American Journal of Economics and Business Administration

Original Research Paper

Equity Mutual Funds in Healthcare Sector: A Comparison of Performance and Risk Through an Age-Cohort Analysis

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Article history
Received: 05-10-2022
Revised: 18-10-2022
Accepted: 21-10-2022

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Abstract: Sustainable finance development led to the spread of some specific categories of equity funds based on a social vocation. Particularly, sustainable funds are portfolios of equities and/or bonds for which environmental, social and governance factors have been integrated into the investment process. Today these tools play an important role in the health sector. The aim is to offer an overview of the healthcare equity funds market through a comparison of their performance and risk. The research is developed through the collecting and re-elaborating of a data set of 269 healthcare equity funds all over the world published on Morningstar on November 30th, 2021. The study uses a multi-disciplinary approach, first, by calculation and comparison of performances and volatility measurements, then, by a cohort analysis to put in evidence the value of some parameters of the cohort of funds in the period 1998-2021. Results of the study show that the investors' attention to the healthcare sector has spread, especially in recent years, offering some reflections.

Keywords: Sustainable Finance, Healthcare, Equity Mutual Funds, Age-Cohort Analysis
JEL Classification: G11, G20, G21

Introduction

The health crisis caused by the COVID-19 pandemic has had sudden economic, financial, and social repercussions all over the world. All countries are committed to alleviating the negative impacts of the crisis and relaunching growth: this phase represents an opportunity to re-establish the economy and to encourage a model of finance for sustainable development.

The need to consider the sustainability and the ethic at the base of economic and financial behaviors and the necessity to combine the logic of profit with social and solidarity purposes are grown, too (Battini, 2000; Capriglione, 2004; Rothschild, 1993; Sen, 1987; Signori *et al*., 2005).

Particularly, the interest in the spread of ethically sustainable finance, that considers economic development together with social responsibility has led to the creation of a "dedicated" financial segment (environmental, healthcare, culture, etc.).

Investor strategies were generally focused on climate change and the environment, but also took into consideration social issues and, recently, more closely related to the health sector.

Indeed, investments that integrate Environmental Social, and Governance (ESG) considerations have acquired further centrality in the financial markets following the Covid-19 health crisis. Actions to address and overcome the COVID-19 pandemic have also contributed to the diffusion and enhancement of sustainable investments. Many countries encourage domestic and foreign investment in the health sector in response to the pandemic (United Nations, 2021).

In this perspective, the interest of the financial system in supporting the health sector arises from the fact that it is characterized by low volatility, the presence of companies with a robust capital situation, and the highest innovation coefficients in the adoption of advanced technologies and digitization. The defensive nature of this sector made it possible to limit the drawdown and allowed it to outperform the global markets. All this has allowed the health sector to grow steadily over time.

Investors have grasped the solid return potential present in the health sector, as well as the opportunity to make investments in companies with sustainable businesses and at the forefront of change. Indeed, investors are increasingly aimed at supporting the well-being and health of people as fundamental resources for society and the economy. In this perspective, the role of finance in supporting the commitment in terms of the sustainability of a company or organization operating in the health sector is relevant.

The study aims to offer an overview of the healthcare equity funds market through a comparison of their

performance and risk. The research is developed through the collecting and re-elaborating of a data set of 269 healthcare funds all over the world published on Morningstar (2021).

The study uses a multi-disciplinary approach and it was run on November 30, 2021, first, by calculation and comparison of performances and volatility measurements, then, by a cohort analysis to put in evidence the value of some parameters (annual return, risk, modern portfolio theory, and portfolio geographical distribution) of the cohort of funds in the period of 1998-2021.

Literature Review

In recent decades, the financial system is considered an engine and promoter of finance that contributes to sustainable development and allows for the maximization of economic results, environmental values, dignity, and human solidarity.

The financial activity, very often, had not been directed to the investment for the development of a territory and to the financing of economic activities that produce goods, services, and employment, but to the exclusive maximization of profit and efficiency.

The financial system becomes a "supporter" of development capable of guaranteeing the rational use of resources over time.

Already, in 1972, the Stockholm United Nations Conference on the Human Environment affirmed the imperative goal for humanity to defend and improve the environment for present and future generations, to ensure peace and social and economic world development.

The concept of "sustainable development" is therefore affirmed, which identifies a growth that aims to satisfy the need of the present generations without however compromising the ability to create a part of the future value.

The World Commission on Environment and Development WCED (1987) defines sustainable development as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional changes are made consistent with future as well as present needs" (WCED, 1987 p. 27).

In this regard, the concept of finance joins the concept of sustainable development and thus defines "sustainable finance" which represents a sector of ethical finance specialized in ethical investments in favor of sustainable development.

According to the European Commission, sustainable finance refers to "the process of taking due account of environmental and social considerations in investment decision-making, leading to increased investments in longer-term and sustainable activities" (European Commission, 2018 p. 2).

Sustainable finance deals with investing in those economic activities that respect sustainability requirements, or financing those productive investments able to protect the right of future generations to benefit from current social, environmental, and economic resources. Therefore, it has the objective of creating value in the long term, financing those activities that not only generate an economic surplus but that are-at the same time - capable of promoting local development, environmental protection, health, employment, financial and social inclusion.

