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Comparative Analysis of Returns and Standard Deviations of Healthcare Companies' Stocks: A Five-Year Study (2019-2023)

Md. Furqan[1], Chetan Rathod[2]

[1,2]Final Year Student, Department of Management Studies, Visvesvaraya technological University, Kalaburagi, Karnataka, INDIA

ABSTRACT

This research conducts a comparative analysis of returns and standard deviations of healthcare companies' stocks listed on the National Stock Exchange (NSE) over a five-year period from 2019 to 2023. The study aims to provide valuable insights for investors in the health sector, assisting them in balancing risk and return in their investment decisions. Secondary data sourced from the NSE website, publications, and journals is utilized, employing a descriptive research design. Statistical tools such as returns, beta, and standard deviation are used to analyze the data. The objectives include examining mean returns, assessing risk levels, contrasting achievements among healthcare corporations, and recommending suitable securities for investors. The findings offer actionable insights for investors aiming to optimize their investment outcomes within the healthcare industry. The investigations examines to the comparisons between healthcare companies' stocks on NSE from 2019 to 2023. The intent is to assist with making informed decisions. Secondary data was collected from various sources, utilizing a descriptive design. Statistical tools such as returns; beta and standard deviation are applied to interpret the information. Key objectives include examining mean returns, evaluating risk, and recommending securities for investors. The results aim to provide useful recommendations for investment within the healthcare sector!.

Keywords: Risk and Return, health sector, Standard deviation.

1. Introduction

In the realm of financial markets, understanding the performance of companies within the healthcare sector is crucial. This research endeavors to conduct a comparative analysis of returns and standard deviations of healthcare companies' stocks over a five-year period, from 2019 to 2023. By scrutinizing the financial performance of these entities, the study aims to shed light on their relative risk and return profiles within the healthcare industry. Previous studies have explored various facets of healthcare company performance. Given the intricate nature of the healthcare industry, characterized by regulatory complexities and sensitivity to external factors like policy changes and technological advancements,

[1] Final Year Student, Department of Management Studies,
Visvesvaraya technological University, Kalaburagi, Karnataka, INDIA
[2] Final Year Student, Department of Management Studies,
Visvesvaraya technological University, Kalaburagi, Karnataka, INDIA

understanding the financial dynamics of these companies is paramount for investors, analysts, and policy makers. Methodologically, the study entails gathering historical stock price data for selected companies, computing their annual returns and standard deviations, and employing statistical tools to identify trends and correlations. Through this process, the research seeks to offer insights into the financial performance and risk profiles of companies within the healthcare industry. The scope of the study Is delimited to the comparative analysis of returns and standard deviations over the specified five-year period. While it aims to provide valuable information for stakeholders navigating the healthcare market, it does not extend to broader economic factors or company-specific strategies beyond the defined parameters. This research contributes to the understanding of financial dynamics within the healthcare sector, offering valuable insights for investors, analysts, and policy makers seeking to optimize their decision-making processes and manage risks effectively in the ever-evolving landscape of the healthcare industry.

2. Statement of the problem

Investors sometimes struggle to decide between making more money or taking less risk. By looking at the risks and potential returns, they can make smarter choices about where to put their money. This study helps investors understand the health sector better. By comparing different health companies' stocks, investors can pick the best options for their investments, considering both risk and return.

3. Need for the study

The need for this study arises from the complexity of investment decisions faced by investors, particularly in the health sector. With a wide range of investment options available, investors require guidance to navigate the trade-off between risk and return effectively. By conducting a comparative analysis of health sector companies' stocks, this study addresses the need for actionable insights that empower investors to make informed decisions. By understanding the risk-return dynamics of different investment opportunities within the health sector, investors can mitigate risks while maximizing returns, ultimately enhancing their investment outcomes.

4. Objectives of the study

- To examine the mean returns of chosen firms' stocks within the healthcare sector.
- To ascertain the level of risk linked with the securities of designated companies in the healthcare sector.
- To recommend the most suitable security for investors considering investing in any stock within the healthcare industry.

