may have several organizational forms (private or public corporations or subsidiaries of other organizations).

  The typical management company offers several types of services that vary from fund administration, investment advisory to distribution.

- **Board of directors (trustees in case of a trust)**: they safeguard the assets and manage the legal part of the fund, guaranteeing the compliance with laws, regulations and rules, ensuring that corporate policies are followed.

- **Investors:** people who provide the capital.
- **The Regulators**: they are established by governments or independent organizations in order to oversee the functioning of financial markets, including fairness of all investment funds activities.
- **Third-Party Service Providers**
  - *Fund administrator:* she/he manages the trading, valuation and pricing of the share fund. Her/His main duty is to provide back-office support by taking responsibility for the operations and the administrative, accounting and valuation services, allowing the fund manager to concentrate on trades.
  - *Investment Advisors*: the adviser is in charge of overseeing legal agreements, dealing with external service providers, marketing and distributing. They also provide periodic reports to investors.
  - *Brokers and other intermediaries*: when a fund's manager makes a securities trade, brokers and other intermediaries help her/him to execute that trade.
  - *Registrar and Transfer Agents (RTA)*: they manage and keep track of subscriptions and withdrawals of the shares of the fund and control payments of any dividends.
    Registrar and transfer agents must be registered with the regulator.
  - *Fund Accountants*: they are in charge of the fund accounting, meaning that they keep the books of the funds—assets, liabilities, income and expenses—in accordance with the provisions of the regulation taken as a reference. For EU is the Manual on investment fund statistics based on the Regulation ECB/2013/38 and the Guideline ECB/2014/15.
  - *Custodians*: they are responsible for the safe keeping or custody of the assets of the fund. A custodian must be a financial institution and commonly it is a bank, known as the "custodian bank".
  - *Auditors*: the fund can rely on external auditors, independent from the company, that examine fund annual accounts assuring their accuracy. Auditors must be familiar with the rules established for the investment fund.
  - *Legal counsel(s)*: usually they provide legal services and handle all legal matters for the management company.
  - *Analysts and Rating Agents*: investment analysts conduct research about the market, producing analysis that can be qualitative or quantitative in order to provide advice for the investment. Rating agents assess financial strength of the fund, taking into consideration also its level of debt.

o *Distributors*: investors can purchase shares of the fund from the fund directly, from the RTA or from another party, called investment fund distributor. It is an individual or an entity that helps investors to buy and sell units of investment funds. They need to understand the investor's risk tolerance and financial goals to suggest a suitable plan for them.

1.5.2 Fund Structure

A fund may be structured in different ways.

A fund manager, when she/he structures the fund, needs to consider the structure that allows to minimize the set-up and maintenance costs of it. The location of the fund is surely a variable that is very relevant when considering the type of structure the fund will have. Other factors to take into account before deciding the structure are the investment decision making process and the activities of the fund manager (Hwee, et al., 2020).

In this elaborate there are listed the main three structure a fund can assume.

Figure 6 - Fund Structuring Options
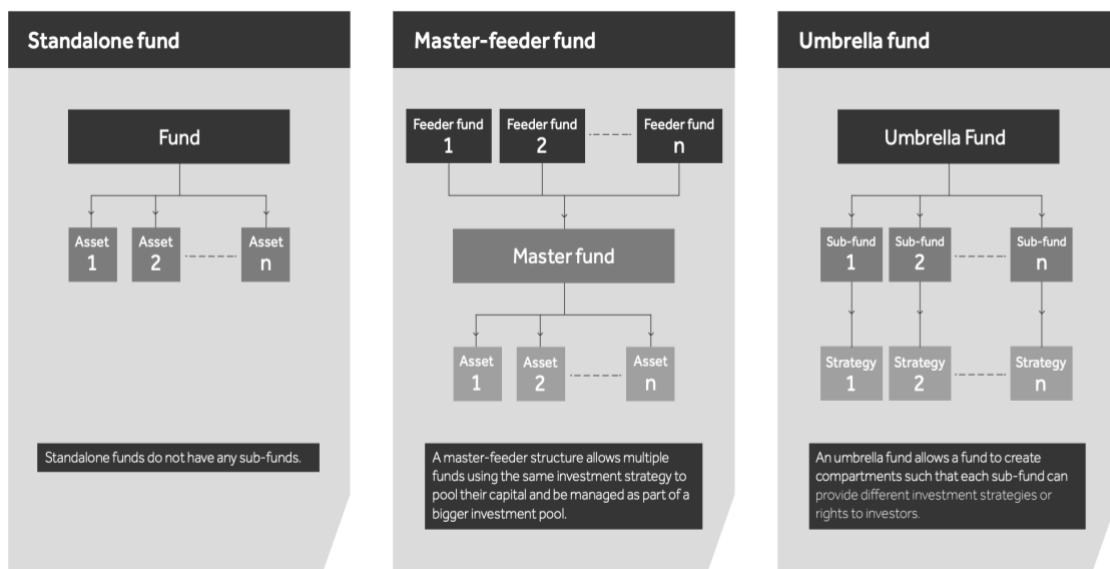
Source: FCA – Financial Conduct Authority (2019)

- **Standalone fund**: is the most common structure for a fund. The fund invests without 'feeding' another vehicle, meaning that there is no any other sub-fund and, at the same time, it is not "feeded" by any other fund.

- **Master-feeder fund**: the master-feeder is a fund (feeder fund) that invests at least 85 percent of its own assets in units of another fund (master fund). The latter can hold shares itself of the feeder (ESMA, 2022).

    The master fund has usually the same policies as the feeders, however, it's the master fund to be responsible for making the portfolio investments and conducting the trading activity.

    This type of structure provides benefits at a tax, costs and dividend level (CFI, 2022).

- **Umbrella fund**: with this type of structure, it's possible to create sub-funds that provide different investment strategies to investors. For example, within a single fund, it's possible to have a sub-fund that invests on the Italian stock market and another one on the German stock market. Each sub-fund has its own investment policy and a separate portfolio of asset. Umbrella funds have different advantages, in terms of costs and tax-efficiency, since investors can easily transfer shares from a sub-fund to another without creating a capital gain, which would be taxable (Lhabitant, 2006).

The second two types of structure are more common for hedge funds, rather than mutual funds.

1.5.3 AMC Structure

One of the most important actor for a fund is the fund manager. It is the person, a group of people or another company that is responsible for managing the fund, deciding the investment strategy and what, how, where, when and how much capital of the investors to invest.

Typically, the fund managers is an asset management company (AMC) or a person working with it.

An AMC is known also as the 'asset manager' and is also called investment management company (IMCO). The main objective of the company is to invest pooled funds from investors into a variety of securities and assets.

The strategy and the investment style adopted by the fund manager are generally in line with the asset manager's strategy. Whenever the fund manager and the AMC don't coincide, the final choice regarding the trade of a security depends on the fund manager.

As an investor, selecting the fund with a talented fund manager or asset manager will significantly impact the profitability of the fund.

As regards the AMC structure it is possible to give a graphical representation of its operational scheme in *Figure 7*.

Money is collected from investors, and the pooled capital obtained is divided in N shares and invested in different securities or assets.

As concerns the remuneration of AMC; AMC managers are compensated via fees, usually a percentage of a client's AuM.

Figure 7 - AMC structure
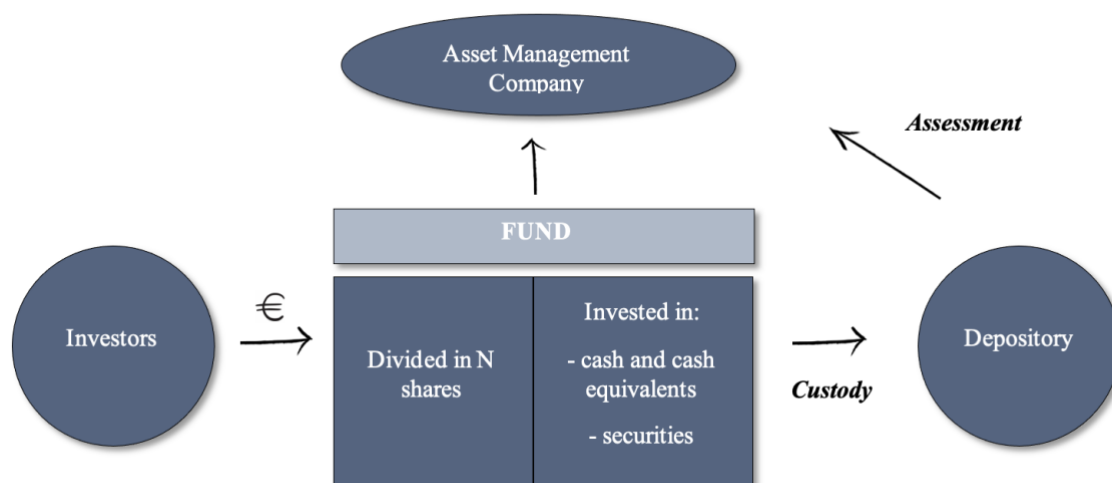
Source: Economia degli intermediari finanziari (ANON., 2020)

The custodian and the depository are two figures that are very relevant for the AMC.

The custodian holds the securities in custody. Depositories are the subjects who are in charge of both the custody and the legal ownership of securities (a custodian doesn't own the assets legally, the depository does. So every depository is a custodian, but not every custodian is a depository).

This means that shares or holdings will be held by the custodian, but they will be legally held in a Depository's safe-keeping account.

The depositary has many duties:

- it has powers of custody of the financial instruments;
- it ascertains the legitimacy of the sale, issue, repurchase, redemption and cancellation of the fund units;
- it ascertains the correctness of the calculation of the value of the fund shares or carries the calculation itself on behalf of the manager;

- it carries out the instructions of the manager if they are not contrary to the rules of the supervisory bodies;
- it monitors the liquidity flows of the fund.

1.5.3.1 Value creation

The value creation of an asset management company is made up by different phases:

1) In the first phase of management, it is necessary to identify which are the drivers of the diversification of the investment.

   - Geographic/Sectoral: it means that the allocation is based on the geographic residence of the issuers or on specific sectors.

   - Types of risk: the manager of the fund may prefer classes of securities that are more or less exposed to the fluctuation of interest rates, or an approach that refers to either the ratings, the standard deviation or Sharpe ratio of certain categories of securities.

   - Management/Investment style adopted: the management defines a plan and a strategy in order to achieve the financial and investment goals of the investors. The investment strategy of the fund depends on many factors, such as the wealth, the risk tolerance and the goals of the investor. There are different strategies that a fund can pursue, depending also on the type of the fund, but there is not a one-fits-all classification.

Table 2 - IFs strategies

Main strategies for Mutual Funds	Main strategies for Hedge Funds
Growth: managers try to identify companies that seem to promise significant revenues and earnings, and they are willing to pay high prices for this high-growth-potential securities.	**L/S equity**: the long short equity strategy combines long and short positions of the same industry to reduce the market exposure.
Value: managers select securities that are considered undervalued. In general, it's a less risky approach with respect to the growth approach.	**Relative value arbitrage strategies**: these strategies exploit pricing anomalies between different securities. They include *equity market neutral* (that exploits discrepancies between related equity securities), *fixed income arbitrage* (that focuses on discrepancies within and across fixed income markets of different countries) and *convertible*
Fundamental: managers try to recognize when the price is not equal to the	

fundamental, realizing capital gains.

Technical: also called quantitative approach, it's a strategy based on mathematical models trying to figure out patterns in the past behaviour of securities.

Risk factor control: it's an approach that favor fixed income securities.

Top-down: this approach starts from the big picture -e.g. the general economic trend- and then incorporates this trend into specific markets or industries selecting their most profitable securities.

Bottom up: individual securities are selected on the analysis of individuals companies, before the industry, sector or country and before considering the overall situation of the economy.

bond arbitrage (that takes advantage on discrepancies between convertible bonds and the underlying equity).

Event-driven: it's a strategy that origins from the opportunities and risks associated with an event, such as acquisitions, mergers, consolidations, recapitalization, liquidations, and bankruptcy. It is often used also by private equity funds.

It includes, among others, the *distressed securities strategy*, that focuses on debt and equity of companies that experience financial difficulty and *merger arbitrage strategy*, that exploits the uncertainty related to the merger announcements.

Global macro: this strategy is related to leveraged, directional investments based on macroeconomic trends such as moves in interest rates, currencies, demographic shifts and economic cycles.

Managed Futures: this strategy relates mainly to CTA (commodity trading advisors) that trade commodities and future contracts.

Source: author's elaboration

In this first phase the AMC focuses on the market research, the investment strategy to follow and the trade allocation, identifying the "slices of the cake" (geographical areas/sectors of securities) of the overall portfolio, but not the single bond or stock to purchase/sell (EFAMA, 2022).

It is the most important part of all, most of the total performance of an AMC depends, indeed, on the choices made in this phase.

After making these choices, the manager must translate them into securities to buy and move on to the second phase.

2) The second phase of the fund management involves the security selection. This choice can be based on different approaches, such as *stock picking*, a strategy based on identifying and buying stocks that are believed to be temporarily undervalued and that are expected to rise in price, or sell overvalued stocks which price is expected to fall,

or *market timing*, a strategy that considers also beta management (e.g. if it is expected that the market may go down, it is preferable a null or even negative beta in order to be less reactive with respect to this market decline; vice versa if the market is expected to rise it is preferable a positive beta).

These decisions are made at a more "micro" level than those of the first phase, but the contribution to overall performance is minor.

3) The third phase relates to the trade execution and the following evaluations. The fund manager needs to deal with the reporting and performance evaluation of the fund. Moreover, in relation to the performance of the fund, a fund manager assesses risks that the fund is exposed to, guaranteeing a continue monitoring of the fund exposure to risks (The Committee of European Securities Regulators, 2009).

4) The fourth phase refers to the relation between the AMC and the depositary services. When the fund manager decides to buy or sell a security it's necessary to pass the order to a custodian, that must check that the purchase of the security is feasible according to the fund regulations.

Also, the custodian bank takes care of accounting on a distant software house, on which the custodian writes each transaction.

Inside this software house, the disk space is rented on behalf of various asset management companies with employees who constantly backup the data that has been stored on the disks.

1.6 Advantages and Disadvantages of IFs

Investment funds, as written until now, include a broad category of securities and they differ a lot to one another, making them an investment product suitable for each type of investor. From the point of view of the investor, there are both advantages and disadvantages to take into consideration, before making this type of investment.

As regards the advantages common to most of investment funds, they are:
1. Reduction of transaction costs: you avoid paying for each trade; thus you bare less transaction costs and this has a relevant effect on investors' profits.
2. Reduction of risk: the diversification of the fund reduces the unsystematic risk that, investing in only one security, you may face more. It is estimated that the majority of

mutual funds invest in over 100 securities (Fidelity Learning Center, 2022). Naturally, the risk depends on the type of the fund.

3. Reduction of personal time spent: investing in an IF (that is actively managed) implies the payment of a fee to the fund manager, however, in this way the investor doesn't need to spend personal time doing too many research, investment decisions and performing trades.

4. Variety: there are many types of investment funds and it's possible to choose the one that is more in line with each investor risk profile and investment goals.

As regards the disadvantages:

1. Lack of choice and owners' rights: the fund manager is the one who decides the composition of the fund, in a totally independent way. The only thing the investor can choose is the type of fund to invest in. Moreover the investors cannot have the rights connected with the individual securities of the fund.

2. No guarantee of success: there is no guarantee that the performance of the fund is higher than investing in the single security.

3. Costs: investors will have to pay different fees, depending on the type of fund. In any case, it's necessary that in the fund prospectus there is a detailed list of all the fees.

1.6.1 Fees and Commissions of an IF

There are several fees related to the services provided by each subject involved in the fund, directly or indirectly. It is important to remember that not all funds have the following fees, it depends on the structure and the type of the fund.

The main fees that need to be paid are the following:

- **Entry charge/Subscription fee**: you pay these fee in the moment you invest in the fund. The more you invest in terms of capital the more these commissions tend to decrease. They are expressed in absolute terms and as a percentage of the invested amount.

- **Exit commission/Redemption fee**: in some funds, when you decide to redeem your share, it is required to pay a fee. Usually, the percentage is descended depending on the duration of the adhesion in the fund.

- **Switch fees**: you cannot always switch from one fund to another, for example you cannot switch between funds that have different managers, because these have

different investment policies. When switching is possible, a commission is charged to the individual fund participant.

These commissions are expressed in absolute terms or percentages of the invested amount.

- **Management fee**: it is a percentage applied on the amount of capital invested at the beginning and all the returns that have been recorded independently on the result of the management activity.

  Typically, it's (BNP Paribas, 2020) (BNP Paribas, 2020) (BNP Paribas, 2020) (BNP Paribas, 2020) about 50-100 basis point, but it depends on both the amount invested and the investment strategy adopted. Moreover, it is generally higher for hedge funds, ranging from 1-2 percent (F.Jarvis, 2015).

- **Performance/carry/incentive fee**: it is a fee charged by the fund manager when the fund earns a positive return and thus constitutes an incentive for the company to generate a gain for its clients. It can be either calculated as a percentage of net profits or as the excess over a specific threshold or a hurdle rate (F.Jarvis, 2015).

- **Operating expenses**: they are costs to owe to third parties (that can be paid directly by the fund or by the management company) such as administrative fees, advisory fees, accountant's fees, custody fees, audit fees, transfer agency commissions, legal fees or marketing and distribution expenses.

All the costs related to an investment fund are summarized in a single annual fee: the *expense ratio*, that represents, therefore, the cost of owning an IF share.

The TER (Total Expense Ratio) is a fundamental measure to understand the profitability of the fund, because it takes into account all the known costs associated with the fund operation and expresses them as a single number, usually as a percentage, that can be compared with the return obtained from the fund.

CHAPTER 2: COVID-19 RELATIONSHIP WITH FINANCIAL MARKETS

2.1 Covid-19: brief overview

The Coronavirus affected the overall economy deeply, both in terms of real economy and in terms of financial markets. It spread uncertainty among all the market and economic agents, changing their habits and behavioural aspects in consumption and investing.

It increased the level of risk and volatility and forced tempestive fiscal and monetary policy interventions.

It is meaningful to go over again the main stages of the coronavirus pandemic, as the market reacted differently depending on the wave of the pandemic and its severity, the number of cases, the speed of contagion and all the several news regarding possible treatments, vaccination and aids from institutional bodies.

Moreover, as the spread of the virus varied significantly depending on the country, the analysis is of course different if we consider a country or another.

It is important to underline that Covid-19 recession is a crisis that is substantially different from the global financial crisis of 2008, because of many reasons.

Firstly, it could not be anticipated in any way. The uncontrollable spread of the virus has taken the whole world by surprise, whereas the 2008 crisis was a consequence of actions and developments in housing and financial markets combined with weak regulation and high leverage in the banking sector.

In addition to that, the Covid crisis is a health crisis that caused major losses of GDP for entire countries, blocking the supply of many goods and services. This is the reason why, whereas usually central banks try to intervene to avoid that a financial crisis become an economic one, with Covid, first there was the economic ruing (in terms of GDP), and then central banks intervened to avoid that the crisis became also a financial one.

The actions undertook were successful because no major banks collapsed and the major indices were able to recover their pre-pandemic values, despite a relevant loss in February and March 2020 (Goldstein, et al., 2021).

2.1.1 The main stages of the Pandemic

This elaborate describes the main stages of the pandemic, considering that, since the virus is not gone yet, it is possible that there will be further developments related to the pandemic and other economic considerations to be retrieved.

Despite the latest waves and variants of Covid, the reaction of the market has been more intense in the first wave, due to the unexpectedness of the event, so the focus of the elaborate is mainly on the first stages of the pandemic.

However, also the main changes and implications that the Covid outbreak has caused in the longer term will be discussed, considering all the time-period from 2020 onwards.

The first wave of coronavirus can be divided in two main stages:

1) The first one started the day when the Coronavirus was identified for the first time in Wuhan, in China, at the end of February.

   The first cluster of cases was reported from Wuhan Municipal Health Commission in December 2019 (WHO, 2020). Later on, in middle of January, cases were reported also in Thailand. On 23 January 2020, the Chinese authorities declared the lockdown of Wuhan, the very first lockdown of the pandemic. Yet, at that time, there were already other confirmed cases in many other Asian countries (Vasileiou , 2020). In this first phase the health emergency involved primarily China, Korea, and some other Asian countries.

   The WHO defined Coronavirus as a global emergency only on January 30th, 2020, due to the consequent spreading of the virus all around Asia and outside as well.

2) In the second phase, in the second half of February, the contagion expanded and reached first Europe and later America, reaching the point where over 215 countries were affected (CONSOB, 2020).

   In this period, in some European countries, such as Italy, the spreading of the virus and the related lockdown took place weeks earlier with respect of the rest of Europe. In fact, both in terms of timing and in terms of types of measures adopted to fight the virus, the situation has been very heterogeneous from country to country, with some governments that chose to declare national lockdowns and others that had a very lighter approach.

   On the 11th of March 2020 the World Health Organization declared officially the outbreak of the pandemic and on the 27th of March 2020 the number of cases exceeded the 500000.

Without doubts, since the vaccine has been distributed, the pandemic has entered into a new phase, with better future prospects for both global health and economy. Just the news of the vaccination in mid-November had a positive impact on financial markets, especially equity ones. To be precise, already in summer 2020 the mere news of a probable near-term vaccine produced optimistic market sentiments for investors and evident positive movements of indices in financial markets (ECB, 2021).

Since the outbreak of the pandemic countries experienced a series of stricter and lighter quarantine policies, with diversified intensity of Covid waves, variants of the virus and diversified economic consequences, that lead in any case, to significantly limited economy activity.

The consequences of the spreading of the virus have touched many aspects of every-day life, such as, to name one, education. A McKinsey analysis showed that the pandemic left students on average five months behind in mathematics and four months behind in reading (McKinsey, 2021). In addition to that, many high schools and universities, across the world, closed and forego in-presence lessons for a very long period, changing the traditional ways of teaching.

Moreover, as for the entertainment sector, Covid-19 caused postponement and the cancellation of many events, dedicated to sport, religion, culture or politics.

As for tourism, many governments have restricted travels to and from countries that have been more affected by the virus outbreak. There were several flight cancellations and annulled hotel bookings. All these cancellations were estimated to be worth over $200billion (Peterson & Thankom, 2020).

Furthermore, there has been a shortage of supplies, caused also by panic buying and by the closure of many factories in China, that is the world's larger manufacturer and exporter.

All of this had caused consequences for economy, causing a recession for most of the countries affected by the pandemic.

2.2 Impact on the Economy and Public Sector Initiatives

2.2.1 The economic loss

The global economic recession caused by the pandemic is known as "COVID-19 recession". It started after the virus has extended also outside Asia, at the beginning of the second phase mentioned above, in February 2020.

The pandemic has affected adversely almost every major industry, mainly due to the lockdowns of entire regions and the quarantine regimes that people had to undergo in case they tested positive for the virus or came into contact with other positives, which led to a shortage of workers and the inability to perform many services, with a consequent limitation of the economy activity and, in the worst cases, a permanent closure of some businesses.

The recession caused a rapid increase of the unemployment in many countries. For example, In US more than 10 million unemployment cases had been filed in 2020 (Cox, 2021), especially in those sectors that have been more hit, such as the leisure and hospitality sector. During 2020 the unemployment rate increased, reaching 14.8% in April 2020, with just a partial recovery in May 2020, whereas the labour force participation rate, in July 2021, was still 1.7 percentage points below the pre pandemic level, in January 2020 (Falk, et al., 2021). The negative consequences of the pandemic were exacerbated by the concurrent 2021-2022 global energy crisis driven by the demand for energy, that became more intense due to the Russo-Ukrainian War.

To give a global view of the losses in 2020 of GDP the *Figure 8* shows the share of GDP lost by the economies in 2020:

Figure 8 - Share of GDP loss
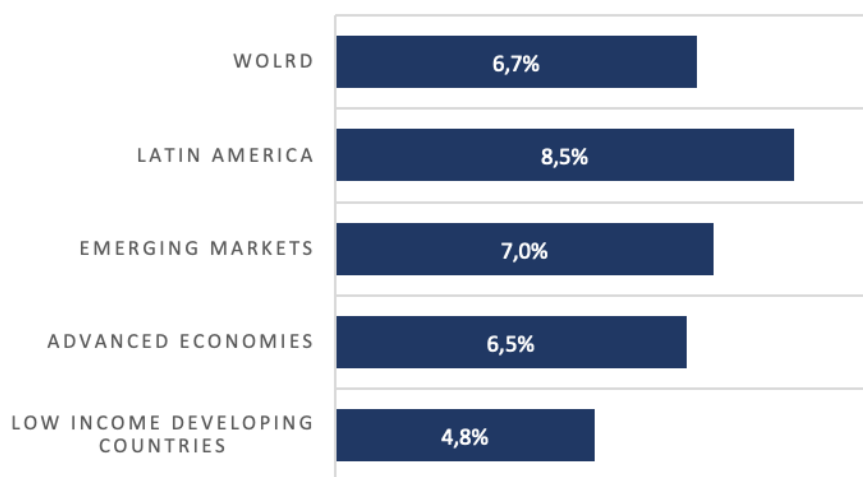
Source: (DATABASE, 2021)

Globally, the loss registered was 6.7% compared to the GDP levels of 2019.
Specifically, still focusing on EU and USA, for US the GDP declined by 3.5% in 2020 (Goldstein, et al., 2021), instead for EU the loss was 6,5%, (ECB, 2021).

A general percentage for all the European Union is not very informative, as there have been countries that were affected in a very harder measure with respect to others, such as Portugal and Spain or Italy, that suffered losses ranging from 8-9%, and other countries such as Ireland or Luxembourg that registered, in contrast, an increase in the real GDP (ECB, 2021).

2.2.1.1 Businesses point of view

As regards the economic loss for businesses related to Covid, it varies, other than for country, also for industries.

These differences between sectors are due to the fact that some companies require face-to-face interactions with clients or between workers more than others; and therefore, they suffered much more from the consequences of the pandemic and in the worst cases, as it happened during the first wave, some businesses had to close totally their activities. This was the case for businesses such as those involved in the industry of accommodation and food services, arts, entertainment and recreation or retail services.

Other companies instead were not penalized in the same way, such as company that works for online entertainment or home delivery.

The solution of "teleworking" was feasible not for everyone, for example, in high-tech industries, social distancing requirements were managed in an easier way than in other industries, such as tourism, which this was not applicable (Affinito & Santioni, 2021).

This is why the effect of the Covid-19 was much more drastic for some businesses compared to others.

2.2.1.2 Households point of view

As regards the economic loss for households, it is still dependent on the country considered. Focusing on the household disposable income (HDI) as a measure, that is the income available for final consumption and saving, it's possible to retrieve interesting information on the changes of households' finances caused by Covid.

To see which parts of HDI were more affected from the Covid, it's relevant to see its composition. The HDI includes: income generated from the production of goods and services, any net income received related to the ownership of financial assets, government redistribution policies and other current transfers.