The consensus towards sustainable finance has certainly grown in recent years and its inspiring principles take on greater value in the context of the restructuring of the financial and social system, such as the current one.

The challenge of sustainable development requires a strategic and organized effort from the financial sector operators, which radically corrects the current attitude towards the environment, people, and society.

Particularly, sustainable finance creates new mechanisms and tools to integrate into traditional ones (Baker, 2018; Bos, 2017; Fatemi *et al*., 2018).

The availability of appropriate financial tools may become a key aspect of this new vision. Sustainable investment has grown in importance over the last several years. Consequently, sustainable investment behavior has attracted increased attention from academics (Barber *et al*., 2021; Ceccarelli *et al*., 2022; Hartzmark and Sussman, 2019; Krüger, 2015; Riedl and Smeets, 2017).

A large part of global asset owners is currently implementing or evaluating Environmental, Social, and Governance (ESG) considerations in their investment strategy. There is furthermore evidence that points to increased investor interest in social sustainability (Bauer *et al*., 2021; Dyck *et al*., 2019; Friede *et al*., 2015; Riedl and Smeets, 2017).

A Morningstar study on about 4,900 funds that are domiciled in Europe, 745 of which are sustainable and across seven of the most popular categories, such as Global Large-Cap Blend Equity, US Large-Cap Blend Equity, EUR corporate bond, demonstrate that in the decade 2009-2019, 59% of sustainable funds recorded better performances than the correspondents that do not integrate sustainability considerations (Bioy, 2020).

The research found that success rates are superior in all categories examined, except that of global large-cap growth equities.

In addition, success rates to 10-Year are highest for US large-cap blend equity (81.3%), while they are very low for corporate bonds in euros (33.3%) (Table 1).

Sustainable funds performed better than traditional funds even during the sharp decline in prices generated by fears over the COVID-19 pandemic.

Success rates are higher in all categories reviewed, except for Fund Global Large-cap Growth Equities (Table 2).

About 72% of the sub-funds launched ten years ago still exist today against 45.9% of the instruments that do not integrate ESG criteria in the construction of the portfolio. Among Equities with a focus on the Eurozone, the percentage exceeds 90% for sustainable products against 42.9% for others. The category that has been most

affected by the closures of ESG funds is that of global large-cap blend equities (52.2%), which is also the most numerous.

Even in the US market, despite a very volatile environment, available ESG funds recorded below-average losses in the first three months of 2020, when the stock markets collapsed following the explosion of the pandemic, and also outperformed during the second quarter, when the prices rebounded.

These consensuses in favor of sustainable investments demonstrate that ESG funds are not only an ethical choice but also an economic convenience.

Sustainable funds performed better than traditional funds during the steep drop in prices generated by fears over the COVID-19 pandemic. In this context, Morningstar estimated net positive flows (+$45.6 billion) in sustainable funds globally in the first quarter of 2020, against net redemptions of $384.7 billion from traditional instruments. Europe is confirmed as the most sensitive region on ESG issues, capturing 72.5% of total funding. The United States follows with 23%. These findings show how the demand for sustainable financial products grew in the volatility phase that affected the markets in the early months of 2020 (Bioy, 2020).

A growing number of research analyzes and opinions expressed by market operators foreshadows a further consolidation of this trend in the medium to long term. According to a survey conducted in Europe by Greenwich Associates with the support of BNP Paribas Asset Management, 81% of respondents take ESG criteria in managing all or part of their portfolio, while a further 16% plan to do so.

The main reasons given are a positive impact on society or the environment (80%), risk reduction (58%), and satisfying the needs of stakeholders (47%).

In the current context, considering the COVID-19 crisis, the attention to these forms of investment is even more evident, which is not only linked to the best performance recorded compared to other alternative financial investments but above all is related to an emotional component. In particular, awareness of a new economic and financial vision more focused on health protection as an inseparable factor from respect for the environment is growing.

Many sustainable funds are investing in the healthcare sector. The goal is mainly capital appreciation through global investments in equity securities of companies operating in the healthcare and scientific sectors.

Healthcare was the best sector of 2020, confirming its resilience in phases of market volatility. Since the beginning of the year, the Morningstar Global Healthcare index has gained 4.14% against -4.9% in the Global markets' basket (+17% and +2%, respectively, in the last 12 months). Two aspects are boosting the healthcare sector. First, many companies are carrying out promising research to cure some diseases. Secondly, in a period characterized by the uncertainties of the Coronavirus, the stocks in the health sector are expressing their nature as a defensive asset offering long-term growth prospects.