5. Review of Literature

(Horne & James, 2001) argued that although beta may not be a good indicator of the realized returns, it remains a reasonable measure of risk (Horne & James, 2001). Study of the Meric et al (2010) in the stock market of US shows a positive risk-return relationship between Industries listed in US stock market. There are many controversial results have been revealed in empirical literature; therefore, this study reviews Capital Asset Pricing Model (CAPM) to explore the relationship between expected return and systematic risk. The COMPUSTAT database, a major corporate financial data base widely used in both academia and businesses, provides market beta estimates for individual firms. Investment services firms also provide beta estimates as "risk attributes" or "volatility measures" of their bond and stock

funds. No other theoretically well-founded model alternative to the CAPM has been implemented for the estimation of the cost of equity capital (Kaplan & Peterson, 1998). (Awalakki & Archanna, 2021)The study examines the relationship between economic and financial indicators and stock returns for 28 selected firms listed on the National Stock Exchange over an eight-year period (2010-2017). Utilizing panel data regression, the results indicate that Return on Equity (ROE) and Price to Book Value (PB) exert a positive and significant impact on stock returns. The findings suggest that managers can enhance stock valuation by understanding and effectively utilizing key resources, emphasizing the importance of informed decision-making for investment strategies and market predictions. (Awalakki & Archanna, 2021). The research paper investigates the impact of key accounting ratios, including ROE, ROA, P/E, P/B, P/S, and P/C, on stock prices of the National Stock Exchange over a 15-year period (2005-2020). The study aims to analyze how these financial indicators influence stock returns, emphasizing their importance for investors, creditors, and stakeholders in evaluating the financial condition and profitability of companies listed on the exchange. (Markowitz, , 1952) Portfolio investment theory was the first modern theory proposed by Markowitz (1952). Assumed that the rates of return of individual assets covariance with one another, and there is a rather stable covariance, or correlation coefficient, between the rates of return of every two assets. Thus, he stated that it is theoretically possible to construct a variance-covariance matrix of all risky assets. (Awalakki & Archanna, 2023) This non-empirical research paper delves into the interplay between investor attention and financial market volatility, leveraging insights from behavioural finance. It explores the determinants of investor attention, including cognitive biases and social factors, and analyses their impact on market dynamics, offering a thorough review of existing literature and theoretical frameworks to enhance comprehension of this intricate relationship. (Abedi, Dargiri, & Rasiah, 2012). This study emphasizes the importance of the risk-return relationship in aiding investors and organizations in decision-making. By reviewing theories, empirical studies, and performance measures like Treynor, Sharpe, and Jansen Indices derived from the Capital Asset Pricing Model (CAPM), it aims to enhance the understanding of industry sectors' risk-return constructs for improved decision support. (Awalakki & Archanna, 2023). This study explores the impact of overconfidence biases on investment portfolios, examining cognitive and emotional mechanisms such as illusion of knowledge and emotional attachment. Rooted in behavioral finance literature, it highlights consequences like excessive trading and loss aversion, proposing mitigation strategies like diversification, passive investing, and behavioral coaching for more informed and rational portfolio decisions. (Subramanyam, Nalla, &Kalyan, 2018). The study aims to educate investors on mutual funds, emphasizing the potential for maximizing returns amidst India's growing capital market. It sheds light on investor awareness, risk tolerance, and preferences, showcasing the role of mutual funds in diversifying investments for optimal returns and risk mitigation. (Awalakki, 2022). This article explores the interplay between neurotransmitters (dopamine, serotonin, and norepinephrine), emotions, and investment outcomes, unraveling their role in shaping investor behavior and decision-making. It emphasizes the neural mechanisms driving decision diversification and addresses biases, underscoring the significance of education for cognitive function and bias mitigation in managing investor behavior within the finance domain. (Moolbharathi & Sugandi, 2021). This study analyzes the Risk and Return of stocks in the Auto, Banking, Finance, FMCG, and IT sectors from 2017-2021, using statistical tools like Standard Deviation, Beta, and Regression Analysis. It guides investors by assessing sector-wise performance against benchmark indices, aiding in informed investment decisions based on risk and return considerations. (Awalakki S. M., 2015). The study in Kalaburagi, Karnataka, reveals that salaried