Its three most Covid-affected components are the salaries/wages, the gross mixed income and the transfers and social benefits from the governments (OECD, 2020).

From the middle of March of 2020, due to the closure of all non-essential businesses, significant portions of the population were not able to work regularly or were not able to work at all. In some cases, businesses received subsidies aimed to keep employees on the payroll but in the majority of G7 countries and Australia, most employees recorded declines in compensation in the second quarter of 2020, from -2.2% in Australia to a -9.4% in France (OECD, 2020).

In addition to subsidies, most governments also promoted other fiscal stimulus, via amounts paid directly to households, in order to compensate the reduced wages.

Despite the economic help received, in all countries it's been recorded a significant decrease in the level of household final consumption in the second quarter of 2020, but, at the same time, a general increase in precautionary savings.

In addition to all this, the crisis had terrible effects also in terms of global poverty and inequalities.

The extreme poverty increased for the first time since 1998 (United Nations, 2021) and income losses were larger for younger people and women, increasing inequalities and discrimination.

Women, in particular, were affected disproportionately in terms of economic opportunities, also because there's an higher proportion of women compared to men working in sectors that have been more affected by lockdowns and social distancing measures, resulting in a worsening global gender gap that increased from 99.5 years to 135.6 years (US Globan Leadership Coalition, 2022).

2.2.2 Central Banks Response

Government, Central Banks and regulators played a crucial role in Covid-19 crisis containment, mainly by assisting financial institutions.

Central Banks, in particular, enacted a series of measures aimed at reducing as much as possible the solvency problem with massive transfers and reducing interest rates, easing liquidity conditions and guaranteeing the possibility for the financial institutions to supply credit to households and businesses.

The *Figure 9* summarizes the actions of ECB, Fed; bank of England and Bank of Japan.

Figure 9 - CB measures
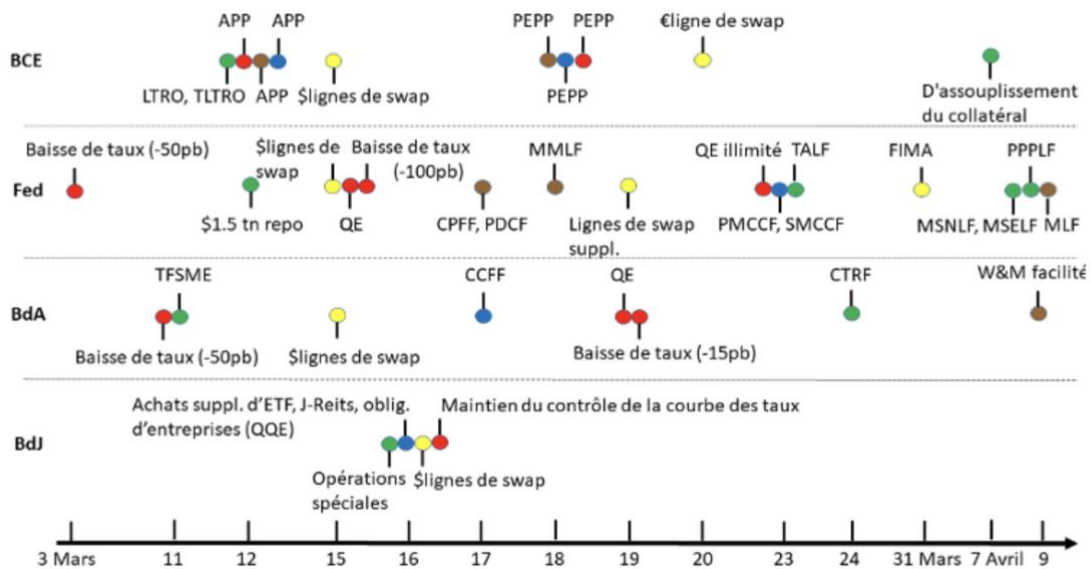
Source: (Banque de France, 2020)

The red actions relate to measures related to risk free rates, the green to providing liquidity, the blue ones aim to support capital market, the brown actions have the goal to support the value of securities and finally the yellow ones are specifically for swaps.

Bank of England on 19 March 2020 cut the interest rate to a historic low rate of 0.1%. In 2022 it recovered returning to the pre-pandemic levels, also getting higher reaching the point of 1,25% on 16 June 2022 (DATABASE, 2022).

As for Bank of Japan, it promoted a massive purchase of corporate bonds, that from April 2022 had returned to pre-Covid levels as BoJ announced in December 2021 (Bank of Japan, 2021).

This thesis focuses mainly on the measures of ECB and FED.

2.2.2.1 ECB

ECB couldn't lower interest rates, because as for the Bank of Japan, they were already zero, so it decided to keep them at the current low level and it enacted other types of measures, in order to provide liquidity and to support capital markets and the value of securities, such as:

- PEPP (the Pandemic Emergency Purchase Programme) that initially was launched in March 2020 and was expected to be 750 billion but explanted to 1850 billion. It

consisted in APP (asset purchasing program) of government bonds, bond of supranational organization and corporate bonds.

- CSPP (Corporate Sector Purchase Program) that consisted in purchases by ECB of bonds and commercial paper of non-financial corporation.
- Easing collateral standards required to make loans, expanding the list of assets that banks can use as collateral.
- PELTRO, LTRO and TLTRO, that are programs that were launched in order to ensure sufficient liquidity and smooth money market conditions during the pandemic period. They mean respectively to Pandemic Emergency Long Term Refinancing Operations, Long Term Refinancing Operations and Targeted Long Term Refinancing Operations.
- Providing liquidity to non-euro area central banks in exchange for adequate euro-denominated collateral with Repo Lines.

As regards the "yellow measures" of the figure related specifically to swaps, ECB built Swap line and Repo line arrangements, that were aimed at providing euro liquidity.
Swap lines provide liquidity against currencies accepted by the ECB and repo line arrangements provide liquidity against adequate euro-denominated collateral accepted by the ECB (ECB, 2021).

2.2.2.2 FED

The FED, as the bank of England, decreased the interest rates and unlimited quantitative easing to keep interest rates low, purchasing massive amounts of debt securities.

In addition to that, to provide liquidity, Fed undertook repo operations in order to make cash available to dealers in exchange of government securities and launched two programs: the Paycheck Protection Program Liquidity Facility (PPPLF) through which Fed supplies liquidity to financial institutions in order to facilitate lending to small businesses and the Main Street Lending Program (MSLP), that has the same aim and includes the MSNLF and the MSELF, which are the Main Street New Loan Facility and the Main Street Expanded Loan Facility, that are loans designed for small-medium enterprises.

Moreover, in order to support the value of securities, Fed launched the PDCF (Primary Dealer Credit Facility), a program that aims at offering low interest rate loans, and CPFF (Commercial Paper Funding Facility) a program finalized at buying commercial paper, in

order to maintain the commercial paper market liquid. Commercial paper are financial instruments that finance a large range of economic activity, supplying credit and funding to companies.

Moreover, Fed re-launched the MMLF (Money Market Mutual Fund Liquidity Facility), in order to lend to banks against collateral purchased from MMFs that invest in Treasury Securities and corporate short-term commercial paper.

To support capital markets and to help firms borrowing directly from capital markets, Fed launched PMCCF and SMCCF, respectively, the Primary Market Corporate Credit Facility (that allowed Fed to lend directly to corporations by buying new bonds and providing loans) and the Secondary Market Corporate Credit Facility (thanks to which the Fed could purchase corporate bonds as well as ETFs investing in corporate bonds).

And as for swaps, Fed arranged international swap lines making dollars available to foreign central banks and also launched FIMA (Foreign and International Monetary Authorities) Repo Facility which had the goal to ensure foreigners the access to dollar funding without the need to sell treasury securities in the market. Specifically, this repo facility FIMA offers dollar funding to those foreign CBs that do not have swap lines with the Fed. Fed provides this funding by making overnight dollar loans to these CBs and, in return, it takes as collateral Treasury securities.

2.3 Impact on Financial Markets Variables

The effects of the pandemic on firms and households and the relative uncertainty caused negative effects in financial markets, that have immediately responded to the Covid-19 spread announcement with dramatic movements (Fontana, 2021).

Most of the world stock markets have suffered losses of trillions of dollars and international financial institutions reduced their forecasted growth for the time-period of 2020 and onwards. (Jabeen, et al., 2022). Just the fear of losing profit and the associated uncertainty in the market has been estimated in 6 trillion USD loss only on 24th February 2020 (Jabeen, et al., 2022).

2.3.1 The stock market crash and the recovery

The 2020 stock market crash, began on 20 February 2020. The securities that have been more affected were treasury securities, corporate bonds and money market funds (Goldstein, et al., 2021).

As for the main indices, they lost a great part of their value during February-March 2020.

The first drop was on 9th of March (Black Monday 1) in which most global markets reported significant contractions.

The second big drop was four days later, on the 13th of March (Black Thursday) where the value of stocks in Europe and North America fell sharply with the largest loss reached by FTSE-Mib.

On March 16th Wall Street suffered the major drop since 1987 (Black Monday 2). And for European markets it was even worse, as the main indices, including the EURO STOXX 50, started the decline already at the end of February 2020 and reached the largest loss since 1987, on March 12th (Fontana, 2021).

Despite this, within the same year, all these indices have rebounded and returned to the pre-pandemic values. Lots of the credit goes to the Central Banks programs that allowed the financial market to recover quickly and completely, differently from the real economy that still has to deal with unemployment and firms losses.

Already at the end of March, on 24 March 2020, the announcement of a US stimulus package pushed the main American indices up, such as the DJI (that jumped by 11.37%), the NASDAQ (+8.12%) and the S&P 500 (+9.38%). The same day, European equities rebounded as well, thanks to ECB action and stimulus plans (Fontana, 2021).

Markets responded to the second wave with a more moderate decrease of the indices but with a consequent recovery as well. The same happened with the other waves, with lower and lower variability, especially after the news of the vaccine, that provided positive effects in the market, especially for the indices of Europe. On December 29th, in fact, after the first month in which the vaccinations started globally, EURO STOXX 50 touched 3581 points, the highest value since the beginning of the pandemic.

Even though the main indices and the stock markets seem to have recovered completely nowadays, it is still relevant to see the way and how the indices and other important macroeconomic variables moved from the start of the Covid-19 and onwards, also to understand the more persistent and significant changes that the pandemic caused in the financial markets.

2.3.2 Financial market conditions

Equity Markets

As for the equity indices, they have been the macroeconomic variable that most clearly shows the impacts that the pandemic had on markets. As mentioned before, there were more than one crash in March 2020, but not all indices moved in the same way and as quickly.

From *Figure 10*, retrieved by Morningstar Direct, it is possible to investigate movements of seven indices, that refer each one to a particular country.

Figure 10 - Stock Market Returns during Covid-19 pandemic
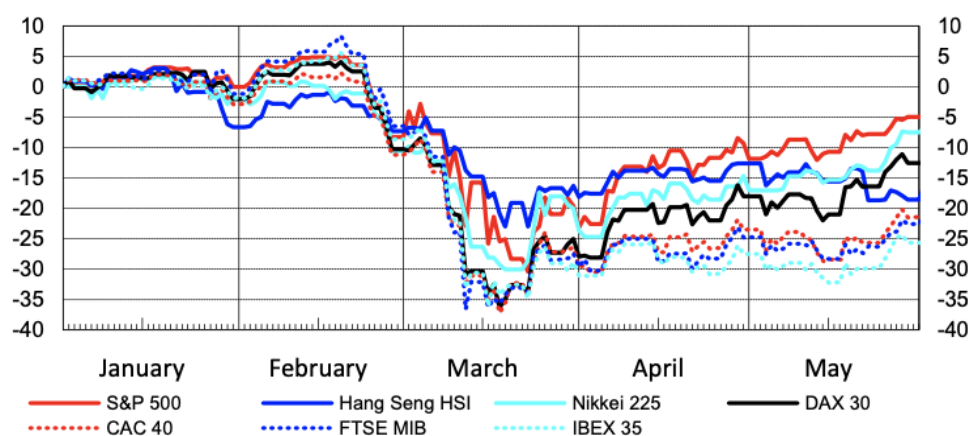
Source: (Santioni & Affinito, 2021)

The indices taken into consideration are the following:

- S&P 500: The Standard & Poor 500 is a U.S. stock index. It was created by Standard & Poor's in 1957 and tracks the performance of a stock basket consisting of the 500 largest-capitalization U.S. companies.

- Hang Seng HIS: The Hang Seng Index is a stock index of the Hong Kong Stock Exchange. It is composed of the 50 largest companies in the Hong Kong stock market and it is a useful measure to analyse the overall performance of the stock market in Hong Kong.

- Nikkei 225: The Nikkei 225 is a segment of the Tokyo Stock Exchange. The index contains the 225 stocks of the largest 225 companies listed on the Tokyo Stock Exchange (TSE).

- DAX 30: The DAX (Deutscher Aktien Index) 30 is the segment of the Frankfurt Stock Exchange. It is in fact composed of the 30 largest capitalized and most liquid German stocks listed on the 'Prime Standard' Segment of the Frankfurt Stock Exchange (FSE)

and traded continuously on the Xetra platform. It was introduced in 1988 and represents the main stock index of the German Stock Exchange.

- CAC 40: The CAC 40 stock index, named after the first Paris Stock Exchange's first automation system, the Cotation Assistée en Continu, is the main French stock market index and one of the most important in the Euronext system. It refers to the 40 composed of 40 companies that have the largest capitalization on the Euronext Paris (formerly Paris Bourse).

- FTSE MIB: is the most significant stock index of the Italian stock exchange. The basket, of which the index is composed, includes the shares of the 40 Italian companies listed with the largest capitalization, free float and liquidity. These 40 companies represent more than 80 percent of total market capitalization (FTSE Russell, 2021).

- IBEX 35: The IBEX-35 is an index of the Madrid Stock Exchange. It includes the 35 largest capitalization stocks of the Madrid Exchange.

Their movements in the figure are focused only on the year of 2020 from January to May, and it is possible to observe that all major stock market indices fell severely in March 2020. However, there are differences among the behaviours of the indices and assets performance, because they vary among countries. For example, from the graph it is possible to notice that FTSE MIB has the fastest drop among all the indices, this is because the virus hit Italy more aggressively and before the other European countries, whereas Hang Seng HIS had a decrease in its value already at the end of January, as the virus in Asia was already existing and expanding. It recovered later on, but dropped in March again, as the other indices.

As for the post-coronavirus recovery, some indices such as S&P 500, recovered fast and completely if we consider also 2021 and 2022 data, also surpassing their value pre pandemic. Not the same happened for the other indices, such as the FTSE 100 index (the London Stock Exchange that is not present in the graph above) and the Hang Seng index. They have recovered slower than the other major exchanges. However, for both, the most probable reason behind this difference is due to political issues, such as Brexit and general political turmoil.

10 year-government bonds

As for the 10 year-government bonds, *Figure 11* and *Table 3,* computed by retrieving the data from Statista*,* show the value of decennial government bonds in US, China, Japan, Germany, UK and France.

Figure 11 - Government Bonds
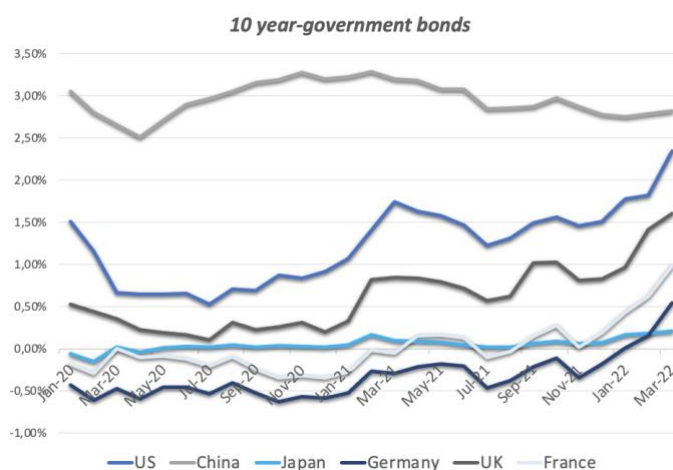
Source: author's elaboration from Statista data

Table 3 - Min and Max Values 10 yrs Government Bonds

	US	China	Japan	Germany	UK	France
Min Value	0,53%	2,51%	-0,15%	-0,63%	0,11%	-0,34%
Corresponding period	Aug-20	May-20	Mar-20	Nov-20	Aug-20	Jan-21
Max Value	2,35%	3,29%	0,21%	0,55%	1,61%	0,99%
Corresponding period	Mar-22	Feb-21	Mar-22	Mar-22	Mar-22	Mar-22

Source: author's elaboration from Statista data

In general, government bonds represent a key asset for both central banks and for retail and institutional investors because studying the movements of the yield is important to understand what the expectations of future growth prospects are.

The Government Bond Market was indeed the first market to respond to the crisis, it is possible indeed to notice from the graph and the table that the yield curve declined at the end of February / starting of March 2020. In some countries the decline was more intense, such as for US and China. Successively, the yields started increasing in most all countries, at a slow rate, with even more positive increases in 2022.

Specifically, the movement in the 10-year Treasury US yield is explained partially by the uncertainty of the market that led to high demand for liquidity, in fact market participants wanted to raise cash selling government bonds and this led to a decrease of the yield (ICI, 2022).

In 2020 the yield reached the lowest peak in all the shown countries, first in Japan and China in March and May 2020 and then in the US and Europe. After reaching the lowest peak it has been started rising, more or less during the period of the vaccination news, after which investors regained confidence and began to expect economic expansion and recovery in the following months.

Japan and Germany yields were less variable due to the fact that they were already below zero for most of the time-period considered.

Credit Spreads

Credit spreads are defined by Morningstar as "the excess yield offered by a security relative to a risk-free security [...]. Credit spread reflects the creditworthiness of an issuer and compensates investors for the risk of potential default." (Athanikar, 2021).

Credit spreads increased significantly after the coronavirus crisis, because of the risk of default, meaning the risk that the issuer doesn't pay the principal and/or the interests, that increased significantly in 2020. Not all issuers have been affected in the same way; there is still a big diversification considering the country.

Furthermore, comparing the behaviour of credit spread in the GFC in 2008, the recovery after this crisis was much faster (Kozlowski, et al., 2021), this is another signal of the prompt response by central banks.

From *Figure 12* it is noticeable that the higher spreads are due to the higher number of downgrades rather than upgrades during the pandemic, implying that the majority of borrowers' credit risk has worsened.

Figure 12 - Credit Spreads
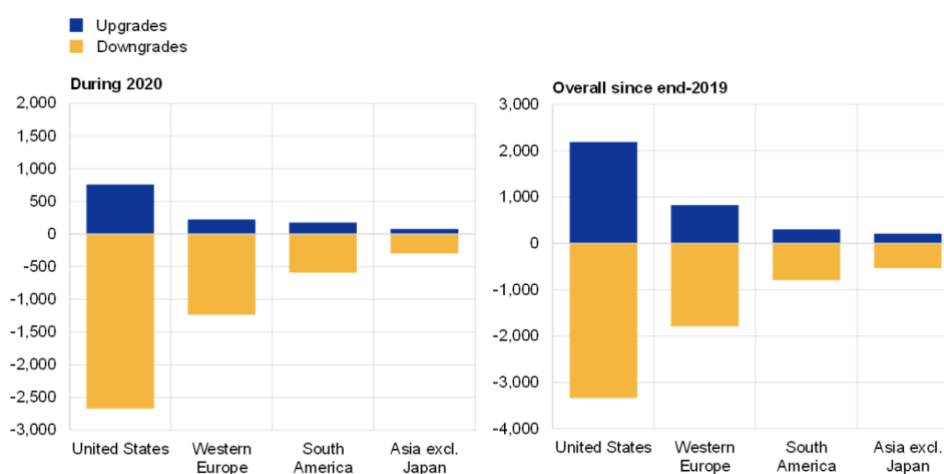
Source: (ECB, 2022)

Volatility

During the pandemic and the subsequent recession and recovery, the level of volatility and uncertainty in the financial markets reached unprecedent levels. Covid-19 crisis was characterized by large daily stock market jumps in both directions, moving up and down dependently on the news of Covid-19 improvements or worsening and programs adopted by CBs.

There are two indices that incorporate the volatility and give the adequate idea of the measure of the uncertainty that is present on the financial markets: VIX (also called CBOE Volatility Index because it refers to CBOE of the Chicago Board Options Exchange, a popular measure of stock market volatility expectation based on options on the S&P 500 index) and the VSTOXX (that refers to Europe and captures the implied volatility of EURO STOXX 50 Index options).

Taken data of VIX and VSTOXX from Eikon it was possible to construct this graph in order to see the movements of these volatility indicators:

Figure 13 - Volatility
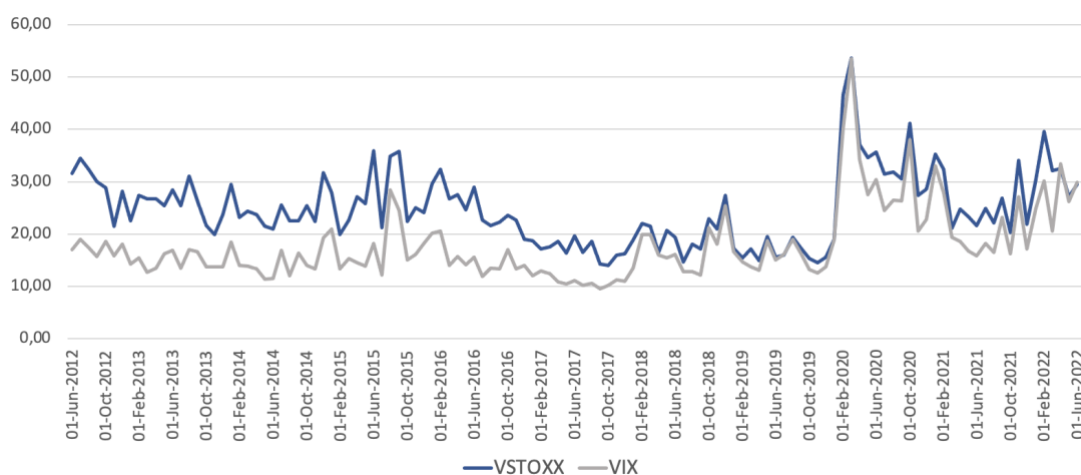
Source: author's elaboration

The VSTOXX in all the time-period considered of 10 years has always been above than the VIX, suggesting that the European market is more volatile than the American one. Only in March 2020 the two indices have been very close to each other, reaching the highest peak on the same week: the VIX on 16th March and the VSTOXX two days later. Normally values higher than 30 points indicate high volatility: the VIX, closed on March 16 2020 at a value equal to 82.69, surpassing the previous record set in 2008. On March 18 2020, instead, the VSTOXX reached the peak, at an intraday high of 90%, a very high level considering the medium level that ranged from 15-20% during the first half of February (DTCC, 2021).

Inflation Trends

As showed, the equity market has been characterized by a strong volatility that led to a high variability also for inflation. Inflation in the past two years has been remarkably unpredictable.

During the year 2020 the inflation rate in Europe has severely decreased, also reaching negative values (Lane, 2021), but it has been increasing ever since.

An ECB article in the ECB Blog explains what might have affected the volatility of the inflation, and it associates the volatility to 4 main factors:

1) The pandemic has influenced the prices of petrol oil prices, that dropped from 70 dollars from the beginning of 2020 to 20 dollars in January 2021 (Lane, 2021).

2) The pandemic has changed the behaviour of consumers spending habits. There has been a drop in the spendings for tourism, travels and an increase in the spendings for home goods such as food or working out/teleworking equipment. Since the HIPC (harmonized index) takes into consideration also the composition of the spendings, these changes had an effect on inflation.

3) Some governments introduced temporary reductions of taxes on goods that led to a reduction of the inflation in 2020 but to an increase in 2022.

4) Also, the sales-periods that have been changed from the conventional dates had an impact on the inflation rates.

The figure below was retrieved from IMF World economic outlook of 2022 that shows the consumer price index for advanced economies and emerging markets. The CPI measures the change in prices paid by consumers in US every month and is calculated by the US Bureau of Labor Statistics as a weighted average of prices of a basket of goods and services. *Figure 14* differentiate this measure between the core consumer price index from the ordinary CPI.

Figure 14 - Inflation Trends
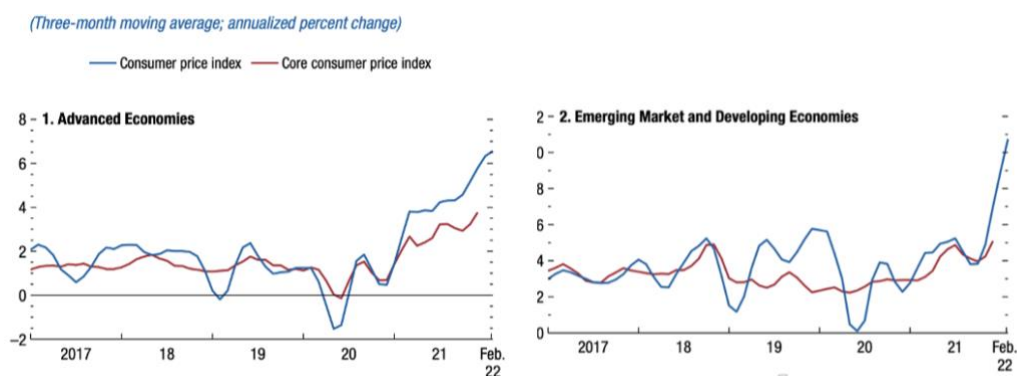
Typically, the Core consumer price index is below from the CPI, with the exception of few periods. In 2020 we can see the anomaly of CPI being below zero, this because inflation rate was really low during the Covid recession, as stated above.

It is easily noticeable that the CPI is more volatile than the Core consumer price index because the latter doesn't consider food and energy sectors. The reasons behind the exclusion of these two sectors are mainly two: first, their prices are very volatile and secondly the demand for food and energy is not elastic, therefore it doesn't vary a lot depending on the price.

General government debt-GDP ratios

Figure 15 - General government debt-GDP ratios
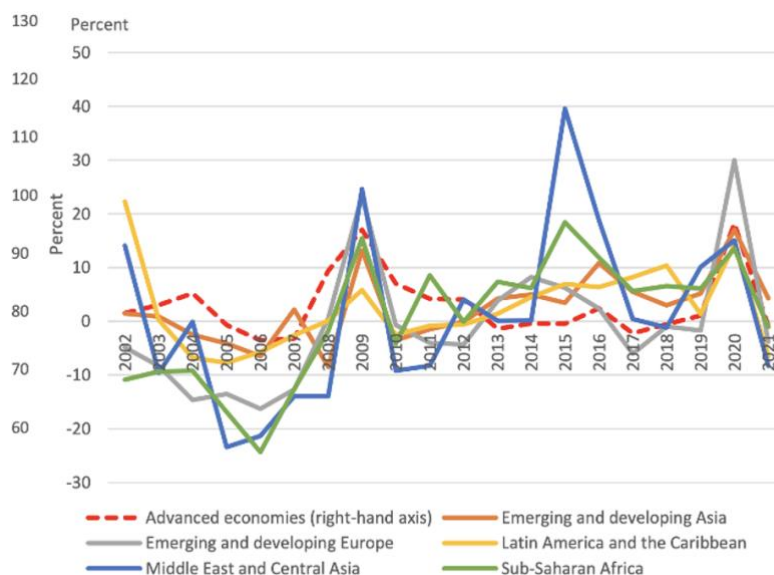
Source: (Obstfeld, 2022)

Figure 15 shows the developments of the ratio general public debt/GDP for both AE (advanced economies) and EMDE (emerging and developing) regions from 2002 onwards.