Table 1: Sustainable Funds Success Rates by Morningstar Category
Table shows success rates over the past one, three, five, and 10 years through December 2019. To calculate success rates, it uses a composite of traditional fund returns and counts the number of sustainable fund returns that rank higher than this composite

Category	1-Year Success Rate (%)	3-Year Success Rate (%)	5-Year Success Rate (%)	10-Year Success Rate (%)
Global large-cap blend equity	75.1	73.7	76.9	67.3
Global large-cap growth equity	60.3	43.2	37.5	56.7
Global emerging markets equity	41.3	60.0	58.8	50.0
US large-cap blend equity	76.4	71.4	76.9	81.3
Europe large-cap blend equity	71.1	75.0	67.2	55.1
Eurozone large-cap equity	63.5	63.0	60.6	62.3
EUR corporate bond	58.0	58.5	62.2	33.3
All categories	65.6	65.6	64.4	58.8

Source: Bioy, 2020

Table 2: Sustainable Funds and Traditional Funds over the first quarter of 2020
Table compares average returns among the sustainable and traditional fund cohorts over the past one, during the coronavirus crisis (in the first quarter of 2020)

Category	Sustainable Funds		Traditional Funds		
	At beginning of the period	Average Returns (%)	At beginning of the period	Average Returns (%)	ESG Success Rate (%)
EAA Fund Global Large-Cap Blend Equity	250	-20.1	1,435	-22.1	74.0
EAA Fund Global Large-Cap Growth Equity	64	-16.6	308	-16.5	46.9
EAA Fund Global Emerging Markets Equity	76	-23.9	555	-25.0	65.8
EAA Fund US Large-Cap Blend Equity	66	-19.7	464	-20.2	65.2
EAA Fund Europe Large-Cap Blend Equity	115	-21.1	607	-22.4	71.3
EAA Fund Eurozone Large-Cap Equity	93	-22.7	434	-24.5	65.6
EAA Fund EUR Corporate Bond	81	-6.3	336	-6.4	51.9

Source: Morningstar, own collection, 2020

DOI: 10.3844/ajebasp.2022.44.54

Data and Methodology

The study of the healthcare mutual funds market has been carried out by collecting and re-elaborating on a data set of funds published on Morningstar.

Specifically, the sample consists of 269 equity funds in the healthcare sector. The bond funds, or the fund with a portfolio consisting largely of securities issued by government agencies, are not considered because the application of ethical criteria in the selection of securities that are issued by governments is particularly uncertain.

The criteria defining States are considered to be generic (such as the absence of oppressive regimes and the protection of human rights) and the differences in portfolio composition may lead to marginal results and, therefore, not always it is easy to figure out what kind of projects will be funded with the proceeds derived from the placement of the State debt.

Healthcare funds show a good percentage compared to the total of equity sustainable funds (15.23%), second only to the technology sector (24, 58%) (Table 3).

The first characteristic of the sample regards the inception date, i.e., the date on which the fund began its operations. Specifically, it shows an increase in healthcare funds in the past twenty years; they passed from 73 in the decade 1998-2008 to 151 in the decade 2009-2019. In the period 2019-2021, during the pandemic period, the healthcare equity funds are respectively, 17 funds in 2019, 26 funds in 2020, and 19 in the first quarter of 2021 (Table 4).

The second characteristic of the sample concerns the country of domicile. Figure 1 shows a prevalence of the total of funds domiciled in Luxembourg (79.18%), followed by those domiciled in Ireland (19.7%), France (0.74%), and Austria (0.37%).

A further characteristic is an Ongoing charge which represents the costs you can reasonably expect to pay as an investor from one year to the next, under normal circumstances. Many investors will be used to looking most closely at the Annual Management Charge, but neither this charge nor the Ongoing Charge includes the performance fees incurred so neither is perfect. However, the Ongoing Charge does represent a more accurate cost of fund ownership as it encompasses the fund's professional fees, management fees, audit fees, and custody fees.

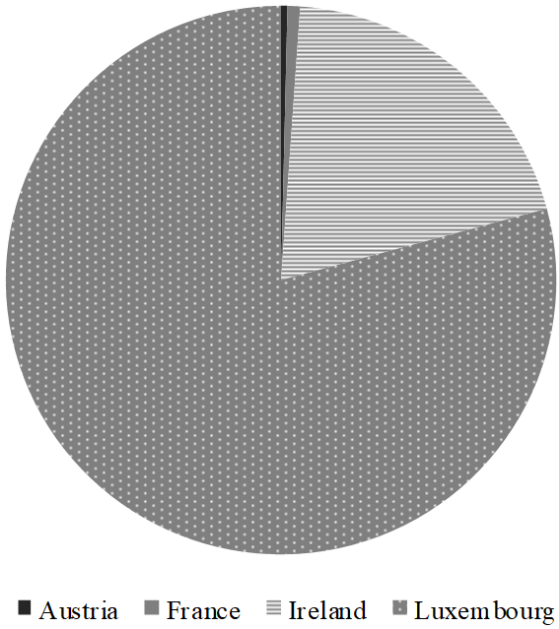

Fig. 1: Healthcare equity funds by country of domicile
Figure shows the country of domicile of 269 healthcare equity funds

Table 3: Equity Sustainable funds by sector
The table shows the number and the percentage compared to the total of the sector equity of the ESG funds of a data set of funds published on Morningstar on November 30, 2021