employees predominantly consider investments for retirement, and recent survey results indicate a lack of significant increase in their investment levels compared to businesspersons. Despite a historical focus on retirement, the growing awareness of investment options suggests an evolving landscape with increased choices for salaried individuals. (AWALAKKI, 2015)This study examines the capital structures of five prominent cement companies (ACC, Ultratech, Ambuja, J.K., Chettinad) from 2008-09 to 2013-14, assessing the impact of these structures on investment patterns and emphasizing the importance of debt-equity mix in effective financing decisions. The intra-company analysis aims to provide insights into the financial dynamics of these firms. Mr. Pandya and Mr. Bhargav (2017), "Total Shareholder Return and Excess Return: An Analysis of Nifty Pharma Index Companies." The paper examines the total shareholder return (TSR) and excess return of pharmaceutical companies in the NIFTY pharma index from 2010 to 2016. Using financial data from the CMIE PROWESS database and risk-free rates from the Reserve Bank of India website, the study finds statistically significant positive TSR and excess return, indicating wealth creation for shareholders. Additionally, there is a positive association between return on net worth (RONW) and both TSR and excess return, suggesting that increasing RONW can enhance TSR and excess return, offering implications for managerial decision-making. Abhishek. V (2018) "A Study on Risk and Return Analysis of Selected Stocks in Bse Sensex". The aim of this study is to assess the risk and return associated with specific stocks and determine the optimal investment options. Standard deviation and beta values are utilized to gauge the risk of the chosen stocks within the Sensex index. Additionally, the research proposes that opting for short-term securities over long-term investments can help mitigate risk. The Sharpe's index model, developed by William Sharpe, is highlighted as an effective investment strategy. Consequently, investors can diversify their risk by investing in a portfolio of securities. (Rohit & Bhavna, 2018), "The Effect of Risk Return Analysis Of Pharmaceutical Companies On Indian Stock Market". The study examines the risk-return relationship of selected pharmaceutical companies in the Indian stock market from 2013 to 2018. With India's pharmaceutical industry ranking third globally in volume and fourteenth in value, it is an attractive sector for investors. Using MS Excel for data analysis, the research highlights that while Sun Pharmaceutical Industries Ltd offers exceptional returns, its shares carry high market risk. Conversely, Divi's Laboratories Ltd presents a more favorable option due to its combination of high returns and lower associated risk. This analysis aids potential investors in making informed investment decisions within the pharmaceutical sector. Rahul Moolbharathi and Tukaram Sugandi (2021b) "A Comparison Study On Risk And Return Analysis Of SelectedCompanies With Benchmark Index In Nse". The research provides investors with insights into various statistical methods for assessing stock risk and return, with a focus on comparing index performance to benchmark indices. Additionally, it aims to determine the most favorable sector for risk and return investments. The primary goal is to analyze the statistical variation of stocks and indices using regression analysis. Findings reveal that HDFC Bank exhibits higher risk and returns compared to other stocks. Notably, all equities in the portfolio have a beta of one, indicating efficiency in terms of risk and return among the selected market stocks. Mr. S. Sathish, Ms. A. Nagarathinam (2021) "A Study On Risk And Return Analysis Of FMCG Companies In Indian Stock Market". This article was undertaken to analyse the risk and return of the selected NIFTY FMCG sectors. This research examines the optimal security for an investor seeking a high return with minimal risk. Descriptive research is been adopted and based on this it is highlighted that ITC Ltd. Has the lowest return among FMCG companies. They suggest that if an investor expects high returns then he

has to face high risk. A stock with a higher beta value is not suggested since it has a significant market risk that cannot be diversified.

6. Research Methodology

6.1. Sources of data collection

The research utilized secondary data obtained from various sources such as the NSE website, publications, and journals. The study employs a descriptive research design.