The debt/GDP ratio expresses the country's public debt in relation to its gross domestic product. A high debt-to-GDP ratio means a higher probability for a country to default, whereas a low debt-to-GDP ratio indicates that an economy is able to repay debts without incurring to additional debt.

It's evident a big jump of the debt to GDP during the recession times, such as post 2008, in 2015/2016 in middle east and central Asia and in 2020 for Covid recession. The highest jump in the debt to GDP ratio in 2020 was the one of emerging and developing Europe.

This ratio is related to inflation, in fact, as inflation increases government debt to GDP ratio tends to decrease (Fitch Ratings, 2022). During Covid recession there was indeed a low inflation and a high debt to GDP.

Commodities Market

Commodities prices have reflected changes in supply and demand for commodities that suffered from the restrictions in the travelling industry and the total lockdown of some countries.

The commodities market affects a lot also other markets and economic indicators, such as, as mentioned before, inflation.

The oil market in particular has been very affected in March with an unprecedent decrease in prices.

Metal prices, both base metals such as copper, zin or nickel, and precious metals such as gold, platinum or silver, faced as well a reduction in prices, even if more moderate.

The agriculture sector was the least affected by the pandemic as it's very connected with other economic activities (Fontana, 2021) and also because the demand for basic agricultural commodity has been always stable (CEIC, 2020).

However, metal commodities and oil prices recovered totally their value in 2021, instead the energy prices, still have to reach their pre pandemic values, but are expecting to return to those level in 2022 (World Bank, 2020).

2.3.3 Behavioural biases

To fully understand the dynamics and all the implications that the pandemic has caused in the financial markets, it is impossible not to refer also to behavioural economics.

Behavioural finance gives indeed a great help to understand investors behaviour at times of great volatility and uncertainty for both financial markets and the real economy.

Understanding the logics and the rules of behavioural finance can help to detect decision-making patterns that can explain the behaviours of households and businesses whenever their actions may seem irrational if only the "conventional" finance is considered.

Standard finance sees people as "rational"; behavioural finance as "normal". Rational people are seen as investors that care only about utilitarian characteristics and that are never affected

by cognitive errors or have self-control problems. They are expected always to be averse to risk and never averse to regret. Normal people do not follow these rules and their decisions are much more complicated to forecast.

Traditional finance is centered on rational behaviour and efficient markets, whereas the current COVID-19 pandemic has shown market's inefficiently and investors' irrational behaviour.
Investors tend to have several types of behaviour biases, such as herding, overconfidence, representativeness, conservatorium, anchoring, projection bias, availability and salience, heuristics, ambiguity aversion, limited attention, persuasion and social pressure, emotions or self-control problems. These biases play a crucial role in the choices of each individual and also those of businesses, because even if entities, the decisions, also for big corporations, are still taken by individuals.

It is extremely important to understand these aspects to identify persistent changes triggered by the pandemic, such as changes in consumption habits and also other more temporary changes that have both explanations related to traditional finance and to behavioural finance.
The impact of Covid-19 in the financial markets, as we've seen, has been dramatic in the very first period, with a consequent recovery in the following times.
The cause for the drop were due to the lockdown and consequent slowdown of economy activity, that lead, as described before, to lower profits for businesses and higher unemployment, lower growth expectations and asset prices because investors expected higher returns to compensate the higher risk and for another reason, related to behaviour finance, which is the increased risk aversion of the investors (Vasileiou , 2020).

The biases and heuristics lead to errors in the decision-making process, that a rational investor would not make.
Kumar (2020) studied the presence of behavioural heuristics and biases in investors'
decision-making process during COVID-19 and found that heuristics such as representative, anchoring and availability were present in the financial market, as well as overconfidence bias, disposition effect, confirmation bias and loss aversion (Balkhi, et al., 2020)
Herding and social pressure also had an important role in households' decisions
(Parveen, et al., 2021).

Figure 16 defines all the financial effects caused by Covid distinguishing them among real life effects, perceived effects and unforeseen combination.

Real life effects are those consequences that concretely took place and they are a strict consequence of the health crisis.

The unforeseen effects are those effects that could not be anticipated in any way and that have been the cause of all the other implications of the pandemic.

The perceived effects of Covid-19 news are influenced by psychological biases and heuristic, that caused intensified effects in the financial markets, in particular the stock market.

These biases depend on many factors, such as personal characteristics of the individual and also by proper characteristics of the countries, such as financial literacy of population.

Figure 16 - Behavioural Biases during Covid-19
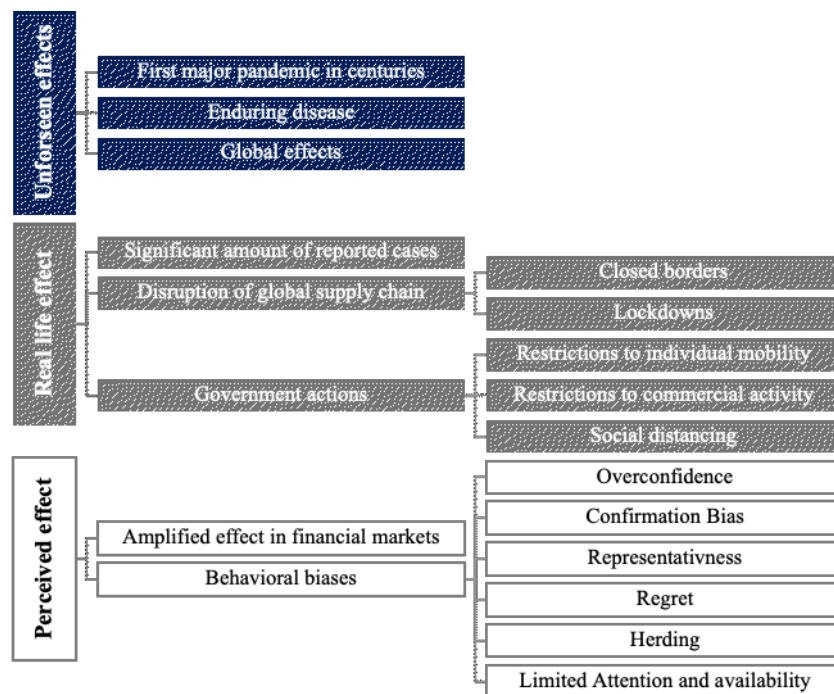
Source: (Hirvonen, 2021) and author's elaboration

In detail the main behavioural biases detected during Covid-19 have been:

-   Overconfidence and overoptimism: investors may overestimate their skills or abilities, including the ability of assessing the probability of certain events. Overconfidence includes other two biases: the *self-attribution bias*, which is the tendency to ascribe a success to its own talent while blaming failure on bad luck and *insight bias,* which is the tendency to believe that after an event has occurred you could predict it before it happened. For example, it's been detected that many investors were convinced that their portfolio was well diversified throughout Covid-19, whereas instead it was not the case.

- Confirmation bias: once people have formed an opinion, they use to rely on it too firmly and for too long. People are reluctant to search for evidence that go against their ideas, and even if they find such evidence, they treat with excessive scepticism or misinterpret the evidence considering it in their favour. Some evidence of confirmation bias during Covid-19 have been found, even though it is very much reduced when the investors are highly educated and financial literate.

- Representativeness: it refers to the reliance of individuals on thinking that certain event is representative of a certain probability. This can be generated by *over inference* (also called base rate neglect, that is when subjects tend to neglect the prior probability over-inferring from the available information whenever the underline distribution is unknown) or by the *law of small number* (when the underline distribution is, instead, known, people believe that even small samples should be representative of the underlying distribution). An example of representativeness detected was the fact that investors during the pandemic focused more on the recent performance of a stock while ignoring the long-run, namely they had over reliance on recent information or on recent news of stock markets, such as the most recent indices performance, announcement of earnings, dividends, policies and any other change in the market.

- The disposition effect and regret theory: the disposition effect is a real-world confirmation of the reflection effect, that shows that when gains are replaced by losses choices are reversed; in particular when probabilities are relatively high, there is risk aversion in the domain of gains and risk seeking in the domain of losses. In finance, for example, investors tend to sell winners (risk aversion in the domain of gains) and hold losers (risk seeking the domain of losses). It is related also regret theory, which is when individuals anticipate the possible regret, they may suffer in the event their choice is wrong and take into account it before making a decision. This often leads to sell winners early and hold losers for too long, trying to avoid the feeling of having made a wrong decision. Regret and adaptive behaviors have been found during this period (Hens & Benli, 2021). This is related to another bias, that is usually very common, which is anchoring. Anchoring is when people often start with some initial possible arbitrary value or idea and then the individual anchor to it, giving it too much weight during the investment decisions. As new information arrives, individuals tend to adjust their first opinion with the new information but never distancing too much from it (Tversy & Kahneman, 1974). This affects also the capability of individuals to estimate risks.

- Herding: it occurs when investors follow other people choices and opinions instead of their own. One of the most evident biases during the pandemic has been herding, such as the panic market buying that induced investors to follow the others, trying to imitate their investment.

- Limited attention and availability: individuals don't use all the available information but process only a subset of information. Attention is a limited resource and individuals pay full attention to more salient information. More recent events and more salient events weight more when individuals judge the probability of an event, and this leads to distortion of estimates. In fact, during the pandemic the negative sentiments were exacerbated by the negative news regarding the negative performance of the indices worldwide (Parveen, et al., 2021) and it has also been observed overreaction to news (Hens & Benli, 2021).

As regards the preference for the familiar, that is usually a very common bias in the market (an example of it is the home bias), this occurs when people have a clear preference for familiar situations because they feel they are in a better position with respect to others to evaluate a gamble. For example, an investor prefers local assets over foreign ones (Baker and Ricciardi, 2014). However, during Covid-19 there were not notable signs of preference for the familiar, probable because a country was more affected by Covid, even if familiar, its domestic investors wouldn't have invested in it.

2.4 Impact on Investment Funds

Globally, considering a wide period of time, the share of investment funds in capital markets grew by 9% in just 10 years, from 17% in 2011 to 26% in 2021, with a big growth especially in 2021 (EFAMA, 2022).

However, focusing only in the first quarter of Covid-19, namely during the virus outbreak, regulated open-ended fund assets decreased by 10.8 percent (EFAMA, 2020), as well as the net cash inflows. Despite this, the outflows didn't increase in the same proportion, showing the confidence of investors placed in a potential recovery, that has subsequently occurred, thanks to the immediate response of central banks and the stock market recovery.

US is the largest market in the world for investment funds in terms of AuM and EU is the second. As regards Asia, the market remains very fragmented and diversified depending on the country, with Hong Kong, China, Japan and South Korea leading countries in terms of development of fund markets (PwC, 2022).

One of the reasons because the demand for regulated funds in USA and Europe is higher is because their equity capital markets are more developed. Indeed, there's a positive association between the development of capital markets and development of fund markets, as shown in *Figure 17*.

The development of equity capital markets is defined as the ratio between stock market capitalization and GDP.

In the horizontal axis there's the country's capital market development and in the vertical axis the size of the regulated fund market (considering only regulated open-end funds, including mutual funds, ETFs and institutional funds).

Figure 17 - Countries with more developed fund industries
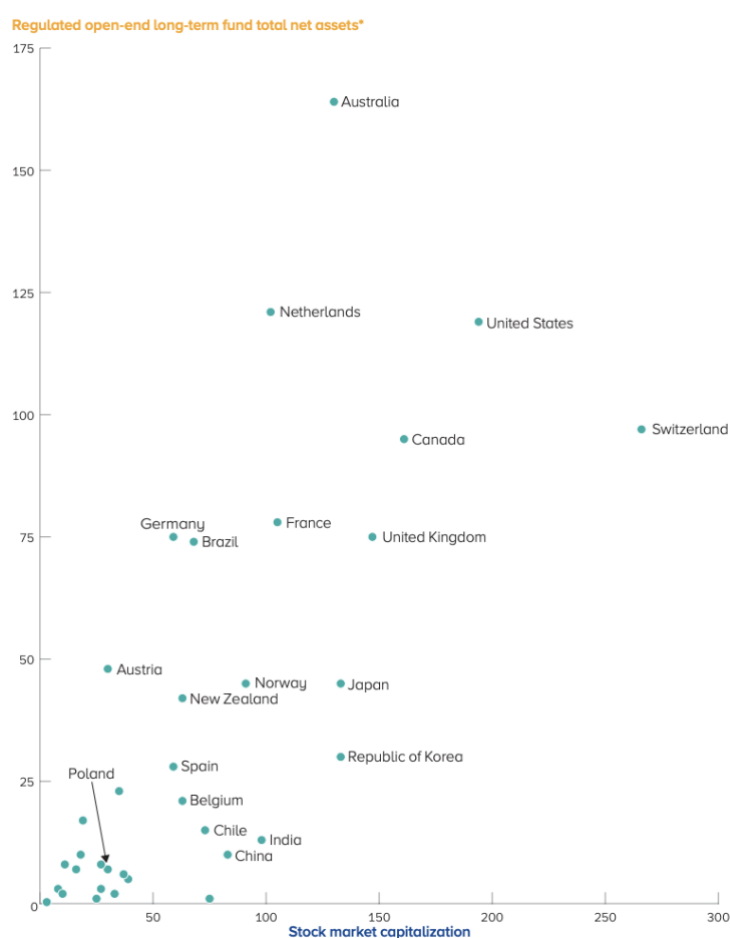
Source: (ICI, 2022)

It's possible to notice that USA, Australia and some EU countries, such as the Netherlands and Switzerland, that have more developed equity capital markets, have more developed fund industries. On the other hand, countries such as Poland that have low developed equity markets, have also lower net assets in regulated long terms funds with respect to its GDP.

This equilibrium, comparing the same figure with the Factbook 2020 of ICI, didn't change from the past years, with the same countries leading in the fund markets.

From this comparison with the data of end-2019 shown in the Factbook 2020 of ICI it was also possible to notice that, in most all countries in 2021, both the fund total net assets and the stock market capitalization (all of them expressed as a percentage of GDP) increased with respect of the ratios at the end of 2019, demonstrating that, despite the pandemic recession, the financial markets recovered and kept growing after the recovery.

In this elaborate the focus is primarily on USA and EU, being the two geographic zones where the fund industry is more developed.

2.4.1 In Europe

In Europe, at the end of 2021, the total AuM was 31,3 trillion of dollars. The total number of funds was 65,200 with total assets worth 21,9 trillion between UCITS and AIFs and the Asset Management Companies (AMC) were more than 4500 (EFAMA, 2022).

2.4.1.1 Diffusion

As regards the diffusion, considering the total NAV domiciliated in this geographic zone, this was worth, at the end of 2020, 18.8 trillion and about 62 % of this was invested in UCITS and the remaining 38% in AIFs (Auditors, 2022). The NAV has been increasing from 2011 until 2020 (about by 119%), this increment was explained first by the fact that the number of purchases was higher than the number of redemptions and also by the increased market appreciation of the securities invested by the fund. Moreover, even though AIFs are less popular, the NAV of AIF had the greatest increase, from a market share of 27% at the end of 2010 to the 38% of the end of 2020 (Auditors, 2022).

Net Sales of UCITS and AIFs together have increased considerably from 2020 to 2021.

2.4.1.2 Distribution

As for the distribution, the figure below expressed the distribution of investment funds in Europe, clearly showing the large differences among countries.

Figure 18 - IFs Distribution and Diffusion in EU
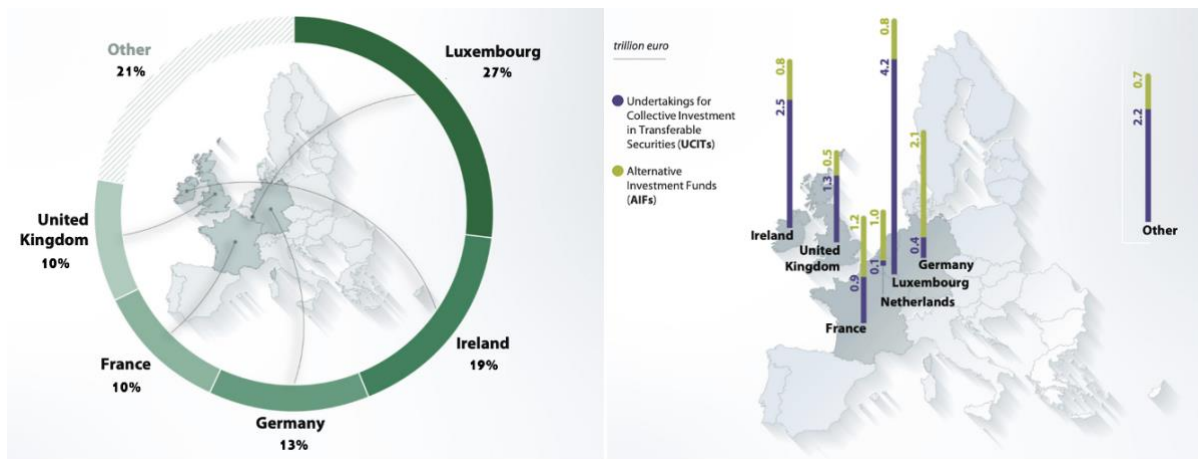
Source: (EFAMA, 2022) and (Auditors, 2022)

As regards the domicile of IFs in Europe, the majority are domiciled in Luxembourg, Ireland, Germany, France and UK. Together they have the 80% of all the AuM (Auditors, 2022).

It is interesting to investigate the reasons behind the 27% of total investment funds in Europe that are domiciliated in Luxembourg. That 27% corresponds to 4.70 trillion of euro and it is domiciliated in a small country with few more than 630000 inhabitants.

Luxembourg, politically and economically speaking, is a very stable country, that has always bet on financial innovation, such as fintech. International investors prefer investing in funds domiciliated in Luxembourg because of the investor protection, strict regulatory supervision and especially the favourable tax regime (Yeung, 2021).

Comparing the same figure from the Factbook 2022 versus the Factbook 2021 it's possible to notice that the distribution within Europe of investment funds didn't change much, the only difference is that, comparing the situation at the end of 2020 with the one at the end of 2021, Ireland from 17% increased the percentage to 19%, instead France decreased it of 1 percentage point, as well as the other countries.

Ireland attractiveness for investors is related to the ETFs growth in the most recent years, as over 60% of the total European ETF market are represented by Irish domiciled ETFs (Irish Funds, 2018).

Looking at the figure on the right in *Figure 18*, it's possible to notice that among countries there are also vast differences on the preferred types of investment funds. While most countries prefer investing in UCITS, others such as Luxembourg, Netherlands and Germany have a clear and distinct prevalence of Alternative Investment Funds. These differences between countries had been persistent also during the Covid outbreak.

In addition to that, funds, in most of the EU, are mainly distributed in their domestic market (also called "domestic funds") and not sold abroad ("cross-border funds"), but also relatively to this case, there's a vast heterogeneity considering the country, with Ireland that invest less than 10% in domestic funds and Spain that, on the opposite, invest more than 90% in only domestic funds. There is another type of funds called "round-trip funds" which are not really cross boarder in the sense that they are funds sold abroad but they are promoted by national providers, not by foreign providers as "true" cross boarder funds. It's important to know this also because many of the countries that invest lots on cross border funds is because they also invest considerable amounts in the round-trip funds.

2.4.1.3 Funds' owners

As regards the types of fund investors in Europe, the majority are: insurer and pension funds by far (they hold 6.5 trillion of net assets in UCITS and AIF in 2021), other financial intermediaries (such as long-term investment funds) and households (whose holdings are approximately 3.9 trillion in 2021) (EFAMA, 2022).

Between 2020 and 2021 there are not significant differences as regards of the proportion held by each type of investor. As well as for the nationality of the investors.

As concerns European countries: Luxembourg accounts only for the 6% and the highest fund ownership share is the German's (24%), followed by UK and France (EFAMA, 2022).

A big share of total funds is held also by foreign investors, that come from outside Europe. Many of which come also from Asia and South America, confirming the popularity of European funds also in emerging countries.

Both net assets of funds held in Europe and funds held outside Europe increased from 2011 onwards, also in 2020 and 2021.

During the very first stage of the pandemic, there has been a decline in AuM experienced by asset managers (Yeung, 2021). However, especially thanks to ECB interventions, there have been new opportunities ahead for investment funds market.

Considering that interest rates have been very low, there have been inflows for UCITS funds from both retail and institutional investors.

This is why, also during the pandemic, UCITS remained a popular investment for all types of investors, reaching record net sales in 2021 for long-term UCITS, suggesting positive and optimistic growth prospects from investors and also for equity UCITS, thanks to the great performance of stock market during 2021 after the recovery from 2020.

In particular, there has been an increase in the sales of funds related to specific asset classes, such as real estate (Yeung, 2021). This interest in real state is not a consequence of the pandemic, but more of a trend in the last years as houses values kept increasing also during the pandemic (Cenname, 2022).

As regards AIFs, the demand during the recovery after the stock market crash returned to pre-pandemic levels. Especially, as reported by EY, investors increased the demand for private equity funds, that suffered postponement of deals during the pandemic, but remained a prevalent investment among the investments in AIFs (EY, 2021) .

2.4.1.4 Funds Type Trends

Considering the nature of the investments and asset classes in which IFs mostly invest in, at the end of 2021, equity funds represented the majority of the investments (33% of total net assets) followed by: hybrid funds (also called multi-assets), that accounted for 21%, bond funds (20%), other funds (14%), money market funds (7%) and real estate funds (5%).

Figure 19 - Fund Types by Nature
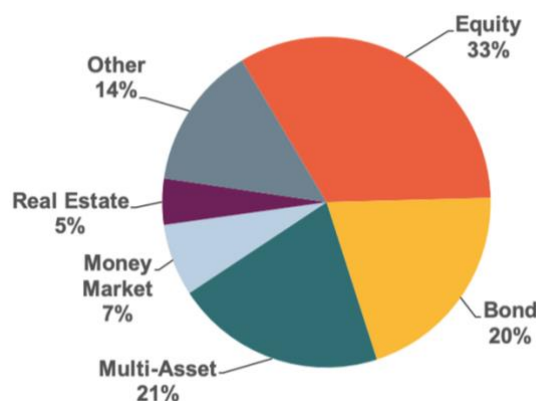
Source: (EFAMA, 2022)

As regards the period of the pandemic outbreak, investments in Bond Funds or Money Market Funds increased, as they are considered less risky assets with respect the other categories of funds. During COVID-19 first wave, in fact, risk-free assets became preferable for most investors (Himanshu, et al., 2021).

2.4.1.5 Sustainable funds and other trends

As regards the future prediction and longer-term trends in the European IFs industry, UCITS are becoming more and more popular, especially thanks to the lower costs, both for actively

and passively managed funds. One of the main funds' types, among UCITS funds, that experienced a fast and steady growth has been ETFs and index funds (EFAMA, 2022).

Moreover, the sustainable funds have been growing uninterruptedly, reaching the share of 18% of the total UCITS in 2021. These reflects the interest of the market for sustainable investments (EFAMA, 2022).

The following figures proves the popularity of sustainable funds in Europe, dividing them into two categories, in accordance to SFDR (Sustainable Finance Disclosures Regulation) classification:

1) Article 8: defines all funds that consider E (environmental) or S (social) criteria but do not have the primary objective to pursue E or S objectives.

2) Article 9: they are funds that have sustainable goals as their primary purpose.

Figure 20 - Sustainable Funds in EU

Source: (EFAMA, 2022)

These numbers refer to the end of 2021 and show the quantity of sustainable funds that are included in the definition of either Article 8 or 9, their net assets value and their net sales.

With respect to the data of 2019 or 2020, these sustainable funds kept increasing, even more radically during the pandemic and afterwards (Bioy, 2021), in fact, this interest in ESG issue has been accelerated by the pandemic and the increased regulation for these funds.

2.4.2 In USA

2.4.2.1 Investment companies: general data

The total number of investment companies in US has increased from 2005 until 2021, with some small declines in some periods of crisis, such as in 2009/2010 and 2019/2020 (ICI, 2022).

It is relevant to see data about the numbers and other characteristics of US registered investment companies because they play a big role in US economy.

The high demand for funds and investment companies depends on many factors, such as US population, the aging of US population and the development of the retirement system in US.

As for the investment company assets, they rose by 4.9 trillion dollars from 2020 to 2021 (ICI, 2022), reaching the total amount of 34.2 trillion assets. The high increase of the value of the assets is explained mainly by the increase of the demand for mutual funds, especially MMF, and ETFs. From 2019 to 2020 the net assets continued to increase, with only a reduction in March 2020, which indicates that the effects of Covid have been more intense in the period of the first wave and that in the longer term there were no major losses.

However, fund market trends are not the same as the ones before Covid and, as the supply of funds is affected by the macroeconomic conditions and considering that some measures have still not recovered yet to pre pandemic levels, the Covid outbreak left signs in the fund market also in the longer term.

2.4.2.2 Funds' owners

ICI conducted an analysis of the characteristics of US Mutual Funds owners. First of all, in 2021 it's relevant to say that 45% of households in US own at least a mutual fund share, and this high number of people include households of any age and income group (ICI, 2022).

Interestingly, differently from Europe, the majority of mutual fund total net assets are held by households; whereas institutional investors account just for a smaller part. In 2019 and 2020 households held 89% of mutual funds' assets, in 2021 the percentage decrease to 88%, always indicating the great participation of US households in the fund industry.

The main source for household to buy mutual funds shares are investment professionals, retirement plans or directly through investment companies of brokers.

As regards the personal characteristics of households that own a share of investment funds, ICI conducted some analysis and it resulted that: the median amount invested by a US household in mutual funds is 200000 dollars, and 320000 is the median financial assets. In addition to that, 70% of individuals that own mutual funds are married or living with a partner (68% at the end of 2019), surprisingly only just few more than the half (57%) are college graduates (54% at the end of 2019) and the vast majority (75%) work full or part time (77%at the end of 2019). As for the age, the majority are held by Baby Boomers and Generation X (together they constitute the 63%) and a 28% by generation Z and Millennials, and only a 9% by Silent or GI Generation, born between 1904-1945. The median age of the head of

household is 51, compared to the end of 2020 that was 50 and 2019 that was again 51, indicating that during 2020 more younger people participated in fund markets.

Among generations there are differences considering the way of purchasing mutual funds shares. For example, generation X and millennials tend to own mutual funds only through employer-sponsored retirement plans, instead older generations own mutual funds also outside these plans (ICI, 2022).

These trends show that fund market is going to be always more accessible and popular for younger generations, especially the more financial educated ones.