Category	Number	Percentage compared to the total
Agriculture	25	1.42
Alternative energy	45	2.55
Biotechnology	58	3.28
Communications	9	0.51
Consumer goods and services	142	8.04
Ecology	254	14.38
Energy	67	3.79
Financial services	68	3.85
Healthcare	269	15.23
Industrial materials	16	0.91
Infrastructure	170	9.63
Natural resource	79	4.47
Precious metals	70	3.96
Private equity	6	0.34
Technology	434	24.58
Water	54	3.06
Sustainable funds	1766	100.00

Table 4: Healthcare equity funds by inception date the table shows the date on which the 269 funds began their operations

Period	Number
2021 (First quarter)	19
2020	26
2019	17
2009-2019	151
1998-2008	73

Table 5: Descriptive statistics on Ongoing charge of healthcare equity funds
The table shows some statistical analysis (average, min, max, mode, quartile, etc.) on costs to pay, from one year to the next, under normal circumstances, on the 269 equity funds in the healthcare sector

	Value
Average	1.55
Min	0.06
Max	3.51
Mode	1.15
1° quartile	1.08
2° quartile	1.53
3° quartile	1.98
Skew	0.14

Table 5 shows some descriptive statistics referring to the Ongoing charge. Particularly, the average value is equal to 1.55%. However, the skew value is significant; it identifies a distribution that cannot be separated with a vertical axis into two equal mirror images. A positive indicator value indicates a skewness distribution extending towards more positive values.

From the methodological point of view, the study is conducted by calculation and comparison of performance and risk recorded by the sample of healthcare equity funds. First, the study offers a panorama of the performance and the determination of volatility measurements (Standard Deviation and Sharpe Ratio) of the sample. The performance shows how an investment has grown or fallen over a set period. Investors may compare the performance of funds with similar investment strategies. The Standard Deviation of fund returns measures how much fund total returns have fluctuated in the past. The Standard Deviation is expressed in percentage terms, just like the returns. The Sharpe Ratio is calculated by using Standard Deviation and excess return to determine the reward for a unit of risk. Secondarily, the study is developed through a cohort analysis to put in evidence the value of some parameters of the cohort of funds in the period 1998-2021. These parameters are the annual return (the performance of the fund over calendar year periods), the volatility measurements (Standard Deviation and Sharpe Ratio), the portfolio geographical distribution (the practice of diversifying an investment portfolio across different geographic regions to reduce the overall risk and improve returns on the portfolio) and the modern portfolio theory. These last parameters consist of three indicators. The R-squared is a percentage measure of fund movements that can be accounted for by changes in its benchmark index. The R-squared of 100 indicates that all movements of the fund are perfectly correlated with its benchmark. On the contrary, a low R-squared indicates that small movements of the fund can be explained by movements in its benchmark index. Beta is a measure of the volatility, or systematic risk, of a fund or portfolio, compared with the market as a whole.

The R-squared can be used to ascertain the significance of a particular Beta. Generally, a higher R-squared will indicate a more reliable Beta. If the R-squared is lower, then, Beta is less relevant than the performance of the funds. Alpha takes the volatility (price risk) of a fund and compares its risk-adjusted performance with a benchmark index. Alpha is also known as the residual return.

Performance of Healthcare Equity Funds

Equity healthcare funds register an average value of performance equal to 2.87% on November 30, 2021 (Table 6).

Furthermore, the current performance is not influenced by those of the past, but it depends on the discontinuous performance of the financial market and on the performance characteristics of the fund manager which are also irregular.

Considering a period of three years the performance is even higher and on average equal to 14.93%, while considering the five years past performance it is equal to 11.47% and in 10 years it is equal to 13.34%.

Table 6: Total returns of healthcare equity funds
Table indicates how well the 269 equity funds in the healthcare sector performed on November 30, 2021. The total return is the absolute return of the fund, expressed as a percentage, over the past one, three, five, and 10 years

	Performance %				
Category	YTD	1 Yr	3 Yr	5 Yr	10Yr
Healthcare	2.87	31.52	14.93	11.47	13.34

The Standard Deviation (3 Yr) is down and equal in average to 15.97% suggesting that the most of funds in this sector have low volatility of returns (between 11.80% and 17.03%) (Table 7).

This means that the returns of funds have no major variations concerning the average performance of the relative sector, hence the investor's risk to achieve different returns from those expected is lower.

The Sharpe Ratio is calculated by using Standard Deviation and excess return to determine the reward for a unit of risk. The higher the Sharpe Ratio, the better the fund´s historical risk-adjusted performance. The Sharpe ratio is calculated for the past 36-month period by dividing a fund´s excess returns by the Standard Deviation of a fund´s excess returns. The Sharpe Ratio has positive values for the healthcare sector (1.05) suggesting that funds of this sector have been able to achieve on average a higher return than a risk-free asset.

It is possible to evaluate variations of funds' monthly returns concerning the relative Morningstar category (Fig. 2). The Morningstar Rating is a backward-looking, quantitative, risk-adjusted measure of a fund's performance versus its peer group. In percentage terms, only a few funds have a high risk, the most of the funds of the sample have a variation in the monthly returns similar to the Morningstar category.