6.2. Sample size

The study consists of NIFTY health sector companies which are listed on NSE.

6.3. Statistical tools and techniques

- Returns: A company's stock price can fluctuate due to various factors, resulting in positive or negative outcomes. Market return refers to the profit earned over a period of time, where profit is considered positive and loss negative. Returns are calculated as the percentage change between the closing and opening prices.
- Standard Deviation: Standard deviation measures the extent of dispersion of a dataset relative to its mean. It is determined by taking the square root of the variance. A stock with high volatility will have a higher standard deviation, while a stable blue-chip stock will have a lower standard deviation

7. Data Analysis and Interpretations

Table: 1; Table showing the MEAN return of the companies in descending order:

Rank	Companies	Average returns (%)
1	Biocon Ltd	41.22
2	Cipla Ltd	23.76
3	SBI Life Insurance Company Limited	21.32
4	Lupin Ltd	21.72
5	Sun Pharmaceutical Industries Ltd	24.82
6	HDFC Life Insurance Company Limited	13.38
7	Max Financial Services Limited	20.22
8	ICICI Prudential Life Insurance Company Limited	12.68
9	ICICI Lombard General Insurance Company Limited	12.98
10	Apollo Hospitals Enterprise Ltd	-0.58

Interpretation:

The table ranks ten companies based on their mean returns over the five-year period from 2019 to 2023. Biocon Ltd leads with the highest mean return of 41.22%, followed by Sun Pharmaceutical Industries Ltd and Lupin Ltd. Cipla Ltd and SBI Life Insurance Company Limited also demonstrate strong performance. However, Apollo Hospitals Enterprise Ltd shows a negative mean return of -0.58%, indicating a decline in returns. HDFC Life Insurance Company Limited, Max Financial Services Limited, ICICI Prudential Life Insurance Company Limited, and ICICI Lombard General Insurance Company Limited have average returns ranging from 12.68% to 20.22%, indicating moderate to good performance. Overall, this data provides insights into the relative performance of these companies in terms of generating returns for their investors, with some performing exceptionally well, while others

may need to address issues affecting their returns, as seen in the case of Apollo Hospitals Enterprise Ltd. The table highlights varying levels of performance among the companies, providing investors with insights into their historical returns and potential investment opportunities.

Table: 2; Table showing standard deviation of companies in descending order:

Rank	Companies	Standard deviations (%)
1	Biocon Ltd	46.67
2	Cipla Ltd	35.45
3	Apollo Hospitals Enterprise Ltd	30.34
4	Max Financial Services Limited	34.43
5	Lupin Ltd	16.62
6	ICICI Lombard General Insurance Company Limited	29.71
7	HDFC Life Insurance Company Limited	28.81
8	SBI Life Insurance Company Limited	28.84
9	ICICI Prudential Life Insurance Company Limited	24.92
10	Sun Pharmaceutical Industries Ltd	26.55

Interpretation:

The table ranks companies based on their standard deviation, indicating the variability of returns over the five-year period. Biocon Ltd exhibits the highest variability, followed by Cipla Ltd and Apollo Hospitals Enterprise Ltd. Sun Pharmaceutical Industries Ltd shows the lowest variability, Max Financial Services Limited also exhibits moderate variability with a standard deviation of 34.43. Lupin Ltd has the lowest standard deviation of 16.62, suggesting relatively lower variability in returns compared to the other companies. ICICI Lombard General Insurance Company Limited, HDFC Life Insurance Company Limited, SBI Life Insurance Company Limited, ICICI Prudential Life Insurance Company Limited, and Sun Pharmaceutical Industries Ltd have standard deviations ranging from 24.92 to 28.84, indicating moderate levels of variability in returns. Overall, standard deviation provides insights into the volatility or risk associated with the returns of each company, with higher values indicating greater variability and potentially higher risk for investors. Higher standard deviations suggest greater fluctuations in returns, which may imply higher risk for investors. This information helps investors assess the stability and riskiness of investments in these companies' stocks.