Another interesting research conducted by ICI on households was investigating, at the end of 2021, how households select the mutual funds they invest in. The six main characteristics that mutual funds households consider are: fund's investment objective, risks associated with the fund, historical performance, performance compared with an index, the rating service, and fees and expenses. Among these, mutual fund rating service is the characteristic that was considered the less important one and in the second place there was the performance compared to an index. As regards, instead, the characteristic that was considered to be the most important, it was the historical performance.

In the same study conducted at the end of 2020 and at the end of 2021 the responses didn't change much, with exception of the weight given to the historical performance, that was higher in 2020, meaning that in 2020 the historical performance of a fund seemed to be more relevant on average for households, compared to the 2021. Probably, this was a post pandemic outbreak consequence, as investors felt Covid-19 as something closer at the end of 2020 than it was at the end of 2021 and therefore gave more important to historical performance as performance of indices have been very volatile in 2020.

2.4.2.3 Funds Type Trends

Figure 21 - Fund Types by Nature in USA
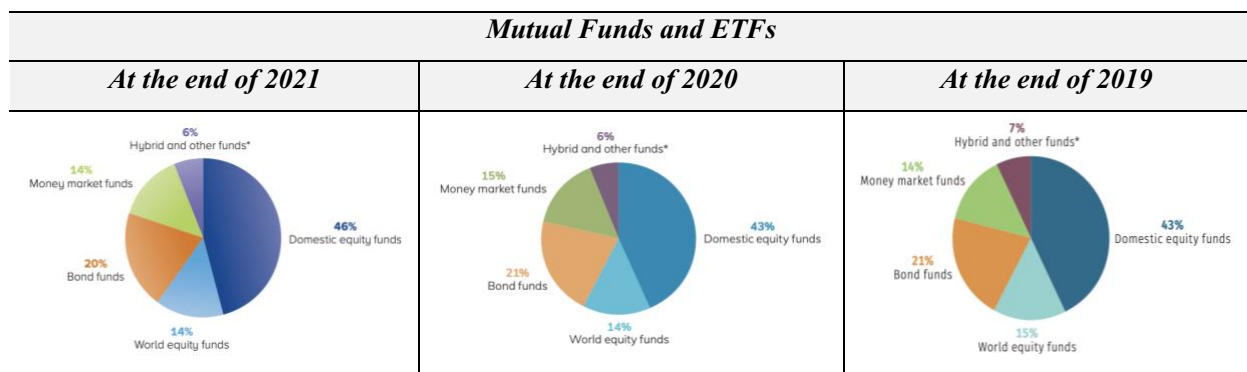
These graphs refer to only Mutual Funds and ETFs. The assets of these two typologies of funds in US reached 34.2 trillion in 2021, an increase of 8,5 trillion with respect to the end of 2019.

The majority of these assets, in all the three periods considered, were equity funds, in particular domestic equity funds (that invest in US corporations primarily). They were 43% in 2019 and 2020 and increased in 46% in 2021, signalling positive future growth expectations for US businesses.

Bond funds were 21 % in 2019 and 2020 and decrease to 20% in 2021, this may signal that investors feel less risk averse and prefer betting on equity instead of low-risk securities such as bonds.

2.4.2.4 Sustainable Funds

Figure 22 - Sustainable Funds in USA
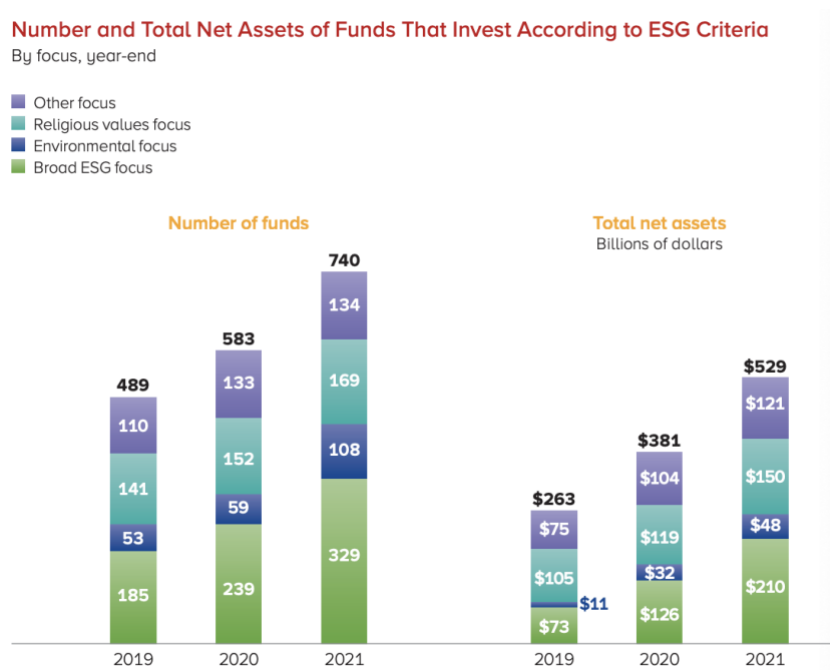
Source: (ICI, 2022)

ICI defined a classification of funds, defining some as sustainable, by analysing fund prospectuses and assessing the presence and relevance they gave to ESG criteria. In 2021 the number of mutual funds and ETFs that were considered sustainable was 740 with assets worth 529 billion, an increase from 2020 when there were only 583 funds, with total assets wort 381 billion (ICI, 2022).

75

The analysis of ICI takes into account a very wide range of sustainable funds: funds with broad ESG focus, environmental focus only (that for example invest only in alternative energy or that engage for climate change and clean energy), religious values focus and funds with other focus. However, the majority of these 740 sustainable funds fall in the category of broad ESG investment funds.

These rising numbers relative to sustainable funds, both in Europe and in America, are the result of a trend that has been going on for a few years and that has been accelerated by the pandemic. This topic will be discussed more in detail in the fourth chapter.

CHAPTER 3: LITERATURE OVERVIEW

3.1 IFs overview

3.1.1 Literature about main characteristics of IFs

The contribution of this thesis to the literature related to Investment Funds, especially in its first chapter, provides a more general overview of IFs characteristics in a more holistic vision.

There is a wide literature concerning investment funds, especially referring specifically to a single type of them. There was, however, less literature referring to IFs as a whole. This work drew from a variety of sources, in order to make a more comprehensive analysis that would include the full range of existing investment funds.

Among the literature, some specific books, regulations and articles have been of major help. These documents have been integrated with other sources and analysis in order to give a more impactful contribution to the literature.

As regards the characteristics of IFs, the main two books taken as a reference were: *Mutual Fund Industry Handbook* of Boston Institute of Finance (Boston Institute of Finance, 2006) and *Handbook of hedge funds* of François-Serge Lhabitant (Lhabitant, 2006).

Mutual Fund Industry Handbook presents all the main characteristics of mutual funds. The data and the information dated back to 2006, year of the book's publication. However, the book gives relevant insights about the industry, describing data and the fundamental characteristics of the market. It has a section dedicated to the history of mutual funds from the beginning since the 1800s. This part, in particular, has been extremely relevant for the current elaborate and it has been integrated with an article of Yale School of Management of Rouwenhorst (2004) that demonstrated that origins of investment funds are even more ancient and date back to 1700s (Rouwenhorst, 2004).

Another fundamental part of the book of Boston Institute of Finance is the section defining the main subjects involved in the fund industry, indicating for each role the responsibilities and the activities. The thesis takes inspiration from this part for the description of the subjects of the fund market, defining the front-office, back-office and middle-office activities of the industry.

Furthermore, also the main characteristics of the funds, from the categories to their main strategies, are described in the book. Moreover, the authors proposed possible types of classification for mutual funds.

The book of Boston Institute of Finance listed all possibilities of classification based mainly on the nature of the investment, whereas this thesis goal is to provide a wider classification taking into consideration also investment company types, the management styles and other types of funds and breakdowns.

As for the *Handbook of hedge funds,* it reproposes the same analysis but for hedge funds. It starts with an initial part dedicated to hedge funds overview, containing a detailed analysis of the history of hedge funds, the listing of all the legal environment situation in US, Europe and Asia and finally the operational structures of the funds. The second part of the book is entirely dedicated to hedge fund strategies.

These two parts have been the two main sources for this elaborate relatively to the hedge-funds-related paragraphs, especially the part of the strategies and their classification and the part of the history that was integrated with other sources in order to make the history of investment funds in the current thesis more generally applicable to all IFs.

As for the classification of funds, another useful report has been *Euro area investment fund statistics* of ECB (ECB, 2017), that contains statistics regarding all types of collective investment undertakings other than MMFs and pension funds. It aims to regulate the reporting about investment funds, trying to make it more harmonized between all EU. However, this thesis made a wider classification, that includes both the MMFs and the pension funds among the Investment Funds.

As regard the legislative regulations that have been consulted, Regulation (EU) No 1073/2013 (ECB, 2013) of ECB concerning statistics on the assets and liabilities of IFs has been used in order to retrieve the definition of IFs and article 58 of EFAMA has been analysed in order to integrate the paragraph concerning the possible types of structure of a fund. Indeed, it gives the proper definition of a feeder fund.

Furthermore REGULATION (EU) 2015/760 defines all the rules related to the transparency and the documents of IFs (EU, 2015).

Lastly, the investor bulletins of SEC have been examined for this elaborate, specifically the bulletins related to hedge funds, ETFs, Mutual Funds and Investment companies (SEC, 2012).

A paper of commonfund institute (CFI, 2022), which is an institute dedicated to the promotion of financial knowledge and to the study of best practices for the financial management, has been fundamental to define costs of investment funds and how they account for the overall profitability of an IF.

3.1.2 Literature about ESG Funds

As regards the literature about ESG or, more in general, SRI funds, the report of OECD entitled as *ESG Investing: Practices, Progress and Challenges* (2020) was one of the main sources about the explanations of the definitions, ESG investing practices and trends overview. This report defines indeed the ESG ecosystem, its ratings methodologies and investment approaches.

Moreover, the other sections of this report relate to the empirical assessment of responsible investing and policy developments related to ESG.

As for this thesis, the first part related to definitions and differences between ESG, ethical investing and philanthropy has been particularly relevant.

Still as regards to ESG topic, three other reports have been fundamental to address the theme:

- The first one "*The Investor in ESG Mutual Funds*", by Paulo Pereira da Silva and Victor Mendes investigates connection between ESG and mutual funds (Mendes & Pereira Silva, 2021).
- "*Hedge funds and ESG*" by PNB Paribas focuses on only hedge funds and their sustainable aspect (BNP Paribas, 2020).
- The third one is an article from Morningstar describing the growth of sustainable funds in 2020 (proved, among other things, by the increased number of sustainable funds launches), indicating the top 10 ESG Funds that had the highest inflows (Bioy, 2021).

3.2 Financial Markets and Covid-19

For the second chapter, that deals with the relationships between Covid-19 and the financial markets, the available literature is in smaller quantity than the literature dealing with

investment funds in general. Despite this, the literature is, for obvious reasons, more recent and therefore more up to date. This offered an opportunity to give insights to the current situation and the main issues of the financial markets.

3.2.1 Covid-19 overview and economy implications

Regarding the first paragraph of the second chapter about the Covid-19 overview, the main literature consulted relates to the reports published by WHO, the World Health Organization, in order to summarize Covid-19 main stages.
WHO is the UN agency that offers technical guidance and documentation about international public health issues.

As for the actions taken in place by the central banks, this thesis listed the main economic support programs, focusing on the ones undertaken by the European Central Bank and the Federal Reserve. As reference for this part the literature consisted in reports and articles published by the central bank themselves, such as "*Les mesures de politique monétaire pendant la première phase de la crise de la Covid-19*", of Banque de France published in 2020 (Banque de France, 2020), listing schematically all the main programs adopted by ECB, BoJ, BoE and Fed. Moreover, the report has been integrated with other sources, such as a report of Bank of Japan, published in 2021, concerning announcement on the monetary policy (Bank of Japan, 2021), and the database of BoE indicating the official history of bank rates of Bank of England (DATABASE, 2022).

As for the implication of Covid-19, there are a lot of papers that summarize the economic and social implications of the pandemic. As for the social effects, for this elaborate a lot of data have been considered, such as McKinsey statistics (McKinsey, 2021) about the educational sector, US Global Leadership Coalition findings on social discrimination (US Globan Leadership Coalition, 2022) and United Nations articles on SDG goals developments and slowdowns due to the pandemic (United Nations, 2021).

For the economic considerations, the literature concerning the topic was relatively rich, consisting also in many reports from supranational organizations, such as a report of OECD dedicated to statistical insights on the effects of Covid-19 on the households and public finances. It shows the movements of HDI and GDP in 2020, focusing on its components and how they varied heterogeneously by countries (OECD, 2020).

3.2.2 Covid-19 and markets

The more detailed analysis of the second and third chapters of this thesis contributes to the literature related to equity market's response to the pandemic and the fund industry trends and performances during this period.

As regards the part related with the relationships between the pandemic and the financial market, a wide literature has been consulted.

First of all, a paper of ICI has been analyzed. ICI represents the primary source of statistics regarding the investment companies' industry. The paper entitles "T*he Impact of COVID-19 on Economies and Financial Markets*" and it summarizes all the economic consequences of the pandemic (ICI, 2020).

Then, the paper of Roberta Fontana (Fontana, 2021), published in 2020, gives detailed information about the implications and the effects of each announcement related to Covid-19 on financial markets and on the investors' behavior. This part was integrated with ECB article about the impact of the announcement of the vaccine (ECB, 2021).

As regards specifically the macroeconomics and financial market conditions, this thesis analyses them starting from the equity indices movements.

This topic has been discussed by Santioni and Affinito (Santioni & Affinito, 2021), with an article about the global investment fund portfolio rebalancing, which describes also the performance of indices in 2020. This thesis integrated this aspect with more detailed information about indices and possible explanations of their movements.

As for the 10-year government bonds movements during the pandemic period the literature was very poor, therefore, an analysis was conducted retrieving data from the Statista database, considering the situation in 6 different countries, globally.

The article published by ECB concerning the role of credit risk in recent global corporate bond valuations was helpful to have insights on the overall situation of credit risk in the financial markets, focusing on the number of upgrades and downgrades of the rating of firms (ECB, 2022).

Regarding the volatility of the market, especially regarding the indices that capture the volatility, for the lack of literature concerning the topic, data from Eikon were collected in order to analyze the movement of the VIX and VSTOXX indices.

World Economic Outlook of 2020, 2021 and 2022 published by IMF (IMF, 2020), the International Monetary Fund, have been fundamental reports where to retrieve important information about other macroeconomic variables during the pandemic.

The 2020 report focused on effects of lockdowns, both economic and social.

The 2021 report focuses on the recovery from the pandemic recession, concerning health and economic variables, such as price pressures and supply disruption.

Finally, the report of 2022 focuses on the war effects that had the effect, among its other terrible consequences, of slowing down the global recovery.

As concerns this thesis, the data retrieved from IMF World Economic Outlook reports, were specifically referred to the inflation trends and its projections in 2020, 2021 and 2022.

As regards the macro-economic variables, this thesis then focused on the Debt to GDP ratios and the commodities prices changes.

As for the first, Maurice Obstfel published a paper about the International Financial System post pandemic that was helpful to conduct an analysis on the general government debt to GDP ratios during the timeline of Covid-19 (Obstfeld, 2022).

For the second, the paper of CEIC, 2020, about the impact of the pandemic on global commodity prices, was the main source related to this part about commodities prices and their response to Covid-19.

As regard behavioural finance, for the definitions of biases, Tversky and Kahneman "*Judgment under Uncertainty: Heuristics and Biases*" provided the main definitions and explanations of the main concepts of behavioural finance (Tversy & Kahneman, 1974).

As for the connection about behavioural biases and the pandemic, the literature is poor, with only few studies available, such as the one conducted by Yue, Gizem Korkmaz, and Zhou (Yue, et al., 2020) that provided empirical evidence of risk aversion of households during the pandemic and the Balkhi, F., Nasir, A., Zehra, A. & Riaz, R. report on psychological and behavioral response to the pandemic, that conducted a research on 400 participants in Pakistan, to understand how behavior of households changed during the pandemic (Balkhi, et al., 2020).

Another fundamental article has been the one written by Evangelos Vasileiou (Vasileiou , 2020), focusing on fear and how it may have affected or drove the market decisions during the pandemic. He used the constant growth model and a behavioral model to explain why the health crisis in some periods where underestimated, giving important insights on the fear and emotions of investors and how they affect their choices.

In addition to the papers above, the author Hirvonen published "*Behavioral finance in financial crises: the case of covid-19*" that, through a quantitative model, assessed the main behavioral biases that were present during the main economic crisis and in particular, the pandemic recession, showing how it affected financial markets movements, influencing investors behavior (Hirvonen, 2021).

Lastly, the report "*When the panic broke out: Covid-19 and investment fund portfolio rebalancing around the world*", which is the working paper by Bank of Italy, mentioned already above in this chapter, whose authors are Massimiliano Affinito and Raffaele Santioni, discusses these topics focusing on herding, positive feedback and short horizon (Santioni & Affinito, 2021).

3.3 Investment Funds and Covid-19

The literature about the effects of the pandemic specifically on IFs is not very wide. However, EFAMA and ICI Factbooks have been the main sources in order to obtain information about the investment fund industry in USA and EU.

EFAMA (European Fund and Asset Management Association) is an association, founded in 1974 by entities from Germany, Belgium, Netherlands, Ireland, Italy, France and UK, that publishes regularly documents providing insights and background information about the investment management in the European market.

In particular, EFAMA Factbooks, that are published yearly, represent the main reference for data about investment funds market in 28 European countries and contain all the information about the developments and the trends of the industry. It analyses both the UCITS and AIF market, the asset allocation of the funds chosen by the fund managers and the information about the main typologies of buyers of investment funds (EFAMA, 2022).

As for ICI; it is an association that represents regulated investment funds, including US mutual funds, ETFs and closed-end funds. Its mission is to reinforce the investment company and asset management industry foundation, producing benefits for investors.

It has a section dedicated only to reports related to Covid-19, with articles and researches referred to specific segments of the fund industry.

The factbooks related to years 2020, 2021 and 2022, respectively having cumulative data until end 2019, 2020 and 2021, represent the main sources for this thesis regarding the part of investment funds analysis (ICI, 2022).

Factbook 2020, Factbook 2021 and Factbook 2022 are structured in the same way, with eight chapters related to: worldwide regulated open-end funds, US-registered ICs, US Mutual funds, US ETFs, US Closed-end funds, US fund expenses and fees, characteristics of US mutual fund owners and US retirement and education savings.

The main chapters consulted were the ones about the worldwide regulated open-end funds, mutual funds, ETF, closed funds and the characteristics of fund owners.

Analyzing all the three factbooks it was possible to define the main differences between the pre-pandemic situation and the nowadays situation, in order to detect the patterns and the trends in funds industry of the last two years that Covid-19 may have caused or promoted.

3.3.1 Funds Performance and Asset Allocation

As for the part related to performances of investment funds, there is not a vast literature concerning the theme. The paper of L'uboš Pástor and Blair Vorsatz focuses on the performance and the flows of actively managed equity mutual funds (Pastor & Vorsatz, 2020) and the one of Akihiro Omura, Eduardo Roca and Miwa Nakai investigates the performance of sustainable investments during the pandemic (Akihiro, et al., 2021) . The results of many studies about this topic are inconclusive and show sometimes contradictory results (Chiappini, et al., 2021).

As regards specifically the rebalancing and how it was affected by Covid-19 the report mentioned above of Massimiliano Affinito and Raffaele Santioni (Santioni & Affinito, 2021), represent the main source about the asset allocation and the re-balancing of IFs triggered by the pandemic, as it analyses in detailed what have been the main changes in funds composition.

CHAPTER 4: EMPYRICAL ANALYSIS

4.1 Country and Industry Rebalancing

Understanding and analyzing the fund market dynamics and fund prices movements during the pandemic helps to better comprehend the drivers of the fund market and investors behaviors and strategies.

First, it's important to see investment funds on two sides:

- the asset-side, because IFs act as investors, investing the asset side of the balance sheets;

- the passive-side, because IFs are also funded agents because they receive capital that increase the liability side of their balance sheets (Affinito & Santioni, 2021).

It is relevant also to think of the inflows and the outflows going into or outside a fund and the reasons why they occur. Usually, when fund managers decide to expand their holdings, they promote capital inflows. Instead, when there are redemptions to bear, fund managers tend to liquidate positions and therefore the fund will suffer from outflows (Affinito & Santioni, 2021).

Affinito and Santioni studied IFs portfolio rebalancing during the pandemic, analyzing IFs inflows and outflows and focusing on Net Purchases. They obtained interesting findings, useful to understand IFs behavior during the pandemic.

A key finding is that IFs that suffered from more redemptions intensified the sales of Covid-affected assets. That implies that when IFs need to face massive redemptions, they create more volatility in the market (Affinito & Santioni, 2021).

Another important result is related to funds ability of beating a benchmark. However, evidence from their research suggests that IFs don't beat market benchmarks in general and during the pandemic this difference in performances between benchmarks and IFs performances became even bigger (Affinito & Santioni, 2021).

This may also be an explanation of why the passive funds are becoming always more and more popular, as already written in the previous chapters.

The paper of Affinito and Santioni conducted an empirical analysis, retrieving data about IFs historical holdings, country's vulnerability to Covid-19 and indices about industry vulnerability to Covid-19.

From these data the authors computed the monthly Net Purchases (purchases minus sales for each IF) for each month at the beginning of 2020, from January to April, identifying the period of January-February as pre Covid-19 period and March-April as the Covid-19 shock period.

They evaluated the reaction of IFs to Covid-19 outbreak through two regression models, focusing on the first 4 months of 2020. The first regression model shows the impact of Covid-19 by country, namely the impact of Covid-19 in the selection of financial assets by country.

The second regression measures the Covid-19 impact on each industry (s), which is the industry of destination of each IF. This last regression, therefore, investigates the impact of Covid-19 in the selection of industries.

4.1.1 Country Rebalancing

Table 4 shows the results of the first equation, reporting the OLS regression coefficients (and its related robust standard errors).

The key regressor *Country Covid19c,t* is the ratio of the number of cases to population, alternatively it can be used the ratio deaths to population, in columns (4), (5) and (6).

These ratios, the confirmed cases/population ratio and the deaths/population ratio, are computed as the ratio between the cumulative Covid-19 cases (or deaths) and population in a specific country-time.

*,**,*** indicate that estimates are statistically significant, namely they are significantly different from zero. This means that respectively the p-value is lower than 0,01, 0,05 and 0,10 and the confidence level is 99%, 95% and 90%.

Table 4 - Net Purchases of financial assets and the Covid-19 impact across countries

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Covid-19 cases	-0.0056***	-0.0058***	-0.0107***			
	(0.0019)	(0.0019)	(0.0023)			
Covid-19 deaths				-0.0756***	-0.0719***	-0.0562***
				(0.0163)	(0.0165)	(0.0179)
Public debt/GDP			-0.0000			0.0000
			(0.0000)			(0.0000)
GDP growth rate			0.0004**			0.0002*
			(0.0001)			(0.0001)
Fund*Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Time FE	No	Yes	Yes	No	Yes	Yes
Fund Clustered Std. Errors	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,153,206	11,709,741	9,698,918	12,153,206	11,709,741	9,698,918
R^2	0.093	0.094	0.098	0.093	0.094	0.098

The results show that the *Country Covid-19* (considering both cases or deaths) is always negative, proving that the pandemic outbreak leads IFs to sell mainly securities issued by more affected countries.

4.1.2 Industry Rebalancing

Table 5 instead reports the OLS regression coefficient of the second equation, that sees the dependent variable as a function of KP affected share.
KP's affectshare is defined by Korent and Peto (2020) and is a measure to define how much a industry requires face-to-face interactions. The higher it is, the higher the sector needs physical interactions. Thus, it indicates also the teleworkability, as, the higher the affected share is, the less probable the telework option becomes.

Table 5 - Net Purchases of financial assets and the Covid-19 impact across industries

VARIABLES	(1)	(2)
Affected share	-0.0001***	-0.0001***
	(0.0000)	(0.0000)
Fund*Time FE	Yes	Yes
Country*Time FE	No	Yes
Fund Clustered Std. Errors	Yes	Yes
Observations	7,066,595	7,066,585
R^2	0.119	0.119

Coefficients of the variable of interest are negative, showing that after the shock, IF increased sales of financial assets issued by more affected industries, moving towards financial assets issued by less affected industries or with a greater probability of teleworkability.

This means that, as regards the portfolio rebalancing of investment funds, IF portfolios, during the Covid-19 outbreak, moved towards securities issued by less affected countries and industries, as expected.

4.1.3 Rebalancing depending on Fund Characteristics

Additional tests were conducted by Affinito and Santioni, in order to understand how funds' portfolios changed during the pandemic.

Among their findings, it resulted that more exposed portfolios, with higher shares of (ex post) more Covid affected securities were sold more during the pandemic outbreak.

By adding in the original equation other interactions between additional regressors, that capture specific aspects about IFs, the authors showed that IF reactions have been heterogeneous depending on the characteristics of IFs.

It turned out that:

- the sales of Covid-affected securities are not intensified when the issuer of the security is different from the country where the IF is domiciled, as happens usually during the crises, because usually IFs have less confidence in foreign investment during times of turmoil. This is consistent with studies of Hirvonen (2021), that showed that the bias "preference for the familiar" was not observed during Covid-19.

- The country of origin of Ifs mattered during the crisis: only Ifs from North America didn't rebalance towards less affected Covid countries and instead emerging countries-domiciliated Ifs were the most concerned about Covid.

- Ifs characterized by more withdrawals, for more redemptions, sell more when the pandemic breaks out and these higher outflows exacerbated the sales of securities issued in more Covid-affected countries. Therefore, IFs tent to rebalance more when their unitholders were more concerned. However, this is expected to be less true for European domiciliated funds, as some European IFs imposed suspensions for redemptions in order to reduce the probability of a decrease of funds shares value. Nevertheless, the main consequence of this action has been to create more outflows after funds reopened (ECB, 2020).

- Among categories of IFs there are differences: considering three types of IFs, corresponding to equity, mixed and the fixed income funds (bonds funds), it resulted that the mixed and fixed income IFs rebalance mainly by country, while equity IFs rebalance mainly across industries. This because the first two invest more in government bonds, thus they rebalance more by country, instead equity funds are more interested in firms and industries.

- Considering the liquidity of financial assets, we can distinguish among three main types of assets: equities, corporate bonds and government bonds. The results suggest that IFs, to rebalance by countries, sell only equities toward Covid-affected countries in order to be less Covid affected, while they rebalance more by industries by selling the corporate bonds or government bonds.

- As regards funds performances, observing benchmark-adjusted returns (which are differences between monthly net returns and benchmark returns), it resulted that returns of IFs decreased in March 2020. This suggests that IF performance ability decreases with panic. Moreover, distinguishing IFs into three groups: the ones that had high pre pandemic returns, ones that had medium return and the ones with low pre pandemic returns, it is possible to notice that they behaved differently. Specifically, the ones that had already high returns pre pandemic tended to have higher net purchases with respect of other groups that instead sold a lot of securities in March. This may suggest that the IFs with higher performance ability tend to suffer less from herding with respect to other groups.