Morningstar introduced in March 2016 Morningstar Sustainability Rating. The Morningstar Sustainability Rating assesses how companies included in a fund's portfolio manage risks and opportunities associated with ESG factors; it allows a comparison among comparable funds or against a benchmark based on ESG criteria. Morningstar assigns the Sustainability Rating to all funds for which at least 50% of the holdings in the portfolio are covered by ESG reviews.

Funds in the sample mostly show an average rating or slightly lower than the average (Fig. 3).

Finally, we point out differences in average returns of healthcare equity funds concerning the portfolio composition. For each fund of the sample, we examine the geographical repartition considering that funds are distinguished and they depend on the area in which the assets are mainly invested.

Particularly, funds that invest more than 50% in Developed Europe have the highest returns equal to 4.95% (Table 8), on the contrary, funds that invest mainly in Asia - Emerging have negative returns equal to -0.03%. In addition, funds that invest mainly in the United States have a return 1 Yr equal to 32.04% (11.57% return 5 Yr), against funds investing mainly in Developed Europe have a return 1 Yr equal to 26.05% (6.61% return 5 Yr). Regarding the volatility measurements, the situation is almost similar: funds that invest mainly in Asia - Emerging, Developed Europe, and the United States, have a positive Sharpe Ratio value. Table 9 shows the annual returns of some healthcare equity funds for the benchmark and the category sector equity healthcare. Funds have been chosen regarding the inception date of the funds. In particular, the following funds were taken into consideration:

- 1 fund created before the 2008 economic crises
- 3 funds were created after the 2008 financial crisis
- 1 fund born before the economic crisis from COVID-19 of 2020

All 4 funds show a positive and significantly higher performance than both the reference benchmark and the healthcare equity sector, which on the contrary show also negative values in some periods.

Table 10 shows the six funds available for sale in Italy that have been awarded the Funds People 2019 brand.

The best performing YTD funds included Variopartner MIV Global Medtech with 16.92% in base currency, followed by Janus Henderson Global Life Sciences with 9.43%. The lowest-performing fund is the Pictet-Biotech fund (Table 11). The healthcare sector is likely to continue to benefit from a prolific wave of Merger and Acquisition operations carried out mainly because top biopharmaceutical companies are looking to add innovative products and platforms to portfolios that include innovative anti-aging products.

The table shows the six funds available for sale in Italy that have been awarded the Funds People 2019 brand, and the date on which every fund began its operations.

Regarding the volatility measurements, l'AB International Health Care Portfolio registered the lower Max Drawdown of 3 anni (-9.89), while the highest value is recorded by the Pictet-Biotech fund (Table 12).

This shows, in general, that by applying a disciplined investment process, which integrates the different factors that impact the healthcare business, investors can have access to assets with a potentially strong return that can invigorate the portfolio in the long term.

Finally, we point out differences in average returns of healthcare equity funds concerning the portfolio composition.

For each fund of the sample, we examine the geographical repartition considering that, the funds are distinguished and depend on the area in which the assets are mainly invested.

In terms of portfolio exposure, the funds that invest more than 50% of the assets in a specific geographical area are 241 and are distributed according to the percentages indicated in Fig. 4.

Funds that invest with percentages below 50% and therefore invest their assets in different geographical areas, which are represented by the remaining 28 funds, are distributed as follows:

- 12 funds invest in North America, the United Kingdom, Europe Developed, Africa/Middle East, Japan, Asia Developed, Asia Emerging, and Latin America
- 16 funds invest in North America, the United Kingdom, Europe Developed, Japan, Asia Developed, and Asia Emerging

Age-Cohort Analysis

The study is developed through a cohort analysis to put in evidence some parameters (annual return, risk, portfolio geographical distribution, and modern portfolio theory) of the cohort of healthcare equity funds in the period of 1998-2021.

The 269 funds of the sample were grouped into six cohorts with four years extent. Each cohort was analyzed pointing out the trend of some parameters registered in different periods. The age-cohort of the healthcare equity funds is represented in Fig. 5.

The first generation includes funds born between 1998 and 2001 that are equal to 30 in the first year's life, 31 after five years, and 93 after ten years. The second generation (2002-2005) is based on 1 fund in the first year's life, too. However, it became more considerable through the years with 62 funds after five years and 135 after ten years. The third and four generations present, in the first year's life, respectively 61 and 12 funds, and then grow in the following years (respectively to 73 and 60 after five years and to 133 and 225 after ten years). The fifth generation includes funds born between 2014 and 2017, which are equal to 48 in the first year of life, and 165 after five years.

From the analysis of the price returns of each cohort, we can observe as all cohorts have a similar trend from 2014 to 2021 (Fig. 6).

In general, the generations had positive annual returns in all the years except in 2016 and 2018 only for the II cohort. Particularly, higher values were registered in 2014 from the third (39.90%) and the second generation (36.38%). These generations in 2016 show negative values, respectively equal to -4.63 and -5.53%. In the first quarter of 2021, all generations show positive price returns, even if with different values.

In terms of volatility measurements of cohorts of funds, all cohorts have a similar value of Standard Deviation and Sharpe Ratio. The second cohort has the most value of Standard Deviation equal to 17.13%. This value is not excessively high suggesting that most of the funds have low volatility of returns. The first cohort shows a good value of the Sharpe Ratio (1.18), while the second cohort shows a value close to zero (0.08) (Fig. 7).

The differences among the funds of the sample, especially in terms of performance and risk, may depend on the:

- Portfolio geographical diversification (or the asset allocation among different countries)
- Type of management adopted by each fund

Concerning the first point, portfolio diversification is a very important factor to consider, when we hold shares of the only company. It leads to a higher risk than holding shares that belong to more companies (Brealey *et al*., 2020).

Geographical diversification is based on the premise that financial markets, in different parts of the world, may not be highly correlated with one another. For example, if US and European stock markets are declining because their economies are in a recession, an investor may choose to allocate part of his portfolio to emerging economies with higher growth rates such as China, Brazil, and India. In the case of sustainable funds, diversification is very important because it allows the investor to have a securities portfolio of companies that may belong to a specific sector (alternative energy, water, etc.), and can be located in different geographical areas.

However, in our sample, not all the cohorts of healthcare equity funds have a highly diversified portfolio (Fig. 8), while some generations hold shares of companies of all the countries taken into consideration, affecting, in such a way, a good geographic diversification, other funds invest all their assets only in some specific areas. In particular, approximately 90% of funds of the first generation have a high diversification portfolio (their units are located in different countries), while funds of the other generations make a low diversification portfolio.

Concerning the second aspect, it is possible to use two types of management, active and passive. Active management refers to a portfolio management strategy where the manager makes specific investments intending to outperform an investment benchmark index. In passive management, investors expect a return that, closely, replicates the investment weighting and returns of a benchmark index, too. They will often invest in an index fund.

The R-squared value of cohorts of healthcare equity funds is high because it indicates a greater adaptation of the fund to the target market (Fig. 9).

Particularly, the healthcare equity funds, born between 1998 and 2001, show an R-squared value equal to 92.01%. This suggests that movements in the benchmark can explain more than 92% of the fund's returns. The lower R-squared value is registered by the second generation (70.15%), which regards funds born between 2002 and 2005. A higher R-squared value indicates a more useful Beta figure. Healthcare equity funds of the first generation have an R-squared value equal to 92.014%, but a Beta below 1; it is most likely this happens when we offer higher risk-adjusted returns. A low R-squared value means that Beta should be ignored.

Table 7: Volatility measurements of healthcare equity funds
Table shows the average, min, and max of the Standard Deviation of fund returns and the Sharpe Ratio. The Standard Deviation facilitates comparisons across all funds, and it is a useful warning sign. The Sharpe Ratio can be used to compare two funds directly on how much risk a fund had to bear to earn an excess return over the risk-free rate

Category	3Yr - Standard deviation %	Sharpe ratio
Average	15.97	1.05
Min	11.80	0.44
Max	17.03	0.98

Table 8: Total returns and volatility measurements of healthcare equity funds by world Regions
Regions table indicates the value of total returns, standard deviation, and Sharpe Ratio of healthcare equity funds concerning the portfolio composition, i.e., geographical area in which assets are mainly invested

World Regions	Performance %						
	YTD	1Yr	3Yr	5Yr	10Yr	3Yr - Standard deviation %	Sharpe ratio
Asia – Emerging	-0.03	30.01	12.06	-	-	15.27	1.02
Developed Europe	4.95	26.05	3.45	6.61	7.30	13.29	0.76
United States	2.83	32.04	15.71	11.57	13.80	16.15	1.06

Table 9: Trailing returns of some healthcare equity funds concerning the benchmark
Table shows the annual returns of some healthcare equity funds concerning the benchmark and the category sector equity healthcare. The benchmark is commonly used to compare the performance of a mutual fund using some financial indicators. The most popular benchmarks are represented by the major stock market indexes, such as the Mibtel, the MSCI Europe Index, or the Dow Jones Industrials

		Performance %			
Category	Data	YTD	1 anno	3 anni	5 anni
CPR Invest - MedTech F EUR Acc	2019	7.63	22.93	-	-
Healthcare equity sector		2.71	2.89	-	-
MSCI World/Health Care NR USD		0.58	11.66	-	-
Wellington Global Health Care Equity Fund EUR Class N Accumulating Unhedged	2016	2.09	18.75	16.80	-
Healthcare equity sector		-2.83	-1.29	7.48	-
MSCI World/Health Care NR USD		-4.96	7.48	1.11	-
BNP Paribas Funds Health Care Innovators Classic Capitalization	2013	5.19	11.96	15.10	9.50
Healthcare equity sector		0.27	-8.08	1.81	0.62
MSCI World/Health Care NR USD		-1.86	0.69	-0.60	-0.85
JPMorgan Funds – Global Healthcare C (acc) - USD	2009	4.77	18.70	18.48	11.51
Healthcare equity sector		-0.16	-1.44	5.20	2.62
MSCI World/Health Care NR USD		-2.28	7.33	2.79	1.15
Pictet-Health I USD	2006	8.00	17.09	14.60	8.27
Healthcare equity sector		3.08	-2.95	1.31	-0.62
MSCI World/Health Care NR USD		0.95	5.82	-1.10	-2.09