4.2 Sustainable Rebalancing

The paper of Affinito and Santioni (2021) focused on understanding if during the pandemic period IFs rebalanced their portfolio towards less affected countries and industries. It resulted that they did. This rebalancing is affected by many factors, such as the category of the fund, its liquidity, performances and so on.

It is meaningful to understand if the rebalancing also involved the typology of assets that the funds, considered from their asset-side point of view, invested in. In particular we are interested in understating if IFs rebalanced towards more sustainable assets during Covid with respect to other lower sustainable types of assets.

As stated in the previous chapters, the interest towards ESG funds has been growing in the last couple of years.
In general, the number of "social" or "green" financial assets is growing and the funds investing in these types of assets are increasing more and more, suggesting that the trend of sustainability did not reverse during the pandemic, but actually has been intensified, seen the success of these types of funds in 2020 and 2021.

4.2.1 Sustainable fund market during Covid-19

The sustainable fund market refers mainly to mutual funds and ETFs that, in the asset allocation process of the fund manager, integrate ESG considerations.

The number of ESG funds, as it's already been written in the past chapter, has increased in the last years, almost doubling in the past five years, increasing their inflows especially in 2020, as it is shown in the following picture:

Figure 23 - Number and AUM of sustainable funds, 2010-2020
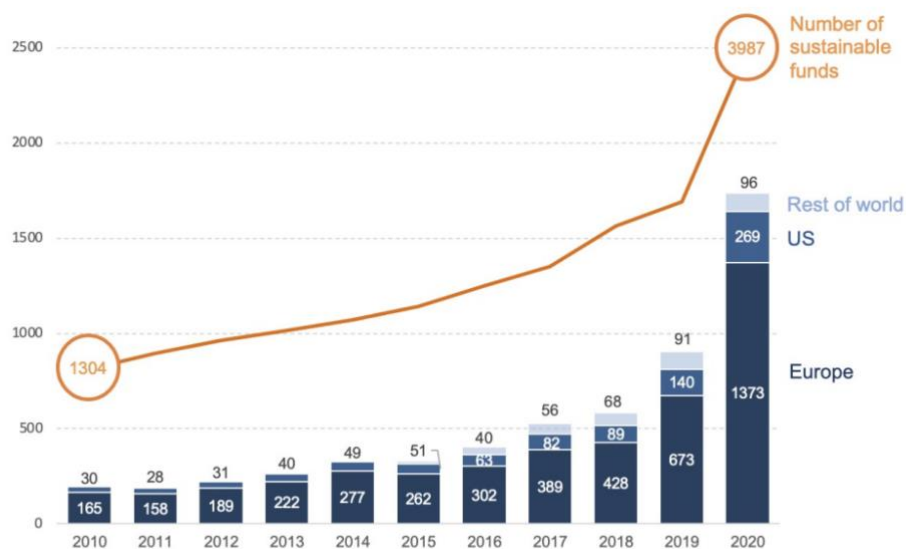
Source: (United Nations, 2021)

The *Figure 23* shows the number and the AuM value of the funds, and divides them between those that are domiciliated in Europe, in US and in the rest of the world.

The majority of sustainable funds are domiciled in developed countries, with the majority of them located in Europe (73%), followed by US (18%). The developing countries contribute only to the 5% of the totality of worlds' sustainable funds by number (United Nations, 2021), however, even in those markets, such as China, Brazil, Singapore and South Africa the market of sustainable funds is expanding (United Nations, 2021).

The growth of sustainable funds has accelerated in the past 5 years and in particular in 2019-2020. This growth has not been only in terms of numbers, but especially in terms of AuM, that grew over the 50% in 2019 and doubled in 2020 (United Nations, 2021).

This growth is due to the popularity of sustainable mutual funds and ESG ETFs and had as main drivers the risks associated with two main events: climate change and the pandemic. Climate change is a topic that is becoming more and more popular and that spread awareness among all investors that started to give attention also to the environmental thematic.

The pandemic offered instead a lesson for sustainability in the sense that, a part from the contribution of Covid-19 to climate problems – via reducing CO_2 emissions – it contributed

to spreading awareness about health and sustainability issues, inducing people to reflect on sustainable consumption and social responsibility (Qaisar, et al., 2021).

Indeed, during the pandemic investors shifted towards greener and more sustainable assets and products. This was explained by Kotler (2011), that affirmed that citizens started re-examining their consumption behaviors, being more conscious of the sustainability issue. Mahmoud and Meyer (2020) carried out two experiments, analyzing the pre and post-Covid-19 period, and they found out that investors increased their emphasis on sustainability in times of high uncertainty and volatility caused by the pandemic. Investors, indeed, during the Covid-19 crash, modified the allocation of their holdings, and it's been shown that they allocated a significantly higher percentage of their holdings to more sustainable risky investment instead of normal risky investment. This suggests that during the pandemic there has been an intense sustainable rebalancing with respect to pre pandemic times (Xu, et al., 2022).

The constant growing awareness of investors about these topics explains the growth of sustainable funds phenomenon. This is expected to have an impact also on funds returns, that are going to be analyzed in the following paragraphs.

4.2.2 Characteristics of sustainable funds

The report of United Nations of 2021 (United Nations, 2021) analyzed the sustainable fund universe of mutual funds and ETFs and found out that the majority of sustainable funds (the two thirds) are equity funds and the remaining part are split equally between mixed and bond funds.

The report underlines also the importance of the ESG disclosure, highlighting the increasing relevance of ESG scores and other measure to determine the sustainability of a fund in an objective way. The disclosure does not just regard the funds ESG criteria but also the funds contribution to the SDGs, which are the Sustainable Development Goals.
Disclosure is necessary in order to avoid "green washing", which is a marketing strategy used by companies or organizations that present their activities as sustainable in order to attract investors when in reality they are not sustainable as declared.

4.2.2.1 ESG Scores

ESG funds integrate ESG criteria in many ways, such as during the screening, the reporting and the strategies to purse. In this thesis we consider a fund as sustainable depending on its level of ESG score.

ESG scores are attributed to investment funds in order to allow investors to consider also the environmental, social and governance impacts of each fund and to measure the fund's ESG performance based on public published data.

They are built on calculations that are based on 10 main themes grouped by the three pillars of sustainability, which are environmental, social and governance pillar. These themes are based in turn on 186 metrics:

- 56 regarding governance;
- 68 related to the environmental part;
- and the remaining 62 are about the social pillar of sustainability.

These themes are shown in *Figure 24*:

Figure 24 - ESG Scores
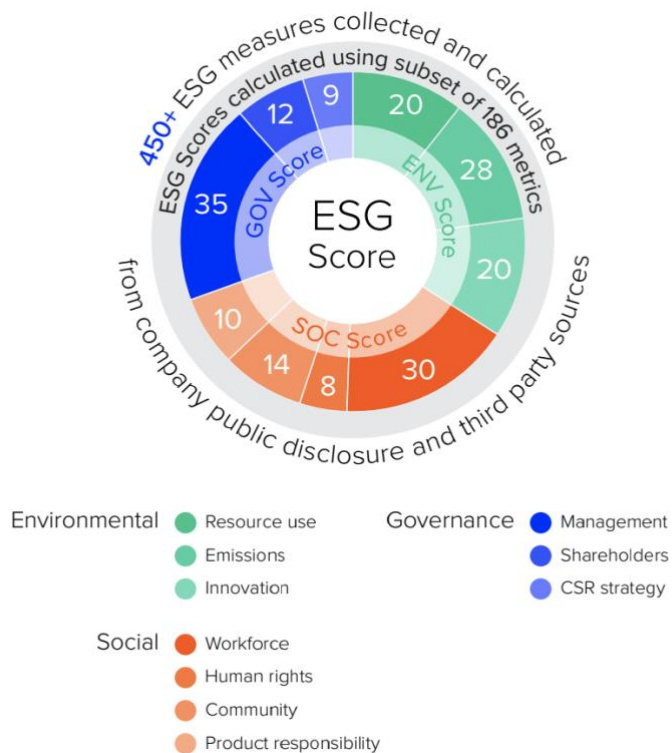
Source: (Refinitiv, 2020)

Environmental category

- Resource use: this theme considers water, energy, sustainable packaging and environmental supply chain.
- Emissions: it considers emissions, waste, biodiversity and environmental management systems.
- Innovation: it takes into account product innovation, green revenues, R&D and CapEX.

Social Category

- Workforce: it considers diversity and inclusion, career development and training, working conditions, health and safety.
- Community
- Human rights
- Product responsibility: it includes responsible marketing, product quality and data privacy.

Governance Category

- Management: it considers mainly the management structure (meaning the independence, committees and diversity of the management team).
- Shareholders: it considers shareholders rights and takeover defenses.
- CSR strategy (including also ESG reporting and transparency).

The dataset of IFs we take into consideration has, among the criteria, the fact that the ESG score is above zero. This because we want to differentiate between funds with and high ESG score and funds with a low ESG score.

This score, that defines the sustainability of a fund, is calculated only for those portfolios that have at least 10 securities and that, for at least 70% of these securities, an individual ESG score is available.

4.3 Performance of Funds

The aim of this thesis is to analyze funds and their performance during the pandemic in order to determine whether and in which measure their performance has been affected by Covid and Government Response to the virus spreading. In addition to that, we want to understand if the

pandemic and its consequences had a lower or bigger impact in funds with higher ESG ratings with respect to those with a low ESG rating.

In the following paragraphs, the construction of the Dataset, the methodology used and the results of the empirical analysis are shown.

4.3.1 The Dataset

4.3.1.1 Collections of Data

The main data sources for this elaborate have been Refinitiv-Eikon, Oxford University Database and Fama and French Library.

Refinitiv-Eikon is an American-British provider of financial data and infrastructure; we downloaded first information on the funds' prices in US dollars for all funds and secondly information about the funds ESG scores and the risk-free rate.

From the Oxford University Database, the information about Covid-19 confirmed cases and countries data were retrieved. The data used from Oxford University is collected by hundreds of volunteers from all around the world, that are responsible for the collection and the constant update of the data.

From Fama and French Library we retrieved data of the three French and Fama Factors, used to apply the Fama and French Model. The library computes and updates these values over time, taking data from CRSP (Center for Research in Security Prices) and Compustat, which is a database of financial and statistical information on global companies around the world.

4.3.1.2 Selection of Funds

The Funds that have been selected are 20, chosen based on their ESG score and domicile. Half of these are domiciliated in a state member of the EU and the other half in USA.

The selection was based on the ESG Scores, selecting the top 10 funds with the highest ESG score and the 10 funds with the lowest available ESG score.

This allowed us to divide the sample in two main categories:

- The low-ESG-rated funds: the funds that have not a good ESG performance and that have a low transparency in reporting ESG data compared to the average.
- The high-ESG-rated funds: funds with a high ESG scores, therefore with a good or excellent ESG performance and a high degree of transparency in reporting ESG data.

Figure 25 and *Figure 26* describe the characteristics of the funds analyzed:

Figure 25 - Characteristics of the Dataset
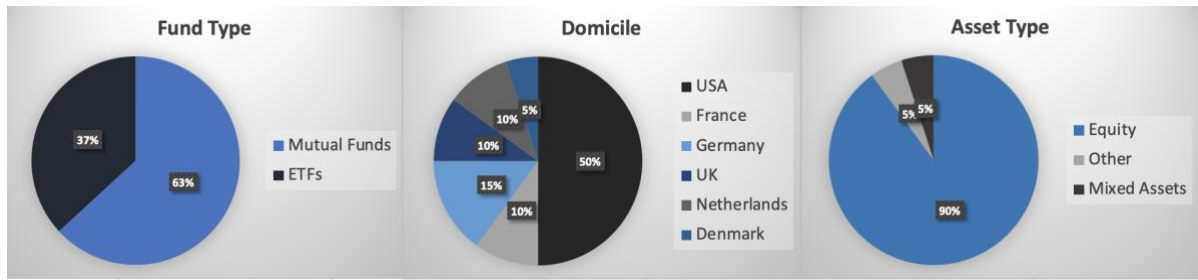
Source: author's elaboration

From *Figure 25* it's possible to notice that the majority of the funds considered are mutual funds and the remaining part are ETFs. The original dataset included all types of investment funds described in the first chapter, meaning also hedge funds, pension funds and PEs, however, when imposing the criteria of having an ESG score above zero the type of funds reduced mainly only to mutual funds and ETFs. This is consistent with the research of United Nations affirming that these two types of funds are those more engaged in ESG reporting.

The domicile was intentionally 50% USA and 50% EU, but as regards the single countries such as Germany and France, they constitute alone half of the domicile of the European funds considered. The other countries are Netherlands, UK and Denmark. Most of these are the countries where the fund market is most developed and with the highest stock market capitalization, whose correlation has been described in *Figure 17* of chapter 2.

As for the asset types, the big majority of the funds considered are equity funds, and this is coherent with the research of United Nations, confirming that the majority of funds that are considered sustainable are equity funds.

There are two funds in the sample that are non-equity funds: Capital Growth Fund and Federal Ambition Climate. The former is a mixed fund and the latter is another type of fund.

Figure 26 - Further Info about the Dataset
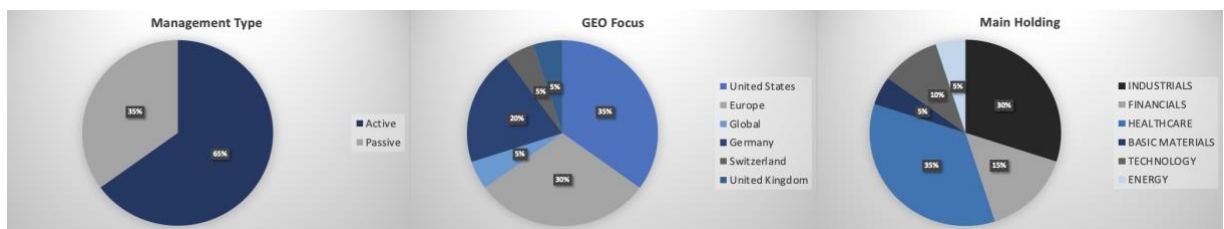
Source: author's elaboration

Further information about the management type, the geographical focus and the main top holding about the selected funds were retrieved from Eikon and shown in *Figure 26*.

As regards the management type, the 63% of the funds are active managed funds, instead the remaining are passively managed.

As for the geographical focus, only 35% focus on US companies or bonds, meaning that not all funds domiciliated in USA, that constitute the 50% of our sample, focus on United States.

There is only a fund that focus on global assets. As for the ones who focus on Europe, 30% focus entirely on the European continent, instead those who focus on specific countries, concentrates mainly on Germany (20%).

Lastly, we analyze the main holding of each of the fund, that weights among the 10-30% of the overall portfolio of the fund.

We can notice that the majority of funds invest primary in the healthcare sector (35% of the selected funds), 30% of the funds invest predominantly in the industrial sector and 15% of the funds focus principally on the technology sector.

Figure 27 shows the value of TNA (Total Net Assets) of the funds considered.

Figure 27 - TNA of funds
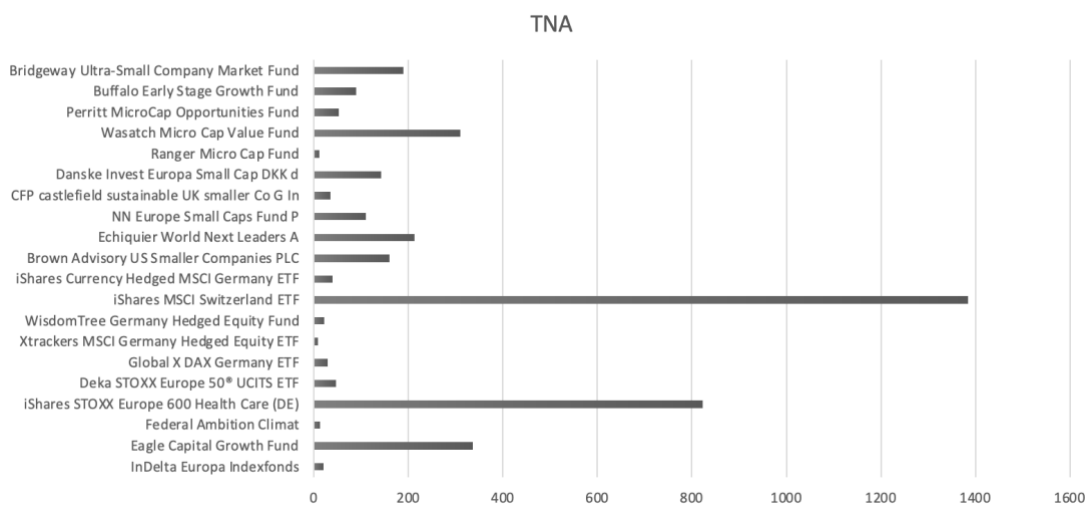
Source: author's elaboration

The TNA is the total NAV of a fund, calculated as the assets minus the liabilities of the fund. In the sample, funds of various sizes were included. The iShares MSCI Switzerland ETF is the ones with the higher TNA, instead the Xtrackers MSCI Germany Hedged Equity ETF has the lowest TNA.

It is significant to consider funds that are heterogeneous in terms of size, because we want to take into account funds with different characteristics in order to have a sample, albeit small, as more representative as possible of all typologies of funds.

As regards for the ESG characteristics of the funds of the sample, many details were provided. They are shown in *Figure 28*:

Figure 28 - ESG Scores of the Sample
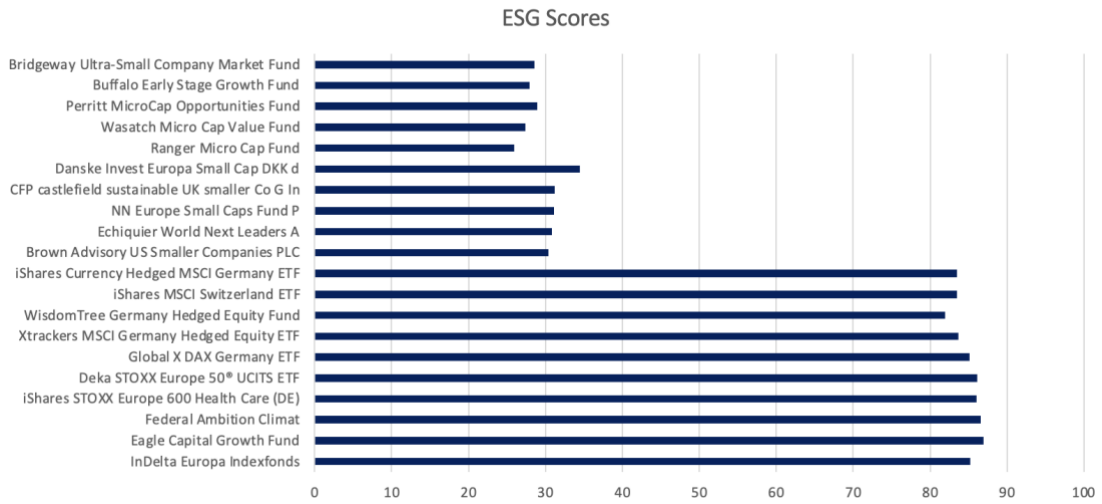
Source: author's elaboration

First of all, it's important to repeat again that a criterion for a fund to be selected was that the ESG score in Eikon was available (meaning that funds had an ESG score higher than 0). Secondly, the sample was intentionally constituted by 50% of funds with a low ESG Score (for this elaborate a low ESG score is considered to be lower than 50) and 50% of funds with a high ESG Score (that have a ESG score higher than 50).

Some more details about the ESG scores of the funds are provided by *Figure 29*:

Figure 29 - ESG Details
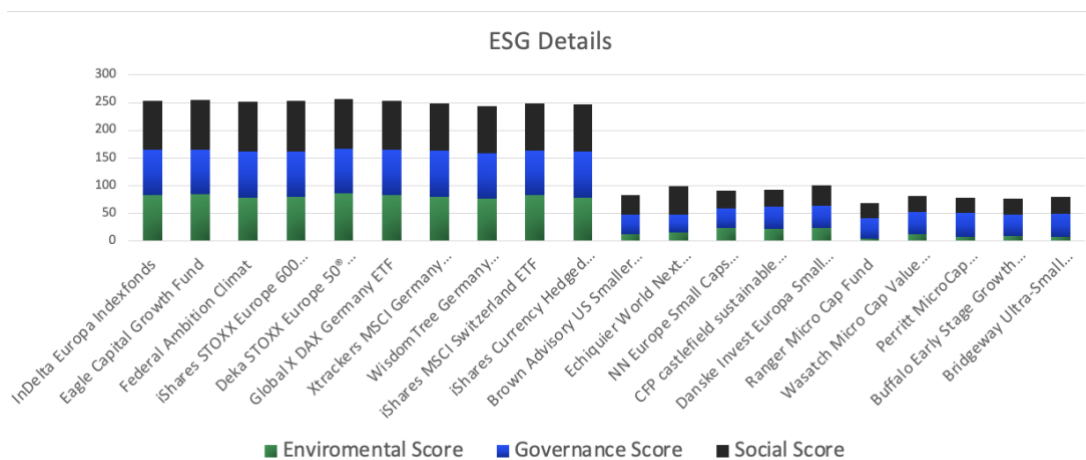
Source: author's elaboration

The *Figure 29* shows the contribution of Environmental, Governance or Social score to the aggregated ESG Score. It's possible to notice that for those funds who have a high ESG score the contribution of all 3 pillars of sustainability is homogenous, instead for those funds that have a low ESG score, they tend to have a higher score in the governance aspect or social and a very minimum score in the environmental aspect. This is particularly true for the following five funds: Ranger Micro Cap Fund, Wasatch Micro Cap Value Fund, Perritt MicroCap Opportunities Fund, Buffalo Early Stage Growth Fund and Bridgeway Ultra-Small Company Market Fund. Interestingly, they are all domiciliated in USA, this is again consistent with the research of United Nations, stating that EU is more active and the leader in the segment of sustainable funds globally.

4.3.2 The Returns

To compute the returns of the selected funds, the prices of the share of the funds were retrieved from Eikon. For those funds for which this information was not available it's been considered the NAV as an equivalent measure.

The returns were computed as following (equation 1):

$$r_t = \frac{P_{t+1} - P_t}{P_t}$$

Where:

r_t = is the return on a fund's share

P_{t+1} = price of the share of a fund in the period t +1

P_t = price of a share of a fund in the period t

In this case *t* corresponds to a particular week and the returns have a weekly frequency.
It's been computed separately, but in the same way, the returns for those funds considered "high ESG-rated" and those "low ESG-rated".

The weekly returns of the selected funds were the object of all the further analysis that have been made. First of all, it's been computed an average of the returns, separately for the high-ESG-rated ones (represented by the blue bars) and the low-ESG-rated ones (represented by the black bars).
The average returns for each fund are displayed in *Figure 30*.

Figure 30 - Average Weekly Returns
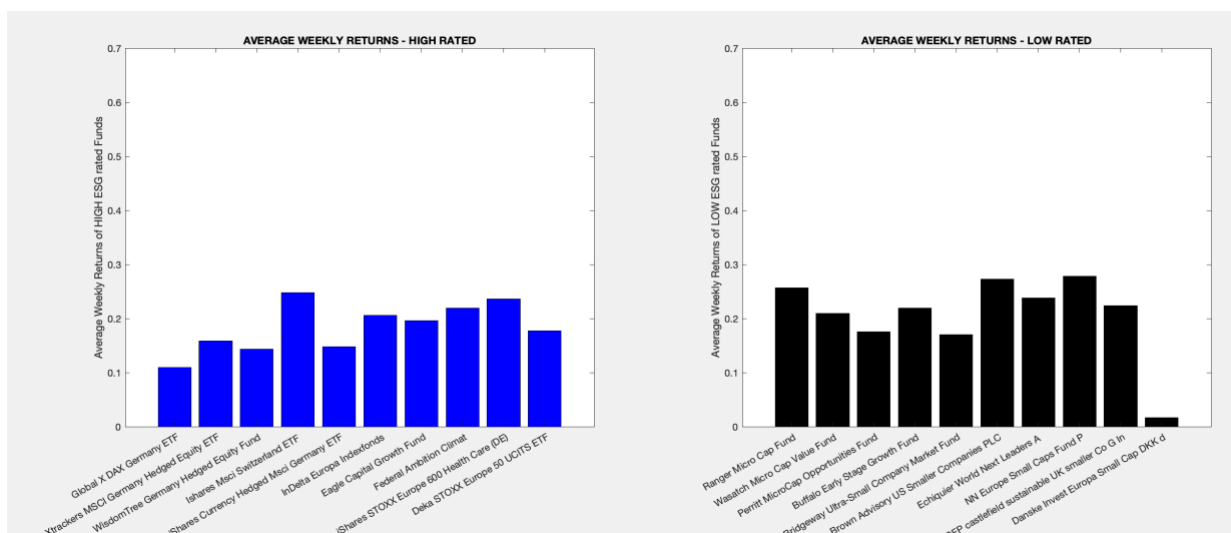
Source: author's elaboration

The average weekly returns are the mean returns for all the time-period considered which is 4th January 2019 – 29th July 2022, for the totality of 189 observations.

All funds have on average positive return that range between 0-0,3 percent.

The fund with the lowest return is one belonging to "low ESG rated" group and its's the Danske Invest Europa Small Cap DKK d.

The sample afterwards was split into two time periods:
- Pre Covid outbreak (from 1st January until 14th February 2020);
- Post Covid outbreak (from 14th February until 19th July 2022)

Figure 31 shows how returns, on average, changed for each fund after the outbreak of the pandemic and it's possible to notice that, while returns pre-Covid outbreak were on average between 0,2 and 0,6, subsequently the outbreak, they range between -0,03 and 0,2, reaching also averagely negative returns for some low-ESG-rated funds (represented by the figures with black bars in the bottom right of *Figure 31*).