Table 10: Healthcare equity funds with Funds People 2019 brand
Table shows the six funds available for sale in Italy that have been awarded the Funds People 2019 brand, and the date on which every fund began its operations

Fund	Name of company management	Inception date
JPM global healthcare	J.P. Morgan AM	2/10/09
Janus henderson global life sciences	Janus henderson investors	31/3/00
Variopartner MIV global medtech	Vontobel AM	10/3/08
Pictet-Biotech	Pictet AM	30/11/95
AB international health care portfolio	Alliance bernstein	5/7/95
Polar capital biotech	Polar capital	31/10/13

Table 11: Total returns of healthcare equity funds - Funds People 2019 on 30, April 2019
Table shows how well the six Italian funds that have been awarded the Funds People 2019 brand have performed on November 30, 2021

Fund	YTD	3 Yr	5 Yr
Variopartner MIV Global Medtech	16.92	17.57	17.74
Janus Henderson Global Life Sciences	9.43	9.98	10.26
AB International Health Care Portfolio	8.62	10.47	9.34
JPM Global Healthcare	4.24	7.11	6.15
Polar Capital Biotech	4.23	16.01	15.34
Pictet-Biotech	1.84	5.48	5.09

Table 12: Volatility measurements of healthcare equity funds - Funds People 2019 on 30, April 2019
Table shows the Standard Deviation, the Sharpe Ratio, and the Maximum Drawdown (MDD) of the six Italian funds that have been awarded the Funds People 2019 brand. The MDD is the maximum observed loss from a peak to a trough of a portfolio before a new peak is attained

Fund	Standard Deviation	Sharpe Ratio	Max Drawdown	Start date Max Drawdown
AB International Health Care Portfolio	11.89	0.79	-9.89	1/10/18
JPM Global Healthcare	13.62	0.47	-12.08	1/8/16
Variopartner MIV Global Medtech	14.50	0.96	-12.94	1/10/18
Janus Henderson Global Life Sciences	14.84	0.63	-13.63	1/10/18
Polar Capital Biotech	20.89	0.75	-18.37	1/9/18
Pictet-Biotech	21.86	0.29	-21.48	1/9/18

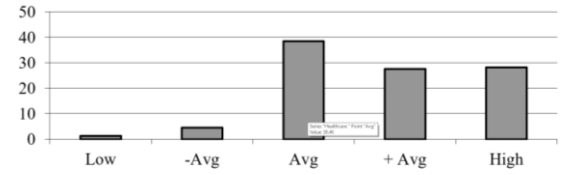

Fig. 2: Morningstar rating
Figure shows the five-tier scale running from Gold (High) to Negative (Low) of the Morningstar rating. Morningstar Analyst Rating™ for funds is the summary expression of a forward-looking analysis of a fund

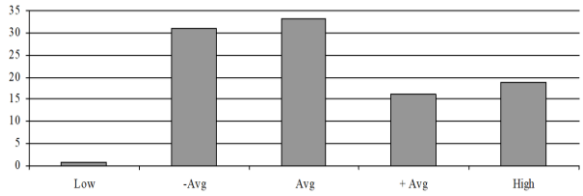

Fig. 3: Morningstar Sustainability Rating
Figure shows the five-tier scale running from High to Low of the Morningstar Sustainability Rating

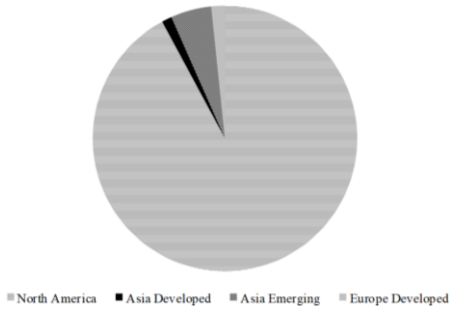

Fig. 4: Portfolio exposure by regions
Figure provides the breakdown of a fund's geographical exposure

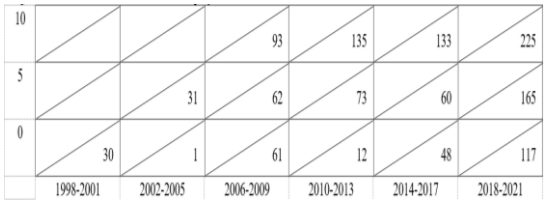

Fig. 5: Age-cohort of healthcare equity funds figure shows the six cohorts of healthcare equity funds created on the date of birth

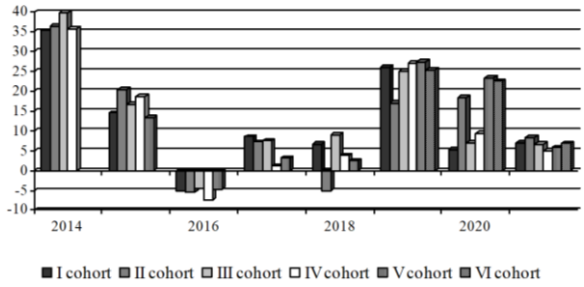

Fig. 6: Price returns of cohorts of healthcare equity funds (%)
Figure shows the average value of the absolute return of the cohorts of healthcare equity funds, expressed as a percentage

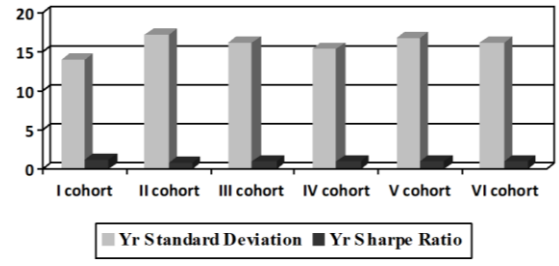

Fig. 7: Volatility measurements of cohorts of healthcare equity funds (%)
Figure shows the average value of the Standard Deviation and the Sharpe Ratio of each cohort of healthcare equity funds

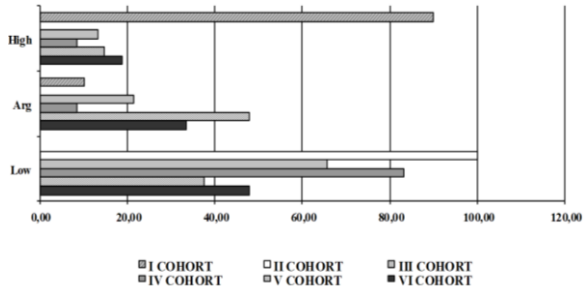

Fig. 8: Diversification degree of cohorts of healthcare equity funds (value in percentage)
Figure shows the geographic diversification degree of cohorts of healthcare equity funds, expressed as a percentage. A high diversification degree means that funds invest in over six countries. A low diversification degree means that funds invest in less than four countries

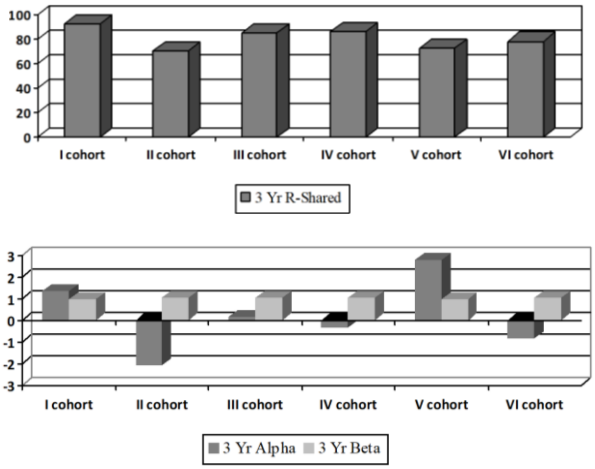

Fig. 9: Modern portfolio theory of cohorts of healthcare equity funds (%)
Figure shows the average value of R-squared, Alpha, and Beta of cohorts of healthcare equity funds

Results and Discussion

Within the financial system, the theme of sustainable finance is increasing.

Sustainability finance describes a wide range of funding for the environment, social and healthcare-oriented technologies, projects, industries, or businesses. Particularly, healthcare investment recognizes the value of human capital and tries to improve human wealth-being and social justice, reducing environmental and healthcare risks and improving social integrity.

In the actual context, because of the COVID-19 crisis, numerous initiatives in the field of healthcare finance are developed with the use of mechanisms, such as healthcare rating and tools, such as healthcare funds.

Particularly, through healthcare equity funds it is possible to invest in markets and in companies, whose activities are concentrated in equipment and services for healthcare, research, development, production, or marketing of pharmaceutical or biotechnological products.

From a quantitative point of view, 269 equity healthcare funds have an average value of Ongoing Charge of about 1.55%, which allows us to understand how a lot of investments have been absorbed by costs.

The performance of the healthcare sector is positive and equal to 2.87%. Considering a period of three years, the performance is even higher and on average equal to 14.93%; considering the five years past performance is equal to 11.47% and in 10 years it is equal to 13.34%.

In terms of risk, the Standard Deviation (3 Yr) is equal, on average, to 15.97% suggesting that the most of funds in this sector have low volatility of returns (between 11.80 and 17.03%).

The Sharpe Ratio has positive values equal to 1.05 suggesting that the funds of this sector have been able to achieve on average a higher return than a risk-free asset.

Conclusion

Healthcare funds have increasing importance, and they continue to have a positive performance, resisting the negative economic and social context. So, it is interesting to think about a future "alternative world politics" oriented to responsible management of traditional resources and to support research and the development of healthcare and social sources. Combining these two actions, it will be possible to guarantee a sustainable future, based on economic growth and a real improvement of social conditions.

Acknowledgment

We are grateful the editor and the anonymous reviewers. Any errors remain those of the authors.

Funding Information

This study receives the grant for Research Projects, ex 60% funds, University of Calabria.

Author's Contributions

The paper is the fruit of the joint work of all the authors who participated in the data collection, coordinated the data analysis and contributed to the writing of the manuscript.

However, **Rosa Adamo** mainly contributed to Sections "Introduction", "Results and Discussion" and "Conclusion"; **Domenica Federico** to Sections "Literature Review" and "Age-Cohort Analysis"; **Antonella Notte** to Sections "Data and Methodology" and "Performance of Healthcare Equity Funds".

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

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