Figure 31 - Average Weekly Returns (Pre-Post Outbreak)
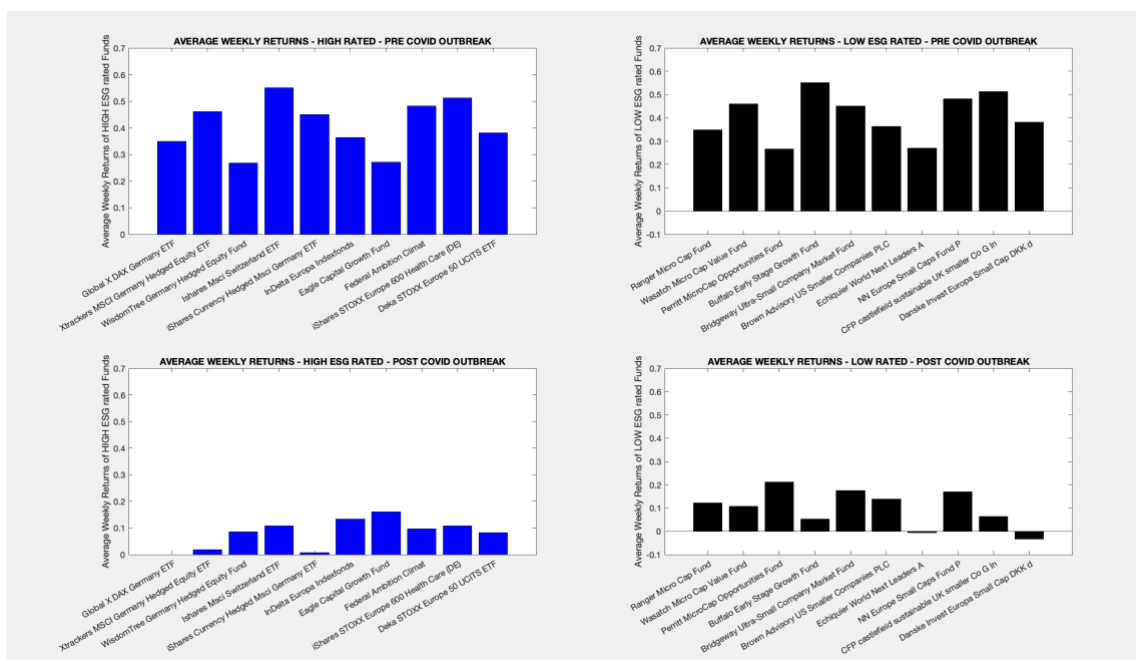
Source: author's elaboration

As for the volatilities of the returns, they are represented in *Figure 32*.

Ranger Micro Cup Fund is the fund whose returns in the time-period considered have been the most volatile and, in general, the funds considered 'low ESG rated' (colored in light blue) have more volatile returns compared to the high ESG rated ones (the ones in dark light blue) in all the time-period considered from 2019 onwards.

By splitting the sample between pre Covid outbreak and post Covid outbreak, in the last two graphs of *Figure 32,* as done before with average returns, it's possible to see that volatilities increased exponentially after the outbreak, especially for low ESG rated funds.

Figure 32 - Returns Volatilities
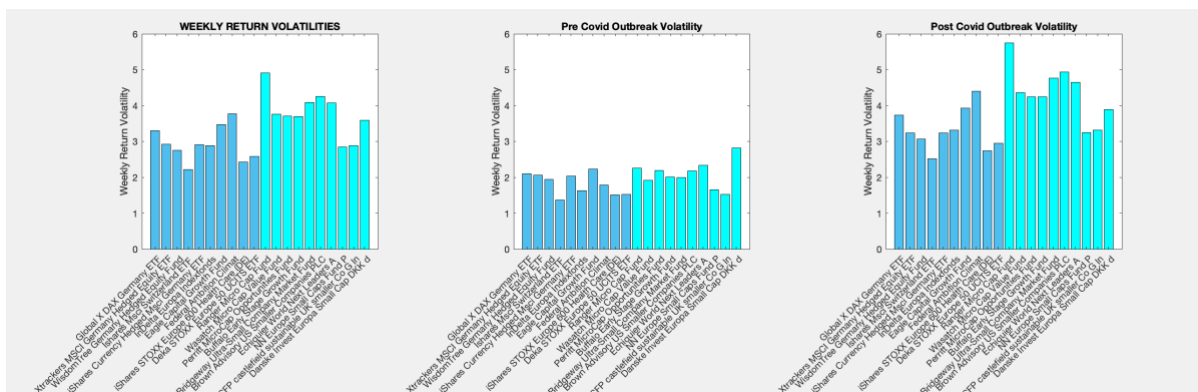
Source: author's elaboration

A descriptive analysis of returns has been completed, in order to synthesize and to make it easier the interpretation of the raw data. The analysis indicates the Mean, Median, Standard deviation, the Minimum, the Maximum value of all funds, the Skewness, the Kurtosis and the quartiles of the totality of weekly returns (*Table 6*).

Table 6 - Descriptive Analysis for each fund and for the groups of funds

	Mean_ALL	Median_ALL	StDev_ALL	Min_ALL	Max_ALL	Skew_ALL	Kurt_ALL	Quant25_ALL	Quant50_ALL	Quant75_ALL
Global X DAX Germany ETF	0.10932	0.15018	3.3044	−16.871	12.024	−0.72828	8.8469	−1.1677	0.15018	1.7487
Xtrackers MSCI Germany Hedged Equity ETF	0.15806	0.26247	2.917	−15.309	10.338	−1.2063	9.2199	−0.93999	0.26247	1.5976
WisdomTree Germany Hedged Equity Fund	0.1433	0.13654	2.751	−12.314	10.291	−0.58788	6.746	−1.1824	0.13654	1.666
Ishares Msci Switzerland ETF	0.24791	0.51168	2.2184	−11.146	7.1813	−1.054	8.9709	−0.78148	0.51168	1.3949
iShares Currency Hedged Msci Germany ETF	0.1481	0.12932	2.9083	−15.657	9.8462	−1.2767	9.5662	−0.92929	0.12932	1.5867
InDelta Europa Indexfonds	0.20597	0.33587	2.8816	−20.274	9.0911	−2.0882	17.645	−0.70132	0.33587	1.5585
Eagle Capital Growth Fund	0.19558	0.29112	3.4755	−12.297	9.9299	−0.58255	5.1237	−1.3025	0.29112	1.9231
Federal Ambition Climat	0.21911	0.25221	3.771	−28.485	21.925	−1.2925	26.109	−0.76555	0.25221	1.3045
iShares STOXX Europe 600 Health Care (DE)	0.23606	0.46375	2.42	−13.655	7.6	−1.3599	10.393	−0.79895	0.46375	1.6248
Deka STOXX Europe 50 UCITS ETF	0.17745	0.30854	2.5798	−17.131	7.3966	−2.2181	15.939	−0.62354	0.30854	1.4469
Ranger Micro Cap Fund	0.25652	0.41765	4.9137	−41.634	15.754	−3.4068	31.145	−1.5969	0.41765	2.8037
Wasatch Micro Cap Value Fund	0.20921	0.43618	3.7554	−21.864	14.262	−1.5094	12.352	−1.5034	0.43618	2.1477
Perritt MicroCap Opportunities Fund	0.17582	0.34278	3.7115	−17.375	13.997	−0.96816	8.5094	−1.3883	0.34278	2.1151
Buffalo Early Stage Growth Fund	0.21951	0.30116	3.6896	−17.483	15.276	−0.66449	7.4592	−1.5613	0.30116	2.3606
Bridgeway Ultra-Small Company Market Fund	0.17021	0.32999	4.0871	−22.298	13.989	−0.94789	9.7824	−1.6394	0.32999	1.974
Brown Advisory US Smaller Companies PLC	0.27261	0.25936	4.2564	−23.561	16.854	−1.0709	10.47	−1.5161	0.25936	2.3791
Echiquier World Next Leaders A	0.23815	0.69411	4.0696	−11.772	9.7923	−0.39235	3.4859	−2.1228	0.69411	2.8916
NN Europe Small Caps Fund P	0.27843	0.65175	2.8384	−16.778	9.3632	−1.8455	11.958	−0.77399	0.65175	1.9186
CFP castlefield sustainable UK smaller Co G In	0.2239	0.45283	2.8766	−21.708	9.7976	−2.9167	23.515	−0.83587	0.45283	1.6582
Danske Invest Europa Small Cap DKK d	0.01626	0.51054	3.5826	−25.622	6.4326	−3.2039	19.679	−0.81288	0.51054	1.9405

Source: author's elaboration

The mean value and the median is the highest for Echquier World Next Leaders and this is explained by the fact that this is the only fund who registered positive returns also during the pandemic outbreak.

The standard deviation is highest (if we consider all the time-period) for Brown Advisory US Small Company Market Fund, which is one of the low ESG rated fund. The high volatility is explained by the fact that this fund invests at least 80% of its assets in equity, and especially in small US companies with high growth prospects.

As for the minimum value, it is reached by the Ranger Micro Cap Fund, that is included between the low ESG rated funds and that presents the highest standard deviation after the Covid outbreak, as shown in *Figure 32*.

The highest value is reached by Federal Ambition Climate and it is equal to 21,925%, immediately after the Covid outbreak when the fund lost 28,49% of its value. With the stacked plot it was possible to retrieve the week in which the fund lost this value and it corresponds to the 9-15th of March 2020.

In addition to that, the skewness, the kurtosis, and the 25th, 50th and 75th quartiles of the returns have been computed.

Regarding the skewness, that measures the asymmetry of the distribution, it is negative for all funds, but not too intensely, meaning that the distributions are moderately skewed. This implies that the left tail of the distribution is longer.

The kurtosis is positive and higher than 3 for all the funds, meaning that the distributions present fatter tails relative to a normal distribution and so they have a greater likelihood of experiencing extreme events as compared to a normal distribution.

Looking at the quartiles, we see that the 25th percentile is negative for all the assets, thus the lowest 25% observations are all negative. The 50th percentile is instead positive for every fund and looking at the 75th percentile, it's possible to notice that also in this case it is positive for each fund.

Table 7 - Descriptive Analysis of the Two Groups

	Mean	Median	σ	Min	Max	Skew	Kurt	Quan25	Quant50	Quant75
HIGH ESG RATED	0,18409	0,42092	2,4415	-15,974	7,974	1,9272	15,515	-0,64293	0,43092	1,2967
LOW ESG RATED	0,20606	0,33094	3,0742	-15,837	11,896	-1,0626	9,3699	-1,2561	0,33094	1,8724

Source: author's elaboration

Afterwards, in *Table 7*, it's been computed the descriptive analysis of the average returns for the aggregate two groups: the high ESG rated funds and the low ESG rated funds.

It's possible to notice that in all the time-period considered from 2019 onwards the mean of returns results to be higher for the second group, the low ESG rated one. However, the volatility is lower for the high ESG rated funds and this is a relevant information, especially for the computation of the performance measures.

The median on average is higher for the high ESG rated.

Concerning the minimum value, the two groups differ only for a decimal point, instead for the average maximum value, the group of high-ESG-scored funds has a lower value than the average of maximum value of low ESG rated funds.

As for the Skewness, Kurtosis and quartiles, the meaning is the same as the previous descriptive analysis.

Afterwards, we divide the returns in three time periods, basically distinguishing the Covid outbreak from the post Covid outbreak:

- 4th January 2019 - 14th February 2020: the pre-pandemic period
- 14th February 2020 – 24th April 2020: outbreak of the pandemic
- From 24th April 2020 – 19th July 2022: post-outbreak period

The resulting figure is the following:

Figure 33 - Returns over time
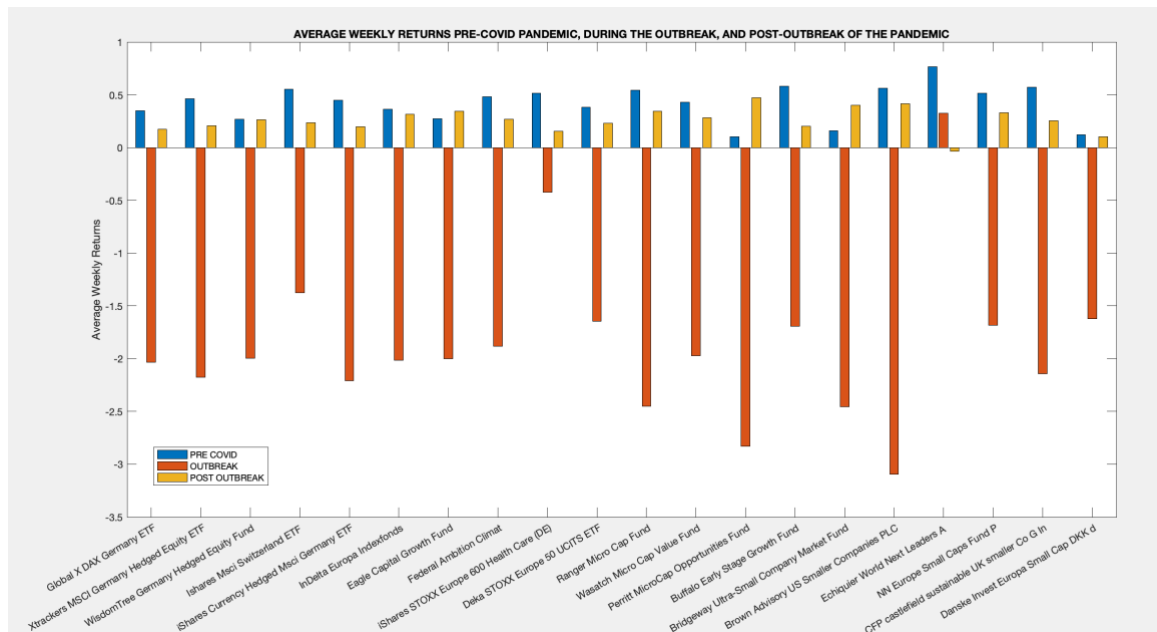
Source: author's elaboration

It's possible to notice that almost all funds experienced negative returns during the Covid outbreak, except for one: the Ecquier World Next Leader. This may be explained from the fact that that fund is composed by the 48,67% by high technology stocks. Technology companies, especially those who specialize in gaming, have experienced positive returns from the pandemic, as a result of all the time spent in house during the lockdowns.

Its increase in value during March-April 2020 was followed however by a decrease of returns in the post Covid outbreak period.

Figure 33 tells us also that all funds, with the exception for Ecquier World Next Leader, recovered partially their value from the Covid outbreak, but on average returns are still lower than the pre pandemic situation, suggesting that Covid had a more persistent effect on financial markets and that investors may still have some behavioral biases, such as the risk aversion caused by the uncertainty that Covid-19 created in the markets.

We can construct the same figure by considering instead of all funds separately, only the two groups and the average returns, as in *Figure 34*.

This figure tells us that during the Covid outbreak, low ESG rated funds experienced on average lower returns with respect of high ESG rated funds, starting from a higher average value. This shows again their higher volatility compared to high ESG rated group of funds.

Figure 34 - Returns over time for the two groups
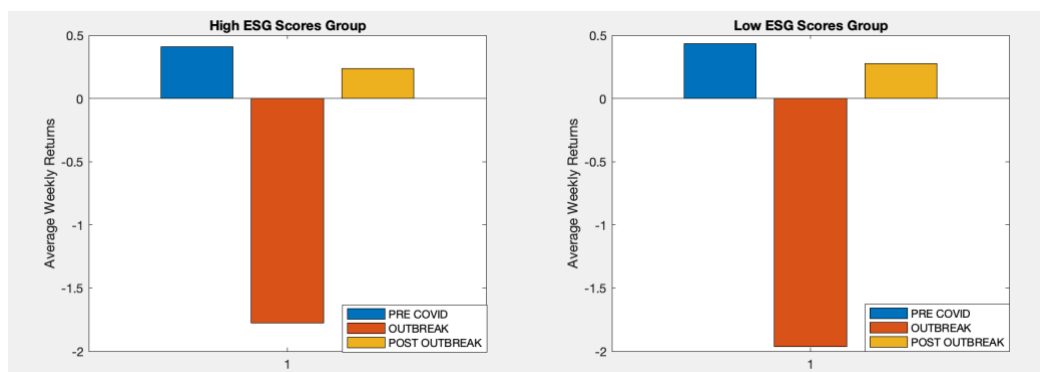
Source: author's elaboration

Furthermore, an analysis about the correlations of the returns of the funds during the Covid outbreak has been conducted and shown in *Figure 35:*

Figure 35 - Returns Correlation during the Outbreak
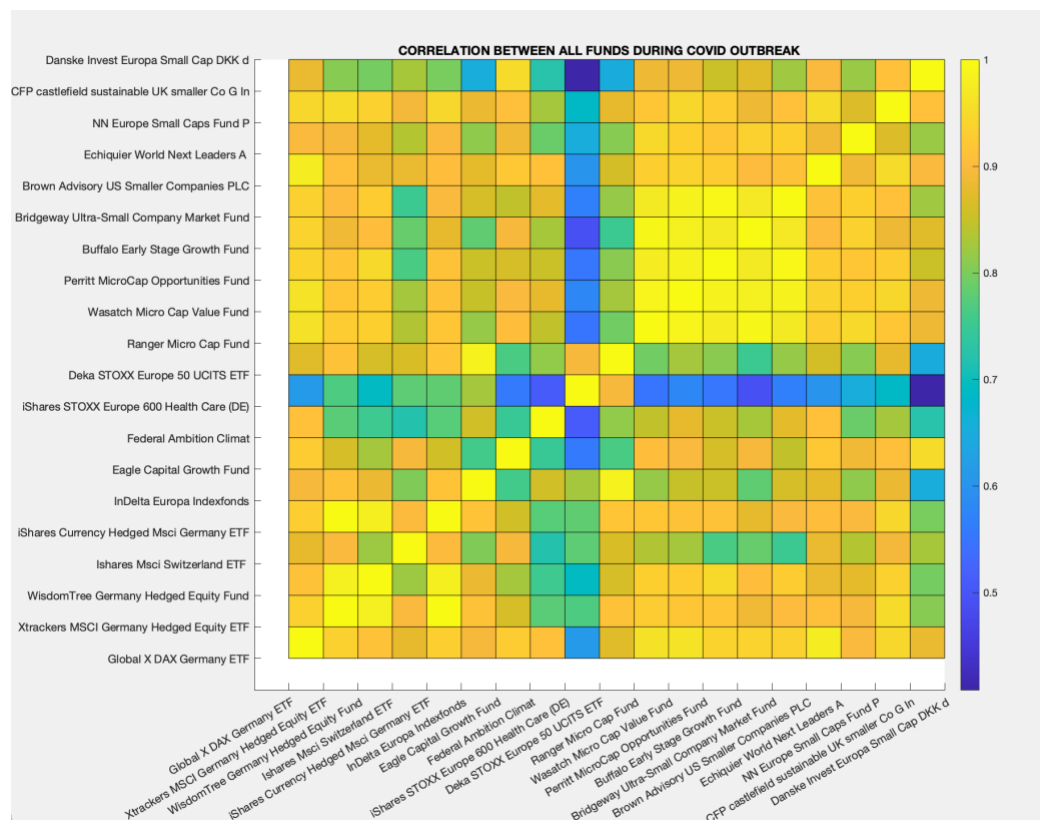
Source: author's elaboration

The *Figure 35* shows how much a fund correlates with another, because it may happen that funds invest in the same types of securities and their movements are similar, or also, that some funds may invest in other funds, thus their correlation is expected to be very high.

Dekka Stoxx Europe 50 UCITS ETF is the fund that correlated less with the others. Instead, Global X Dx Germany ETF seems to be the one who correlated more, this because the Global

X Dx Germany ETF aims to track DAX Index and many other funds invest in German companies and this may explain the high correlation.

From now on the analysis will focus exclusively on the period 24th January 2020 – 19th July 2022, because we want to focus on pandemic period only.

As regards the returns during the pandemic we can see from *Figure 36* the returns of the two group of funds plotted over time, and from this it's possible to notice that, as seen also before, low ESG rated funds are more volatile:

Figure 36 – Comparison of Returns
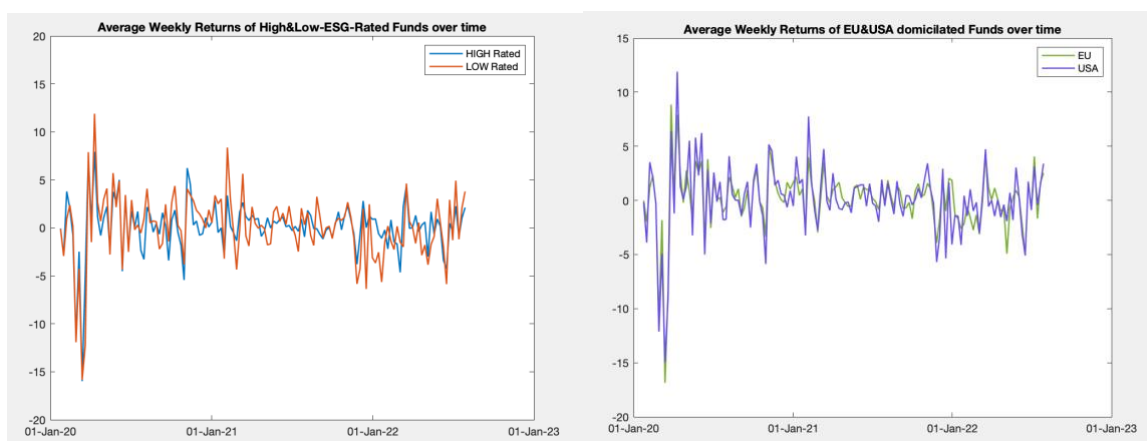
Source: author's elaboration

Moreover, in the graph on the right we can see the difference between the funds domiciliated in USA and the ones domiciliated in Europe. We can see that the variability seems to be a little higher for those funds domiciliated in USA.

This may be motivated by the fact that the majority of these funds invest in US companies, instead the funds domiciliated in Europe invest primarily in companies located in countries that are members of the European Union, that tend to have more stable returns (Brown, 2019). However, the difference in volatility is more evident when we compare high and low ESG rated funds rather than the domicile of the funds.

4.3.2.1 Performance Measures of Returns

Before computing the performance measures, we compute the cumulated returns, which are the total change in the price over a set time.

We see that for all the time-period considered, that goes from 24th January 2020 onwards, the cumulated returns of the high ESG rated are above the low ESG rated meaning that the total

change for the prices of funds with a high ESG score has been higher than the one of the low ESG rated funds.

Figure 37 - Cumulated Returns
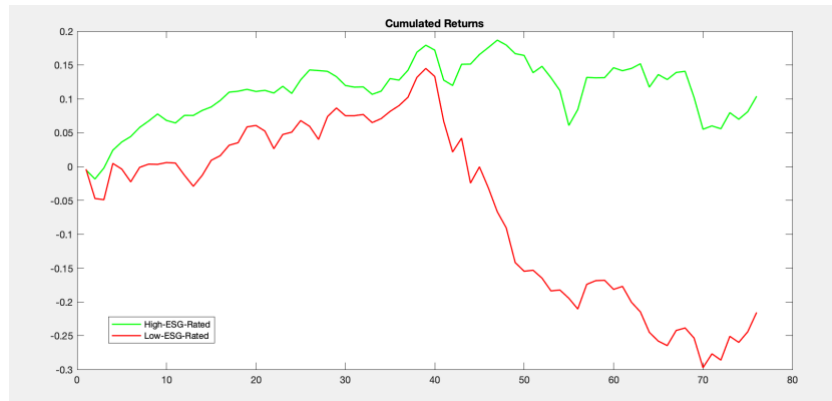
To understand whether of the two groups of funds –the high ESG rated or the low ESG rated- performed better during the pandemic it's necessary to compute their risk-adjusted performance values.

Therefore, eight performance measures have been computed: Sharpe ratio, Sortino ratio, Value at Risk, Expected Shortfall, Calmar ratio, Sterling ratio and the Farinelli-Tibiletti ratio, for both the high and low ESG rated group of funds, and *Table 8* indicates the results:

Table 8 - Performance Measures

SHR_H	SOR_H	TR_H	VR_H	ES_H	CR_H	STR_H	FT_H
0.033302	0.033095	0.13112	0.021961	0.012614	0.0029243	0.0034827	0.1248

SHR_L	SOR_L	TR_L	VR_L	ES_L	CR_L	STR_L	FT_L
0.028124	0.033095	0.12926	0.018001	0.010893	0.0025677	0.0026572	0.19485

Sharpe ratio (SHR) is computed by calculating the ratio between the average returns and their volatility. It measures the average return earned by the investor per unit of risk. The formula is the following:

$$Sh = \frac{\mathbb{E}[R_t]}{\mathbb{V}[R_t]}$$

The highest *Sharpe ratio* is for the high ESG rated funds, thus the average return per unit of risk of high ESG rated funds is higher with respect to the average return per unit of risk of low ESG rated funds.

However, it is important to keep in mind an important limitation of this ratio which assumes a returns' normal distribution. Instead, from the values of the skewness and the kurtosis reported in the first descriptive analysis, in *Table 6*, we ascertained that returns are not normally distributed.

Despite this limitation, Sharpe Ratio clearly indicates that considering not only returns but also their variability, the funds with high ESG Scores are preferred.

This is consistent with the literature that agrees that sustainable funds tend to have less volatility and tend to be more stable with respect to conventional funds, reacting better to unexpected events in terms of risk (Pisani & Russo, 2021).

Sortino ratio (SOR) is a performance measure, which is simply a variation of the *Sharpe ratio*. It divides the average returns by the asset's downside deviation, that is the standard deviation of negative portfolio returns.

$$So = \frac{\mathbb{E}\left[R_t\right]}{\mathbb{V}\left[R_t I \left(R_t < 0\right)\right]}$$

Hence, it can be more useful than the *Sharpe ratio* since investors are more concerned about the downside risk rather than the positive one.

A higher *Sortino ratio* is better than a lower one because it indicates that the fund is operating efficiently by not taking on unnecessary risk which is not rewarded by higher returns.

A low, or negative, *Sortino ratio* may suggest that the risk associated with negative returns is high.

Interestingly, the Sortino Ratio is exactly the same for the two groups of funds, therefore it's not possible, looking at this measure, to express which of the two is better.

Treynor ratio (TR) is a measure computed as the ratio between the average return and beta.

$$Tr = \frac{\mathbb{E}\left[R_t\right]}{\beta}$$

Beta represents the undiversifiable risk of the market. It indicates how much is the return of each group of funds for the amount of systematic risk the investment assumes. Hence, higher results are preferable. According to *Table 8,* the high ESG rated funds have the highest value of the Treynor ratio.

This ratio presents, however, two important limitations: one has to do with its backward-looking nature, while returns behave differently in the future than they did in the past; and the other is that this measure ignores the specific risk, focusing only on the systematic one.

After having analysed these three performance measures, we consider different ways of computing the expected returns and their volatility. Focusing on left tails we compute the *Value at Risk (VR),* the *Expected Shortfall (ES)* and the *Drawdown*.

The *Value at Risk* assesses the main problem of volatility which is the fact that volatility is independent of the direction of returns. Nevertheless, investors care more about the probability of suffering a loss; for this reason, *Value at Risk* quantifies the portfolio loss probability. Alfa is set at 5% and this means that the *Value at Risk* reports the maximum losses that have a probability of 95% of happening.

$$\int_{-\infty}^{VaR(\alpha)} f\left(R_t\right) dR_t = \alpha$$

Since, to compute this performance measure, this value is put at the denominator, higher values are preferable as the loss is lower.

Also looking at the Value at Risk, we observe that, especially for more loss averse investors, funds with higher ESG scores are a better investment.

A limitation of the VaR is that if an extreme event occurs and the investor loses a value expected to be higher than the VaR, this indicator doesn't give any indication about how much the loss would be.

The Expected Shortfall is calculated by computing the average of returns conditional on having returns below the *Value at Risk*, in fact is also known as cVar (conditional value at risk).

$$ES\left(R_t, \alpha\right) = \mathbb{E}\left[R_t | R_t \leq VaR\left(\alpha\right)\right]$$

Also in this case, this performance measure is better for the high ESG rated group.

The *Drawdown* measures the downside volatility. It keeps track of portfolio losses and computes how many periods are needed to fully recover from a loss.

$$D_t = min\left(0, \left(1 + D_{t-1}\right)\left(1 + R_t\right) - 1\right)$$

The *Calmar ratio (CR)* is then computed by taking the ratio between the average returns and the absolute value of the maximum loss for each group of funds as denominator (corresponding to the maximum drawdown). Hence, higher values of the ratio are preferable. Again, this is the case of the group of the high ESG rated funds, whereas the lowest *Calmar ratio* is presented by the low ESG rated funds, even if the difference is not very big.

However, this performance measure has the limit of considering only the returns and the maximum drawdown, ignoring therefore the general volatility.

Sterling ratio (STR) is a variation of the *Calmar ratio* in which we consider at the denominator, instead of the absolute value of the maximum loss, the average of the three largest *Drawdowns*, after having sorted them from the largest value to the smallest one. Also, this performance measure is higher for the first group, meaning that it indicates as the preferred group the one of high ESG rated funds.

Finally, we focus our attention on a measure for returns which is provided by the *Farinelli-Tibiletti ratio (FT)*. It compares the expected gains over the expected losses with respect to a certain threshold.

$$FT\left(\tau, p, q\right) = \frac{\mathbb{E}\left[max\left(0, R_t - \tau\right)^p\right]^{1/p}}{\mathbb{E}\left[max\left(0, \tau - R_t\right)^q\right]^{1/q}}$$

The threshold is set equal to the average risk-free rate, that was computed as the average of the risk-free rate of the time-period considered, from January 2020 until July 2022, and it is equal to 1,45%. Setting p=1 and q=2 and considering an investor with a moderate risk aversion and a long-time horizon, we compute the ratio taking the average when returns are below or above the threshold. The higher is the ratio and the higher are the returns with respect to the risk-free rate. This result is the only result higher for the second group of funds, which are the low ESG rated funds.

Among these eight Performance Measures, 1 goes in favour of low ESG rated funds, 6 to high ESG rated fund and 1 is equal for both. Thus, we may assume that ESG funds (namely the high-ESG-rated funds), even if they have returns on average lower from 2020, when also volatility is considered, they are clearly preferred with respect to the lower ESG rated ones.

4.3.3 The Regression

The returns of the selected investment funds minus the risk free are the response variable and, with the application of the Fama and French model, we regress the variable in order to understand how it varies depending on the intensity of Covid waves and the measures to contrast the virus spreading.

We constructed a panel dataset in order to consider individual specific heterogeneity, observing different entities, in our case funds prices, which vary over time. From the prices we compute the returns and subtract the risk-free rate to them. The risk-free rate is

conventionally decided to be equal to the 10-year Treasury US bill, thus it varies only across time.

The aim is to study this excess return of funds and how it has been affected by Covid-19 pandemic and how ESG-high-rated funds were affected differently from low-ESG-rated funds by the Covid recession.

The regression was conducted in two steps:

1) First focusing only on the effect of the virus and the measures to contrast it on the funds' returns;

2) Secondly considering the "ESG effect" which is the difference of the pandemic effect on funds that have a high ESG score with respect to those funds with a low level of sustainability.

The final regression is represented by equation (2):

$$(Y_{it} - rf_t) = \alpha + \beta_1 X_{1\,z\,t-1} + \beta_2 X_{2z\,t-1} + \beta_3 X_{1\,zt-1} * d_i + \beta_4 X_{2\,zt-1} * d_i$$
$$+ \lambda' \sum_{k=1}^{3} Controls_t + v_t$$

Y_{it} = indicates the funds' performance for a period of time (t) and it varies for *each fund* (i).

rf_t = indicates the risk-free rate, set equal to the 10-year Treasury US Bill and it varies only across time.

α= indicates the intercept of the regression.

β_1= is the coefficient of interest that measures how the returns minus the risk-free rate change due to the intensity of the virus.

X_1= is the Covid indicator computed as the amount of cases/population of a specific geographic zone and it varies across time and the *geographical zone* considered (z), that can be either EU or USA. The $X_{1\,t-1}$ is the Covid indicator measure of the previous week.

β_2= is the coefficient of the second regressor of interest and it measures how the difference between returns and risk-free rate varies depending on the measures enacted by governments to contain the virus.

X_2= is the OxCGRT, namely the Government Response Tracker measure, that indicates all the measures promoted to limit the spread of the virus. Also, this factor varies for z, which is the considered geographical zone (EU or USA). The $X_{2\,t-1}$ is the Government Response Tracker indicator of the previous week.

$\beta_3 X_{1\,zt-1} * d_i=$ it is the interaction of interest that indicates the "ESG effect" on the Covid-19 spreading impact on funds returns. Thus, β_3 shows how the coefficient X1 varies if the dummy d_i is 1, meaning if the fund is a high-ESG-rated fund.

$\beta_4 X_{2\,zt-1} * d_i=$ it is the covariate of interest that indicates the "ESG effect" on the impact of the measures to contrast Covid-19 on funds returns. Thus, β_4 shows how the coefficient X2 varies if the dummy d_i is 1, meaning if the fund is a high ESG-rated fund.

$Controls_t =$ are the 3 factors of the French and Fama 3-Factors-Model.

$\lambda'=$ is the vector of the coefficients of the 3 factors of Fama and French Model.

$v_t=$ is the error term.

4.3.3.1 Assumptions of the model

1) We assume that the funds with highest ESG scores in 2022, when the dataset was retrieved, were also the ones with the highest ESG scores in all the time-period considered.

2) We consider the market price of the funds' shares, that in most cases coincides with the NAV. Whenever the market price is not available, we use the NAV, assuming it is a good measure able to substitute the market price.

3) We assume that the model of Fama and French even if thought for stocks, is applicable also for investment funds, also because the majority of funds selected are equity funds, meaning they invest primarily in stocks. Moreover, we assume that these main 3 factors are a good proxy to take into account what other drivers influence funds returns in the market, as it's been the most used model to study funds' performances in the literature.

4) Lastly, we assume that X1 and X2 affects the funds returns not immediately, but in the previous time-period. This is why we insert the two variables as lagged variables.

4.3.3.2 The Covid Regressor

The index considered to be the measure of Covid-19 is computed as the total number of confirmed cases registered every day divided by the total population.

We transformed the data from daily to weekly with MATLAB and considered the heterogeneity of this factor among USA and the European Union.

The ratio between the number of cases and the relative population for each geographic zone (z) was computed in order to have a significant measure that takes into consideration not only

the absolute value of the cases but a relative measure of the number of cases divided by the population of each z; as the population for each of the considered areas differs a lot.

This factor was similarly computed in the Affinito and Santioni's research (2021).

This measure is useful in order to use it as a regressor for understanding the link between the intensity of the contagion and the returns of investment funds.

Alternatively, according to Affinito and Santioni (2021) another relevant measure to define the pandemic spreading and severity is the number of deaths/population. However, we have chosen the first option as we are interested in understanding the impact of the spread of the virus which tends to lead to a greater number of deaths, in turn.

Of course, this measurement may not be accurate, due to the possibility of the under-reporting of positive Covid-tests or inaccuracy of the tests performed.

4.3.3.3 The OxCGRT Regressor

The OxCGRT, which is an acronym that refers to Covid-19 Government Response Tracker, is an index that takes into consideration thirteen metrics. It is calculated by the Oxford University, collecting publicly available data and it is based on: containment and closure policies, economic policies (in fact it takes also into consideration both income support offered to citizens and to workers and foreign aid for countries), health system policies (such as facemasks and testing regimes) and vaccine policies.

The OxCGRT is calculated as a mean of these thirteen metrics and it is computed daily from 2020 until 2022, for 180 countries, globally. For this thesis it's been computed the mean of the underlying index with a weekly frequency of the 10 countries with the highest GDP in EU plus those countries in which the selected funds of the dataset are domiciled and where in general the fund market is most developed, as a proxy for the aggregate EU data, as that data was not available, and separately, the same index only for USA.

The index is computed by Oxford University in three ways: first taking into account only vaccinated people, secondly considering only non-vaccinated people, and thirdly a weighted average of them. This because each country had its own government policy related to vaccination (Oxford University, 2022). We consider the weighted average measure of the index.

The main measure on which the OxCGRT depends on is the stringency index, that is always calculated by the Oxford University and it is a composite measure that takes into account nine metrics: closures of schools; workplace closures; cancellation of public events; restrictions on public events or meetings; public transport interruption; stay-at-home requirements; public campaigns about Covid information; restrictions on movements nationally and international travel controls.

The OxCGRT is a single number from 0-100 and when it corresponds to a score equal to 100, it indicates the strictest response of a country to the pandemic.
We choose this to be one of the two variables of interest because it is an indicator that aggregates all the consequences of the pandemic, from the health measures to the economic ones, undertaken by the governments to contrast the spreading of the virus. The aim is to understand whether these measures had an impact on the returns of the selected funds.

We plotted the mean of the OxCGRT for all geographic zones in the same graph containing the returns of high and low ESG rated funds. In this way it's possible to see that big movements of the returns correspond to big movements of the indicator, especially for the low ESG rated ones, which seem to indicate that they have been affected more by the OxCGRT index.

Figure 38 - Returns and OxCGRT Index
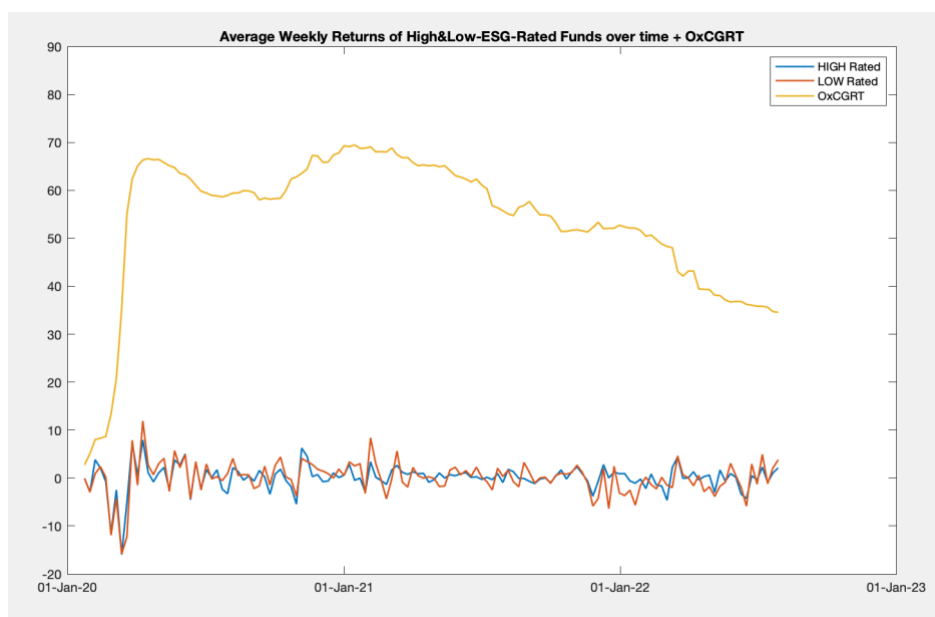
Source: author's elaboration

4.3.3.4. The Fama and French Three-Factor Model

The Fama and French Model is an asset pricing model developed in the 1990s by the economist Eugene Fama (winner of the Nobel Price in Economics) and the researcher Kenneth French, both professors of the University of Chicago, Illinois. It is an evolution of the CAPM, because it adds three factors: the size of the companies, the book values and market values and the excess returns in the market. By including these factors, the model implies that returns do not depend only on the market beta but also for the market capitalization beta and value beta.

The mathematical model can be presented in this way (equation 3):

$$r = r_f + \beta_1(r_m - r_f) + \beta_2(SMB) + \beta_3(HML) + \varepsilon$$

These three factors are:

- $(r_m - r_f)$ is the "market factor" and it corresponds to the risk premium. It is the difference between the expected returns of the market and the risk-free rate. It compensates the investor for the risk undertaken. It is the traditional beta, present also in the CAPM model and it measures the rate at which investing in the market instead of a zero-risk asset is more convenient.
- SMB is the "size factor" and it's the abbreviation for "Small Minus Big", also known as size effect. SMB measures the historic excess of small-cap companies over big companies. In the long term, small-cap companies tend to have higher returns than large-cap ones. A positive beta means indeed that a small capitalization financial security tends to perform better than high capitalization one.
- HML is the "value factor", and it's the abbreviation for "High Minus Low". It measures the value premium, meaning the spread between those companies with a low Book to Market value ratio (defined as "Value stocks") with respect to those companies with a high ratio (defined as "Growth stocks").
  A positive HML indicates that the returns of value stocks are higher than the ones of growth stocks.

These factors are important because they drive the expected returns in the market and are a good and broadly used measure to explain the equity securities returns.

However, we are not interested in their coefficients, because our aim is to understand, controlling also for these factors, which are the coefficients of X1 and X2 and how they influence funds' returns and the excess return over the risk-free rate.

4.3.3.5 Methodology

We started from a panel dataset, where we had information about each fund and had variability also in some of the regressors used, X1 and X2, that vary depending on the geographical zone considered.

The regression we decided to implement is a Random Effects estimation after having computed two tests:

- The Lagrange multiplier test of individual effects proposed by Breusch and Pagan and reproposed by Baltagi and Li (1990) that allowed us to understand that RE is a better way to proceed rather than a Pooled OLS estimation, as the p-value was lower than 0,05 so we reject the null hypothesis of variances across entities equal to zero, meaning that there is no significant difference across units. Therefore, in our case, the panel data was needed.

- The Hausman Test, that allowed us to understand that RE is preferred to FE because its p-value was higher than 0,05 so we cannot reject the null hypothesis, under which both FE and RE were consistent, thus, we choose RE because it's a more efficient estimator, that combines the *between* group variability with the *within* group variability (results are shown in *Table 12)*.

We regress in *Table 9* the equation (1) without considering the two interactions between X1, X2 and the dummy indicating the level of ESG score for each fund.

Afterwards, we regress the complete equation in *Table 10*, focusing deeply on the coefficients of those two interactions, in order to analyze the "ESG effect" on the effects of the pandemic.

4.3.3.6 Results

By regressing our COVID on the Covid Spreading Indicator (X1), the OxCGRT index (X2) and at the same time controlling for the 3 factors of Fama and French Model we can understand how the pandemic influenced the returns of IFs.

The results were presented in *Table 9.*

Commenting first the goodness of the estimated data, the number of observations is 2620, the funds considered (n) are 20 and the periods considered are 131 (T).

Rsquared is 0,16490 which is low, meaning that the 16,49% of the variability is explained by the model, however all coefficients are statistically significant at 99% level or at 95% level.

*,**,*** indicate in fact that estimates are statistically significant, namely they are significantly different from zero. This means that respectively the p-value is lower than 0,01, 0,05 and 0,10 and the confidence level is 99%, 95% and 90%.

Table 9 - First Regression

```
Panel: Random effects (RE)

N = 2620  n = 20  T = 131 (Balanced panel)
R-squared = 0.16303    Adj R-squared = -114.36912
Wald Chi2(5) = 1212.552465 p-value = 0.0000
RSS = 34922.661342 ESS = 11637.991420 TSS = 46560.652762
Standard errors robust to heteroskedasticity adjusted for 20 clusters

        ------------------------------------------------------------------
         Y_P |  Coefficient   Rob.Std.Err     z-stat     p-value
        ------------------------------------------------------------------
      X1 t-1 |   -5.527536      0.336766     -16.4136    0.000 ***
      X2 t-1 |    0.106341      0.007132      14.9112    0.000 ***
    Mkt_Rf_P |   -1.941192      0.101095     -19.2016    0.000 ***
       SMB_P |   11.878367      5.589191       2.1252    0.034 **
       HML_P | 4301.333038    680.187902       6.3237    0.000 ***
       CONST |   -5.960251      0.412885     -14.4356    0.000 ***
        ------------------------------------------------------------------
sigma_mu = 0.000000      rho_mu = 0.000000
 sigma_v = 3.667431     sigma_1 = 0.088330
   theta = 0.000000
        ------------------------------------------------------------------
```

Source: author's elaboration

The first regression tells us that the number of Covid cases had a negative impact on funds returns (negative coefficient of -5,53); instead the Covid-10 Government Response Tracker had a positive effect on the returns of the IFs considered (positive coefficient of +0,11).

All estimates are statistically significant as the p-value is for all lower than 0,05 so the coefficients are different from zero at a 95% confidence interval.

The negative coefficient of X1 (the Covid regressor) is coherent with the first research analysed in this chapter of Affinito and Santioni (2021) that found that investment fund net purchases decreased due to Covid, due to higher sales compared to purchases (Affinito & Santioni, 2021), leading to lower returns. Moreover, according to Affinito and Santioni (2021), IF performance ability decreases with panic, due to behavioral bias such as herding, that induce people to sell and have a higher risk aversion in their investment decisions. This

result was expected also looking at *Figure 33* or *Figure 36* that show a decrease in returns and, in general, more variability and lower returns when the Covid waves were more intense. This is also in line with other researches, such as Erdem (2020), Ding et.al (2021) and Cardillo et al. (2022). The latter studied stock market performances movements depending on both Covid Cases and Deaths and his research results show negative coefficients in both cases, suggesting that, as Covid-19 confirmed cases/deaths increases in a specific economic, all firms show a worse stock market performance (Cardillo, et al., 2022).

The positive coefficient of X2 indicates instead that the harder the measures to contrast Covid are, the more the performance of investment funds increase. This may be explained by the fact that investors, after having suffered panic and loss aversion whenever the gravity of the virus intensifies, they react with optimism to a strict Government response.

We may suppose that this is because when investors see a tougher and more efficient government response to the fight against Covid they feel safer and more optimistic about the market.

This result is in contrast with part of the literature; however, Cardillo et al. studied how separately the Containment and Health Index, Stringency Index and the Economic Support Index impacted on stock market performances, and the study suggests that investors actually do not react positively on stringency and economic measures, instead they react with optimism to containment and health measures, especially when they regard the vaccine investments and policies (Cardillo, et al., 2022).

The research conducted by Helen Chiappini, Gianfranco Vento and Leonardo De Palma (2021), instead, found negative returns of sustainable indices to lockdown announcements and therefore it is possible that also fund returns may be affected negatively by the intensity of lockdown measures but positively by other measures.

As for the economic measures, this aspect is very controversial in the literature. Another study, that focuses only on the economic measures, claims that monetary policies reassure the markets and investors, instead fiscal policies potentially tend to increase uncertainty in the market (Heyden & Heyden, 2020).

We chose to see in an aggregate way how the overall response to Covid-19 impacted the fund market and returns, and we see that investors seem to regain trust when Governments responds severely with strict actions to the pandemic; however for future analyses, it may be meaningful to study separately the effects of the diverse kind of economic, containment and health measures on the funds returns.

Adding the covariates in order to understand the "ESG effect" we obtain the results shown in *Table 10:*

```
Panel: Random effects (RE)

N = 2620  n = 20  T = 131 (Balanced panel)
R-squared = 0.16490    Adj R-squared = -114.11202
Wald Chi2(7) = 2596.475649 p-value = 0.0000
RSS = 34844.837701 ESS = 11715.815061 TSS = 46560.652762
Standard errors robust to heteroskedasticity adjusted for 20 clusters


----------------------------------------------------------------------
         Y_P |  Coefficient   Rob.Std.Err     z-stat      p-value
----------------------------------------------------------------------
      X1 t-1 |    -7.113659      0.474650    -14.9872    0.000 ***
      X2t-1  |     0.109562      0.006518     16.8098    0.000 ***
    Mkt_Rf_P |    -1.941192      0.101088    -19.2029    0.000 ***
       SMB_P |    11.878367      5.598435      2.1217    0.034 **
       HML_P |  4301.333038    656.488152      6.5520    0.000 ***
  X1t-1*d_ESG |     3.172247      0.495844      6.3977    0.000 ***
  X2t-1*d_ESG |    -0.006442      0.001090     -5.9114    0.000 ***
       CONST |    -5.960251      0.402174    -14.8201    0.000 ***
----------------------------------------------------------------------
sigma_mu = 0.000000      rho_mu = 0.000000
 sigma_v = 3.663076     sigma_1 = 0.084000
   theta = 0.000000
----------------------------------------------------------------------
```

Source: author's elaboration

By adding these interactions, we see that the coefficient β_1 is even more negative, instead β_2 is slightly higher than the β_2 of the precedent regression.

As for β_3 and β_4, which are the coefficients of X1$_{t-1}$*d_ESG and X2$_{t-1}$*d_ESG, the first one has a positive sign, whereas the second one is negative.

Focusing on the first coefficient β_3, it means that low ESG rated funds returns were more affected by Covid-19 spreading (X1) with respect to high ESG rated funds, in fact a fund with a high ESG score has a β_1 that increase by 3.17 points more than a low-ESG-rated fund.

The effect is still negative, suggesting that in any case Covid-19 spreading had a negative impact on funds returns also for high-ESG-rated funds, however the "ESG effect" contributed to obtain a more contained reduction of funds returns.

The fact that high ESG rated funds returns are more resilient with respect to low ESG rated funds during the pandemic is supported by most of the literature, that defines the sustainable funds as being more able to sustain crisis with respect to conventional funds (Omura, et al., 2021). However, there are also some contributes that found controversial results, such as Bae

et al. (2021) that studied stock markets returns and found no evidence that corporate social responsibility affects returns during the pandemic.

Nevertheless, the majority of the literature seems to indicate that the "ESG effect" of stocks, rather than funds, is a competitive advantage and it has a positive effect on the performance of financial instruments. Garel and Petit-Romec (2021) and Albuquerque et al. (2020), for example, found that more sustainable firms (with high ESG scores) are likely to experience lower volatility and better stock returns (Cardillo, et al., 2022). In addition, Abate et al. (2021), analyzing only European funds, showed that SRI funds outperformed during Covid-19 the conventional ones (Pisani & Russo, 2021).

Thus, in general, we can define the ESG portfolios to be "less turbulent" with respect to conventional cones.

As regards the β_4 , the coefficient of X2$_{t-1}$*d_ESG which is the $X_{2\,zt-1} * d_i$ of equation (1), meaning the interaction between the Government Response Tracker Index and the dummy identifying if the fund is high ESG rated or not, it is, instead, negative.

Furthermore, by looking at *Figure 16*, we expected to see that low ESG rated funds returns have been more positively affected by the measures to contrast the pandemic, more than the high ESG rated funds returns did.

This has been confirmed by this regression, as the negative coefficient indicates that the high-ESG-rated fund returns increase their returns less as the Governments Response Tracker index increases with respect to low-ESG-rated funds. However, the coefficient is very low, -0,006, so the difference is minimal.

This may be a consequence of the fact that as the lower ESG rated funds lost more of their values during the pandemic, consequently they are the ones who benefit more from the measures trying to prevent the spreading of the virus.

4.3.3.7 Tests

In order to test the significance of the regression, we computed the Lagrange multiplier test for first-order serially correlated errors and random effects, that Baltagi and Li (2021) proposed, to test the serial correlation and the presence of individual random effects. We tested the null hypothesis of no serial correlation and no random individual effects. And as the p-value is $< 0,05$ we reject the null, therefore serial correlation and individual random effects are present in our model. In fact, we computed the robust standard errors, robust also to heteroskedasticity.

Moreover, we test the multicollinearity. Multicollinearity takes place whenever there is correlation between two or more independent variables. To understand if this is indeed the case, the VIF is calculated. The VIF is the Variance Inflation Factor that quantifies the inflation of the variance because of the collinearity of the regressors. As a rule, a VIF value greater than 10 indicates the presence of problematic multicollinearity; if it is greater than 1 and less than 10, as in our case, it means that the multicollinearity is present but not excessive, therefore it can be ignored.

4.3.3.8 Comparing FE and RE results

Table 11 - FE Regression

```
Panel: Fixed effects (within) (FE)

N = 2620  n = 20  T = 131 (Balanced panel)
R-squared = 0.16585    Adj R-squared = 0.15749
Wald F(7, 19) = 562.145463 p-value = 0.0000
RSS = 34793.204942 ESS = 11767.447820 TSS = 46560.652762
Standard errors robust to heteroskedasticity adjusted for 20 clusters


          -----------------------------------------------------------------
          Y_P |   Coefficient   Rob.Std.Err     t-stat     p-value
          -----------------------------------------------------------------
      X1 t-1 |     -6.488575      0.672471     -9.6489     0.000 ***
      X2 t-1 |      0.117139      0.007545     15.5251     0.000 ***
    Mkt_Rf_P |     -1.942525      0.101092    -19.2154     0.000 ***
       SMB_P |     11.888674      5.598577      2.1235     0.047 **
       HML_P |   4308.614135    661.041165      6.5179     0.000 ***
  X1t-1*d_ESG |      1.866997      0.882850      2.1147     0.048 **
  X2t-1*d_ESG |     -0.021554      0.008009     -2.6912     0.014 **
          -----------------------------------------------------------------
```

Source: author's elaboration

Table 12 - Hausman Test

```
Hausman's test of specification


     --------------------------------------------------------------------
     Varname |        A:FE          B:RE    Coef. Diff    S.E. Diff
     --------------------------------------------------------------------
      X1 t-1 |    -6.488575     -7.113659      0.625084     0.460626
      X2 t-1 |     0.117139      0.109562      0.007577     0.005056
    Mkt_Rf_P |    -1.942525     -1.941192     -0.001332     0.019888
       SMB_P |    11.888674     11.878367      0.010307     0.178660
       HML_P |  4308.614135   4301.333038      7.281097    70.903494
  X1t-1*d_ESG |     1.866997      3.172247     -1.305250     0.908242
  X2t-1*d_ESG |    -0.021554     -0.006442     -0.015112     0.010048
     --------------------------------------------------------------------
A is consistent under H0 and H1 (A = FE)
B is consistent under H0       (B = RE)
H0: coef(A) - coef(B)  = 0
H1: coef(A) - coef(B) != 0
     H = 2.495012 ~ Chi2(7)
p-value = 0.9275
```

Source: author's elaboration

In *Table 11* we repeated the analysis with the Fixed Effects (also called Within Group Estimator).

We can see that in general all estimates are still statistically significant, at a minimum 95% confidence level.

Instead, in *Table 12* we report the Hausman Test with the indication of the coefficients obtained with both methods.

We need to remind that FE differs from RE because it is constructed on the basis of different assumptions. The main difference among RE and FE is that FE does not require uncorrelation between unobserved variables and the observed ones, however this comes with a cost: with FE we cannot estimate time-invariant variables, which can be estimated with Random Effects, whose estimate tend however to be more biased even if with smaller standard errors (Williams, 2018).

Indeed, we expect that the standard errors are higher with the FE estimator compared to RE estimator, meaning that it is expected to have higher t-statistics and higher confidence intervals. This is the case of our results, both of non-robust standard errors and robust standard errors. In fact, as we've already written, RE is the most efficient estimator and, as also shown by the p-value of the Hausman Test of our model, RE is the preferred method.

Despite this, since most of the regressors only vary over time and do not differ from one fund to another, the within variability is much higher than between variability, thus the estimates between FE and RE do not differ a lot.

Returning to *Table 11* and on the difference of the coefficients of *Table 12*, as for the coefficient of X1 *t-1*, we can see that with FE it is lower, in absolute value, with respect to RE, suggesting that the effect of Covid-19 spreading has a lower impact on IFs returns, both high-ESG-rated and those low-ESG-rated.

In addition to that, the "ESG effect" is lower, captured by the coefficient of X1*t-1**d_ESG. This means that the fact that the fund has an elevate ESG score affects the funds returns in a weaker way, computing the estimates with Fixed Effects. Therefore, the "resiliency" of ESG funds to Covid-19 recession appears to be lower with FE.

As regards the coefficient of X2 *t-1*, it's slightly higher than the coefficient computed with RE, and this suggests that the effect of the health, containment and economic measures on fund's returns is higher for low-ESG-rated funds compared to high-ESG-rated ones.

The coefficient of the interaction between X2*t-1* and the dummy in this case shows instead that the fact that the fund is a high-ESG-rated fund reduce, even more with FE compared to

RE, the positive effect of X2, as the coefficient is more negative compared to the RE regression.

Despite these considerations, with the Hausman Test and the Breusch Pagan's LM Test we came to the conclusion that RE is the best methodology for our data and therefore produce the most reliable estimates.

In any case, with any of the two methods, we arrive to the same key finding, which is the fact that the pandemic spreading, measured by the number of confirmed cases divided by the population of the geographic area considered, had a negative effect on funds' returns, whereas the strength of the response of the Governments to the pandemic instead has had a positive impact on the returns.

The "ESG effect", on the other hand, shows that the positive impact of the Governments measures is slightly lower for ESG fund's returns compared to conventional funds, but in a very low measure; instead the "ESG effect" becomes very relevant, when we consider the negative impact of the Covid-19 diffusion, in the sense that if the fund is a high-ESG-rated fund its returns are substantially less affected by the impact of the pandemic, suggesting that ESG funds are more resilient to Covid-19 rather than low-ESG-rated funds.

CONCLUSIONS

The study conducted in this thesis tries to contribute to the recent literature regarding the effects of Covid-19 in the short and medium term and its interactions with financial markets, specifically with the fund market. The results are in favor to the sustainability market, in the sense that from the research it resulted that sustainable funds react better to the crisis than conventional funds, showing their ability to face market shocks.

Main findings

The results of the regression model show that Covid-19 had a negative impact on the returns of investment funds.

Returns of IFs and their ability to remunerate more with respect to the risk-free rate have been deeply impacted by the pandemic, and despite various aids and supports, the effects of Covid in the market still remain evident, as the majority of funds returns keep being lower than their pre pandemic levels.

The spreading of the contagion and all the relative consequences caused panic and uncertainty in the fund market that had a reflection in the prices and therefore in the returns.

By conducting multiple regressions, we were able to conclude that high ESG rated funds were more resilient than low ESG rated funds during the pandemic, being capable to contain more the decrease in their values.
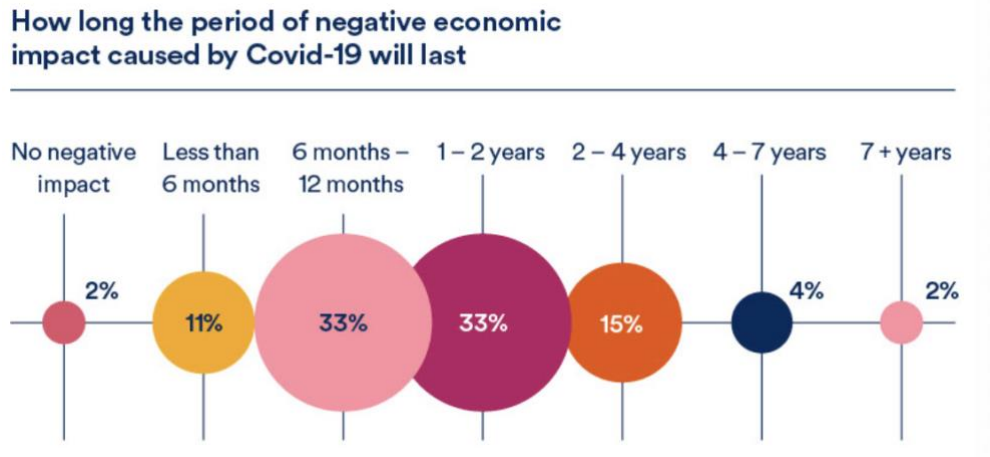
In summary, investment funds with a high ESG scores can also be seen as an insurance against unexpected risks, showing high level of resiliency.

However, the majority of funds analyzed didn't recover completely, being still below the initial values of January/starting of February 2020.

It's almost impossible to say how long the impact of Covid will last; an article of Schroders (2020) suggests that still after 7 years we may feel the effects of the pandemic, as shown in *Figure 39,* that indicates the duration of the economic consequences caused by the pandemic.

Those economic consequences, namely the Covid-19 recession, GDP reduction and so on, as analyzed in the previous chapters, imply also effects on financial markets.

Figure 39 - Covid Impact Duration

How long the period of negative economic impact caused by Covid-19 will last

No negative impact	Less than 6 months	6 months – 12 months	1 – 2 years	2 – 4 years	4 – 7 years	7 + years
2%	11%	33%	33%	15%	4%	2%

Source: (Dyson, 2020)

This denotes that the impacts of this crisis do not limit to the Covid outbreak and will last for more years ahead, affecting all the macroeconomic variables we analyzed in chapter 2 and also the fund market analyzed in chapter 2 and 4.

Moreover, pandemic effects may be aggravated by additional factors, such as the geopolitical instability and conflicts, that reduce even more the optimism in the market.

The model applied in this thesis has highlighted that the trend of sustainability is able to resist crises and it's a trend that is expected to persist in the fund market. The sustainability sector is indeed a segment in which more and more investors are deciding to invest their savings, because, as our study tries to show, it is a good way to protect themselves from market volatility and it continues to have good future growth prospects, as put on evidence by the development of the last years.

Limitations of the model and suggestions for further research

One of the limits of the model is that only few funds have been analyzed and only those domiciliated in EU and USA have been considered. This was decided because we wanted to study the top 10 funds with the highest ESG scores versus the 10 funds with lowest ESG scores; it could be meaningful to analyze more funds and not just the two extremes. It could be analyzed a wider dataset of information that refer also to further countries in order to see if the same results are valid also when other domiciles are considered.

Another limit is that the OxCGRT regressor includes all the measures undertaken by Governments aimed at contrasting the virus; however investors, as pointed out previously, may have reacted differently depending on which measure has been promoted; in fact, whether it was a lockdown or a strict vaccine policy, rather than an intense economic support program; the impacts on the returns may have been different, as analyzed by other studies, such as Cardillo et al. for stock market returns.

Lastly, for further analyses, it might be meaningful to consider other specific funds' characteristics, such as the level of liquidity or the pre-pandemic performance, that influence the future funds returns, as we observed in the Affinito and Santioni research (2021). Indeed, it may be possible that those funds with a high ESG score are also those funds that had a better performance during the pre-Covid period; in that case it would be necessary to consider this aspect in order to exclude potential self-selection biases.

Implications

Understanding the fund market trends and which funds are more resilient to crisis could be highly benefitting for every individual that wants to participate in the financial market, as it helps them taking better financial decisions and leads them to better judgement, advice and thus better end-results.

This thesis suggests that funds with higher ESG scores should be preferred to lower ESG rated funds; therefore it incentivizes the sustainable movement, not only ideologically, but also economically as in the longer term it is able to produce more profits and it is less subject to volatility in the market, that, as Covid-19 clearly showed, can exacerbate in any moment in a total unexpected way.

References

Affinito, M. & Santioni, R., 2021. *When the panic broke out: Covid-19 and investment funds' portfolio rebalancing around the world,* Rome: Banca d'Italia.

Akihiro, O., Roca, E. & Miwa, N., 2021. *Does responsible investing pay during economic downturns: Evidence from the COVID-19 pandemic,* Chicago: Finance Research Letters,.

Álvarez, Inmaculada C.; Barbero, Javier and Zofío, José L., 2017. *A Panel Data Toolbox for MATLAB. Journal of Statistical Software*. [Online]
Available at: http://dx.doi.org/10.18637/jss.v076.i06.
[Accessed 20/07/2022].

ANON., 2020. *Economia degli Intermediari Finanziari.* Torino: ISEDI.

Athanikar, M., 2021. *4 things to understand about Credit Spread.* [Online]
Available at: https://www.morningstar.in/posts/65065/4-things-understand-credit-spread.aspx#:~:text=Credit%20spread%20is%20the%20excess,relative%20to%20another%20risky%20security.
[Accessed 20/06/2022].

Auditors, E. C. o., 2022. *Investment funds,* Luxembourg: Publications Office of the EU.

Balkhi, F., Nasir, A., Zehra, A. & Riaz, R., 2020. *Psychological and Behavioral Response to the Coronavirus (COVID-19) Pandemic,* Karachi, Sindh, Pakistan: Cureus.

Banca d'Italia, 2021. *When the panic broke out: Covid-19 and investment funds' portfolio rebalancing around the world,* Roma: Banca d'Italia.

Bank of Japan, 2021. Statement on Monetary Policy.

Banque de France, 2020. *Les mesures de politique monétaire pendant la première phase de la crise de la Covid-19,* Paris: Banque de France.

Basile, I., Ferrari, P. & Abate, G., 2021. *The level of sustainability and mutual fund performance in Europe: An empirical analysis using ESG ratings,* Milan: Wiley Online Library.

Bioy, H., 2021. *Sustainable Funds' Record-Breaking Year.* [Online]
Available at: https://www.morningstar.co.uk/uk/news/209411/sustainable-funds-record-breaking-year.aspx#:~:text=The%20record%20number%20of%20fund,sustainable%20funds%20to%203%2C196%20funds.
[Accessed 01/07/2022].

BNP Paribas, 2020. *Hedge funds and ESG,* Paris: BNP Paribas.

Boffo, R. & Palatano, R., 2020. *ESG Investing: Practices, Progress and Challenges,* Paris: OECD Paris.

Boston Institute of Finance, 2006. *Mutual Fund Industry Handbook.* 1st Edition ed. Boston: Boston Institute of Finance.

Brown, M., 2019. *Are European Stocks Really Less Volatile? Or Are Correlations Driving Volatility Lower?.* [Online]
Available at: https://qontigo.com/are-european-stocks-really-less-volatile-or-are-correlations-driving-volatility-lower/
[Accessed 10/08/2022].

Cardillo, G., Bendinelli, E. & Torluccio, G., 2022. *COVID-19, ESG investing, and the resilience of more sustainable stocks: Evidence from European firms,* Forli: Wiley.

CEIC, 2020. *COVID-19 Impact: Global Commodity Prices.* [Online]
Available at: https://info.ceicdata.com/covid-19-impact-global-commodity-prices
[Accessed 22 06 2022].

Cenname, A., 2022. *Investing in real estate during COVID-19? Here's everything you need to know.* [Online]
Available at: https://www.jpmorgan.com/wealth-management/wealth-partners/insights/investing-in-real-estate-during-covid-19-heres-everything-you-need-to-know
[Accessed 28/06/2022].

CFI, 2022. *Master-Feeder Structure.* [Online]
Available at: https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/master-feeder-structure/
[Accessed 29/04/2022].

CFI, 2022. *Master-Feeder Structure.* [Online]
Available at: https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/master-feeder-structure/
[Accessed 03/05/2022].

Chiappini, H., Vento, G. & De Palma, L., 2021. *The Impact of COVID-19 Lockdowns on Sustainable Indexes,* Basel: MDPI.

CNBC, 2021. Jobless claims jump, hitting highest level since mid-August. *CNBC*, 15 October, p. 1.

CONSOB, 2020. *LA PANDEMIA DI COVID-19 E LA CRISI DEL 2020.* [Online]
Available at: https://www.consob.it/web/investor-education/crisi-covid-19#:~:text=La%20crisi%20connessa%20alla%20diffusione,in%20varie%20aree%20del%20

mondo.

[Accessed 20/06/2022].

DATABASE, 2021. *Share of Gross Domestic Product (GDP) lost as a result of the coronavirus pandemic (COVID-19) in 2020, by economy,* online: statista.

DATABASE, 2022. *Official Bank Rate history,* London: Bank of England.

DTCC, 2021. *COVID-19: IMPACT AND IMPLICATIONS FOR FINANCIAL MARKET INFRASTRUCTURES,* New York City: DTCC.

Dyson, R., 2020. *Market shock: how did investors react to the impact of Covid-19?,* London: Schroders.

ECB, 2009. *Euro area investment fund statistics (other than money market funds),* Frankfurt am Main: ECB.

ECB, 2013. *REGULATION OF ECB 1073/2013.* [Online].

ECB, 2017. *Manual on investment fund statistics,* Frankfurt am Main: ECB.

ECB, 2020. *The suspensions of redemptions during the COVID-19 crisis – a case for pre-emptive liquidity measures?.* [Online]
Available at: https://www.ecb.europa.eu/pub/financial-stability/macroprudential-bulletin/html/ecb.mpbu202104_3~a7ddbf0d16.en.html
[Accessed 17/08/2022].

ECB, 2021. *ECB Economic Bulletin, Issue 5/2021,* Frankfurt am Marin: ECB.

ECB, 2021. *Rotation towards normality – the impact of COVID-19 vaccine-related news on global financial markets.* [Online]
Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2021/html/ecb.ebbox202101_02~f0960a5b38.en.html
[Accessed 24/06/2022].

ECB, 2021. *Rotation towards normality – the impact of COVID-19 vaccine-related news on global financial markets,* Frankfurt am Main: ECB.

ECB, 2021. *The ECB's policy response to the COVID-19 pandemic,* Frankfurt am Main: ECB.

ECB, 2022. *The role of credit risk in recent global corporate bond valuations.* [Online]
Available at: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202202_02~c4d8d57172.en.html
[Accessed 20/06/2022].

EFAMA, 2020. *International Statistics Q1 2020 | Large drop in worldwide investment fund assets in Q1 2020 against the backdrop of large net inflows.* [Online]
Available at: https://www.efama.org/newsroom/news/international-statistics-q1-2020-large-

drop-worldwide-investment-fund-assets-q1-2020

[Accessed 02/07/2022].

EFAMA, 2022. *Fact Book 2022,* Brussels: European Fund Asset Management Association.

EFAMA, 2022. *Key industry statistics.* [Online]

Available at: https://www.efama.org/

[Accessed 03/07/2022].

EFAMA, 2022. *The role of asset management.* [Online]

Available at: https://www.efama.org/about-our-industry/role-asset-

management#:~:text=The%20core%20mission%20of%20an,of%20funding%20for%20their%

20business.

[Accessed 14/05/2022].

ESMA, 2022. *Directive 2009/65/EC.* [Online]

Available at: https://www.esma.europa.eu/databases-library/interactive-single-rulebook/clone-

ucits/article-58

[Accessed 23/05/2022].

EU, 2015. *Regulation EU 2015/760,* s.l.: EU.

European Commission, 2022. *Investment funds.* [Online]

Available at: https://ec.europa.eu/info/business-economy-euro/growth-and-

investment/investment-

funds_it#:~:text=Investment%20funds%20are%20investment%20products,stocks%2C%20bo

nds%20and%20other%20securities.

[Accessed 26/04/2022].

European Union, 2022. *Investment Funds: EU actions have not yet created a true single

market benefiting investors,* Brussels: Official Journal of the European Union.

EY, 2021. *Investment Funds: shifted priorities in the post-pandemic growth.* [Online]

Available at: https://www.ey.com/en_lu/news/2021/10/investment-funds--shifted-priorities-

in-the-post-pandemic-growth

[Accessed 03/07/2022].

F.Jarvis, W., 2015. *Understanding the Cost of Investment Management,* Wilton, CT:

commonfund institute.

Falk, G., Romero, P., Nicchitta, I. & Nyhof, E., 2021. *Unemployment Rates During the

COVID-19 Pandemic,* Washington, D.C.: Congressional Research Service.

Fidelity Learning Center, 2022. [Online]

Available at: https://www.fidelity.com/learning-center/investment-products/mutual-

funds/what-are-mutual-funds

[Accessed 19/05/2022].

Fitch Ratings, 2022. *Inflation Lowers Government Debt Ratios.* [Online]

Available at: https://www.fitchratings.com/research/sovereigns/inflation-lowers-government-debt-ratios-16-02-2022-1#:~:text=Annual%20average%20inflation%20is%20forecast,in%20more%20than%2020%20years.

[Accessed 20/06/2022].

Fontana, R., 2021. *Impact of Covid-19 Announcements on Financial Markets,* Graz, Steiermark, Austria: iason.

FTSE Russell, 2021. *FTSE MIB Index,* London: FTSE Russell.

FUND ASSETS AND FLOWS, Toronto: International Investment Fund Association.

Goldstein, I., Koijen, R. S. J. & Mueller, H. M., 2021. COVID-19 and Its Impact on Financial Markets and the Real Economy. *The Review of Financial Studies,* 03 August, 34(11), pp. 5135-5148.

Gremillion, L., 2005. *Mutual Fund Industry Handbook.* Hoboken, New Jersey.: John Wiley & Sons, Inc..

Hens, T. & Benli, V. F., 2021. *BEHAVIORAL FINANCE IN THE ERA OF COVID-19.* Instanbul, PressAcademia , pp. 106-107.

Heyden, K. & Heyden, T., 2020. Market reactions to the arrival and containment of COVID-19: An event study. *National Center for Biotechnology Information*, 02 09, p. 38.

Himanshu, Ritika, Mushir, N. & Suryavanshi , R., 2021. *Impact of COVID-19 on portfolio allocation decisions of individual investors,* New Delhi: National Library of Medicine.

Hirvonen, T., 2021. *BEHAVIOURAL FINANCE IN FINANCIAL CRISES: THE CASE OF COVID-19,* Aalto: Aalto University.

ICI, 2020. *The Impact of COVID-19 on Economies and Financial Markets,* Washington D.C.: ICI.

ICI, 2022. *Fact Book,* Washington, DC: ICI.

IMF, 2006. *Financial Soundness Indicators: compilation guide,* Washington D.C.: International Monetary Fund.

IMF, 2020. *World Economic Outlook,* Washington D.C.: IMF.

International Investment Fund Association, 2019. *WORLDWIDE REGULATED OPEN-END*

Invest Europe, 2016. *Guide to Private Equity and Venture Capital for Pension Funds,* Brussels, Belgium: Invest Europe.

Irish Funds, 2018. *IRELAND – EUROPE'S CENTRE OF EXCELLENCE FOR EXCHANGE TRADED FUNDS,* Dublin: irish Funds.

Jabeen, S. et al., 2022. COVID and World Stock Markets: A Comprehensive Discussion. *frontiers in Psychology,* 52(Retrospective Repercussions of COVID-19: Building Bridges Towards Global Prosperity of Stakeholders), pp. 1-16.

Kaissar, N., 2021. *The Era of Mutual Funds Is Dying. Long Live ETFs.* [Online]
Available at: https://www.bloomberg.com/opinion/articles/2021-10-11/personal-finance-era-of-expensive-mutual-funds-is-dying-long-live-etfs
[Accessed 22/05/2022].

Kozlowski, J., Faria e Castro, M. & Ebsim, M., 2021. *Credit Spreads during the Financial Crisis and COVID-19.* [Online]
Available at: https://www.stlouisfed.org/on-the-economy/2021/february/credit-spreads-financial-crisis-covid19
[Accessed 21/06/2022].

KPMG, 2020. *Fund structuring: beyond just theories,* Singapore: KPMG.

Lane, R. P., 2021. *La dinamica dell'inflazione durante la pandemia.* [Online]
Available at:
https://www.ecb.europa.eu/press/blog/date/2021/html/ecb.blog210401~6407b23d87.it.html
[Accessed 21/06/2022].

Lhabitant, F.-S., 2006. *Handbook of hedge funds.* Chichester (England): John Wiley&Sons, Ltd.

Mahmoud, O. & Meyer, J., 2020. *The Anatomy of Sustainability,* Zurich: SSRN.

McKinsey, 2021. *COVID-19 and education: The lingering effects of unfinished learning.* [Online]
Available at: https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning
[Accessed 12/06/2022].

Mendes, V. & Pereira Silva, P., 2021. *The Investor in ESG Mutual Funds,* s.l.: ResearchGate.

Obstfeld, M., 2022. *The International Financial System after COVID-19,* assachusetts Avenue, NW: Peterson Institute for International Economics.

Obstfeld, M., 2022. *The International Financial System after COVID-19,* assachusetts Avenue, NW: Peterson Institute for International Economics.

OECD, 2020. *Statistical Insights: How did the first wave of the COVID-19 pandemic affect the household sector and public finances?.* [Online]
Available at: https://www.oecd.org/sdd/na/statistical-insights-how-did-the-first-wave-of-the-

covid-19-pandemic-affect-the-household-sector-and-public-finances.htm
[Accessed 16/06/2022].

Olson, E., 2022. *'Sustainable' marketing mixes and the paradoxical consequences of good intentions,* Oslo: Journal of Business Research.

Omura, A., Roca, E. & Nakai, M., 2021. *Does responsible investing pay during economic downturns: Evidence from the COVID-19 pandemic ,* Chicago: Finance Research Letters.

Oxford University, 2022. *Covid-19: Stringency Index.* [Online]
Available at: https://ourworldindata.org/covid-stringency-index#:~:text=The%20stringency%20index%20is%20a,100%20(100%20%3D%20strictest).
[Accessed 24/07/2022].

Parveen, S. et al., 2021. *Examining investors' sentiments, behavioral biases and investment decisions during COVID-19 in the emerging stock market: a case of Pakistan stock market,* Attock, Pakistan: COMSATS University Islamabad.

Pastor, L. & Vorsatz, M. B., 2020. *MUTUAL FUND PERFORMANCE AND FLOWS DURING THE COVID-19 CRISIS,* Massachusetts: NATIONAL BUREAU OF ECONOMIC RESEARCH.

Peterson, O. & Thankom, A., 2020. *Spillover of COVID-19: impact on the Global Economy,* Munich: MPRA.

Pisani, F. & Russo, G., 2021. *Sustainable Finance and COVID-19: The Reaction of ESG Funds to the 2020 Crisis,* Rome: MDPI.

Pwc, 2018. [Online]
Available at: https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/sdg_reporting_2018.pdf

PwC, 2022. *The future of funds distribution in Asia.* [Online]
Available at: https://www.pwc.com/gx/en/industries/financial-services/asset-management/publications/asset-management-insights/set-for-growth/the-future-of-funds-distribution-in-asia.html
[Accessed 01/07/2022].

Qaisar, A. et al., 2021. *COVID-19 and dynamics of environmental awareness, sustainable consumption and social responsibility in Malaysia,* Bandar Seri Begawan: PubMed Central.

Refinitiv, 2020. *Refinitiv Lipper Fund ESG Scores,* New York: Refinitiv.

Regulation (EU) of the European Central Bank n. *1073/2013* of 18 October 2013 concerning statistics on the assets and liabilities of investment funds.

Regulation (EU) of the European Parliament and of the Council n. *760/2015* of 29 April 2015 on European long-term investment funds.

Rouwenhorst, K. G., 2004. *The Origins of Mutual Funds,* New Haven, CT: Yale School of Management.

Santioni, R. & Affinito, M., 2021. *When the panic broke out: Covid-19 and investment fund portfolio rebalancing around the world.* [Online]
Available at: https://voxeu.org/article/covid-19-and-investment-fund-portfolio-rebalancing
[Accessed 15/06/2022].

SEC, 2012. *Investor Bulletin - Hedge Funds,* Washington, D.C.: SEC.

SEC, 2013. *Investment Companies.* [Online]
Available at: https://www.sec.gov/fast-answers/answersmfinvcohtm.html
[Accessed 10/04/2022].

The Committee of European Securities Regulators, 2009. *Risk management principles for UCITS,* Paris: Esma.

Travia, G., 2021. *finaria.* [Online]
Available at: https://www.finaria.it/investire/robo-advisor-italia/

Tversy, A. & Kahneman, D., 1974. Judgment under Uncertainty: Heuristics and Biases. *Science AAAS*, 27 September, pp. 1124-1131.

UN Women, 2021. [Online]
Available at: https://www.unwomen.org/en/news/in-focus/women-and-the-sdgs/sdg-5-gender-equality

United Nations, 2021. *SDG Goals - End poverty in all its forms everywhere.* [Online]
Available at: https://www.un.org/sustainabledevelopment/poverty/
[Accessed 17/06/2022].

United Nations, 2021. *The rise of the sustainable fund market and its role in !nancing sustainable development,* Geneva: United Nations.

US Chamber of commerce foundation, 2016. *Understanding the Financial Inclusion Gender Gap.* [Online]
Available at: https://www.uschamberfoundation.org/blog/post/understanding-financial-inclusion-gender-gap

US Global Leadership Coalition, 2022. *COVID-19 BRIEF: Impact on Women and Girls.* [Online]
Available at: https://www.usglc.org/coronavirus/women-and-girls/#:~:text=The%20COVID%2D19%20pandemic%20has,that%20%E2%80%9Cas%20the%20impact%20of
[Accessed 18/06/2022].

Vasileiou , E., 2020. Behavioral finance and market efficiency in the time of the COVID-19 pandemic: does fear drive the market?. *International Review of Applied Economics*, 28 12, pp. 224-241.

WHO, 2020. *WHO Timeline - COVID - 19.* [Online]
Available at: https://www.who.int/news/item/27-04-2020-who-timeline---covid-19
[Accessed 10/06/2022].

Williams, R., 2018. *Fixed Effects vs Random Effects Models,* South Bend: University of Notre Dame.

World Bank, 2003. *The Global Growth of Mutual Funds,* Washington D.C.: World Bank.

World Bank, 2020. *Impact of COVID-19 on Commodity Markets Heaviest on Energy Prices; Lower Oil Demand Likely to Persist Beyond 2021.* [Online]
Available at: https://www.worldbank.org/en/news/press-release/2020/10/22/impact-of-covid-19-on-commodity-markets-heaviest-on-energy-prices-lower-oil-demand-likely-to-persist-beyond-2021
[Accessed 04/07/2022].

Xu, X., Xie, Y., Xiong, F. & Li, Y., 2022. *The Impact of COVID-19 on Investors' Investment Intention of Sustainability-Related Investment: Evidence from China,* Basel: MDPI.

Yeung, A., 2021. *Considerations for Asian and Chinese asset managers.* [Online]
Available at: https://www.ey.com/en_lu/financial-services/fund-distribution-in-europe---considerations--for-asian-and-chin
[Accessed 28/06/2022].

Yue, P., Korkmaz, A. & Zhou, H., 2020. Household Financial Decision Making Amidst the COVID-19 Pandemic. *Taylor & Francis Journals,* 56(Household Financial Decision Making Amidst the COVID-19 Pandemic), pp. 2363-2377.