Table: 3. Table showing variance of companies in descending order:

Rank	Company	Variance
1	Biocon Ltd	2177.82
2	Cipla Ltd	1256.92
3	Apollo Hospitals Enterprise Ltd	1185.50
4	Max Financial Services Limited	920.72
5	Lupin Ltd	882.93
6	ICICI Lombard General Insurance Company Limited	830.04
7	HDFC Life Insurance Company Limited	831.81
8	SBI Life Insurance Company Limited	704.92
9	ICICI Prudential Life Insurance Company Limited	621.03

10	Sun Pharmaceutical Industries Ltd	276.36

Interpretation:

The table ranks companies based on their variance, reflecting the spread of returns over the five-year period. Biocon Ltd exhibits the highest variance, followed by Cipla Ltd and Apollo Hospitals Enterprise Ltd. Max Financial Services Limited also exhibits moderate variability with a variance of 920.72. Lupin Ltd has a variance of 882.93, suggesting relatively lower variability in returns compared to the other companies. ICICI Lombard General Insurance Company Limited, HDFC Life Insurance Company Limited, SBI Life Insurance Company Limited, and ICICI Prudential Life Insurance Company Limited have variances ranging from 621.03 to 830.04, indicating moderate levels of variability in returns. Sun Pharmaceutical Industries Ltd has the lowest variance of 276.36, suggesting relatively less variability in returns compared to other companies. A higher variance indicates greater dispersion of returns, implying potentially higher risk or volatility. Investors may perceive companies with lower variance as less risky or more stable investments. This information aids investors in assessing the level of risk associated with investing in these companies' stocks.

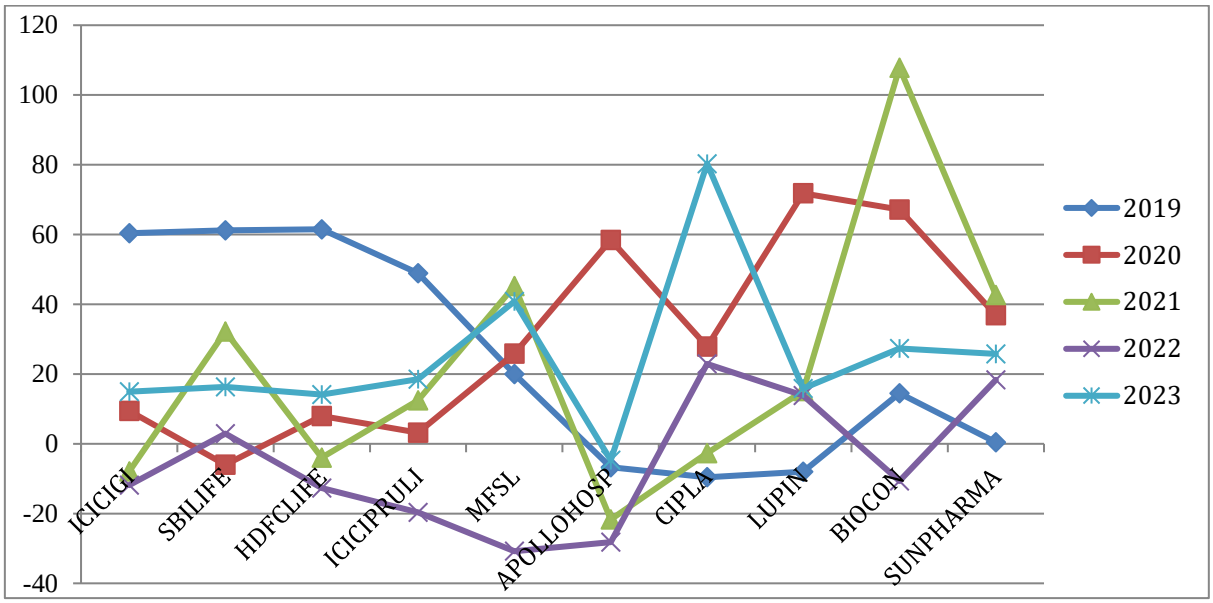
Table: 4. Table showing the coefficient of variation based on the rank:

Rank	Company	Coefficient of variation
1	ICICI Lombard General Insurance Company Limited	221.96
2	HDFC Life Insurance Company Limited	215.55
3	ICICI Prudential Life Insurance Company Limited	196.53
4	Max Financial Services Limited	150.07
5	Cipla Ltd	149.21
6	Lupin Ltd	136.81
7	SBI Life Insurance Company Limited	124.53
8	Biocon Ltd	113.21
9	Sun Pharmaceutical Industries Ltd	66.98
10	Apollo Hospitals Enterprise Ltd	-5936.39

Interpretation:

The coefficient of variation (CV) table ranks companies based on the relative variability of their returns compared to their mean returns. ICICI Lombard General Insurance Company Ltd exhibits the highest CV, indicating extreme variability relative to its mean return. Conversely, Sun Pharmaceutical Industries Ltd has the lowest CV, suggesting relatively stable returns compared to its mean.Apollo Hospitals Enterprise Ltd shows a negative coefficient of variation because we are working with small sample size, the standard deviation larger than the mean, resulting in a negative coefficient of variation.Ahigher CV implies higher risk or volatility, while a lower CV suggests lower risk or stability. Investors can use this information to gauge the risk-return tradeoff and make informed decisions tailored to their risk preferences and investment goals.

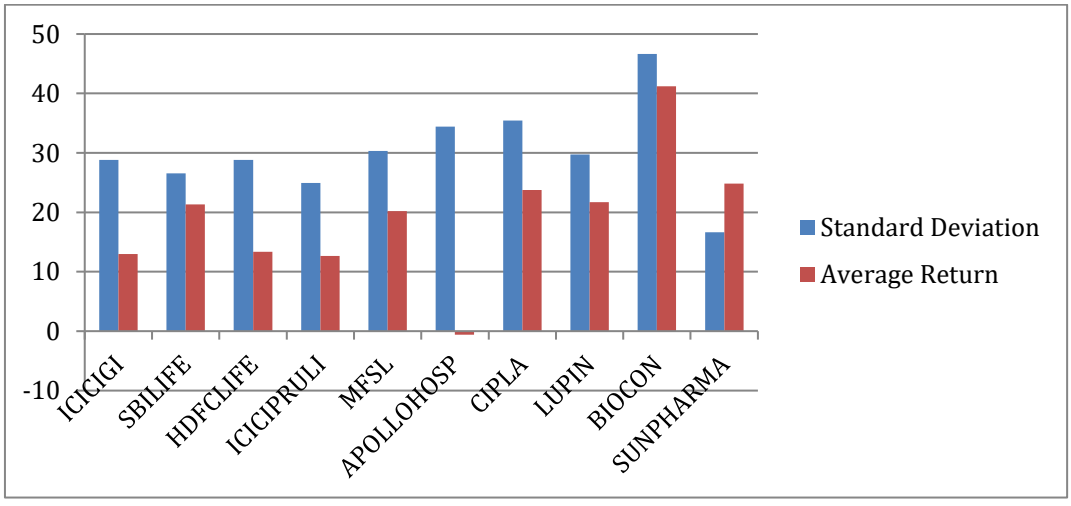
Chart-1; The Line Graph shows the annual returns earned by the companies for the period 2019–2023



Interpretation:

The line plot illustrates the annual returns of various companies from 2019 to 2023.Biocon Ltd has the highest average return, while Apollo Hospitals Enterprise Ltd has the lowest, even showing a negative return. Companies like Cipla Ltd, SBI Life Insurance Company Limited, and Sun Pharmaceutical Industries Ltd also show relatively high average returns. It visually compares the performance trends, showing fluctuations and identifying standout performers across the years. Notably, while some companies demonstrate consistent growth, others exhibit more volatile performance, indicating differing levels of stability and growth potential in their investments.

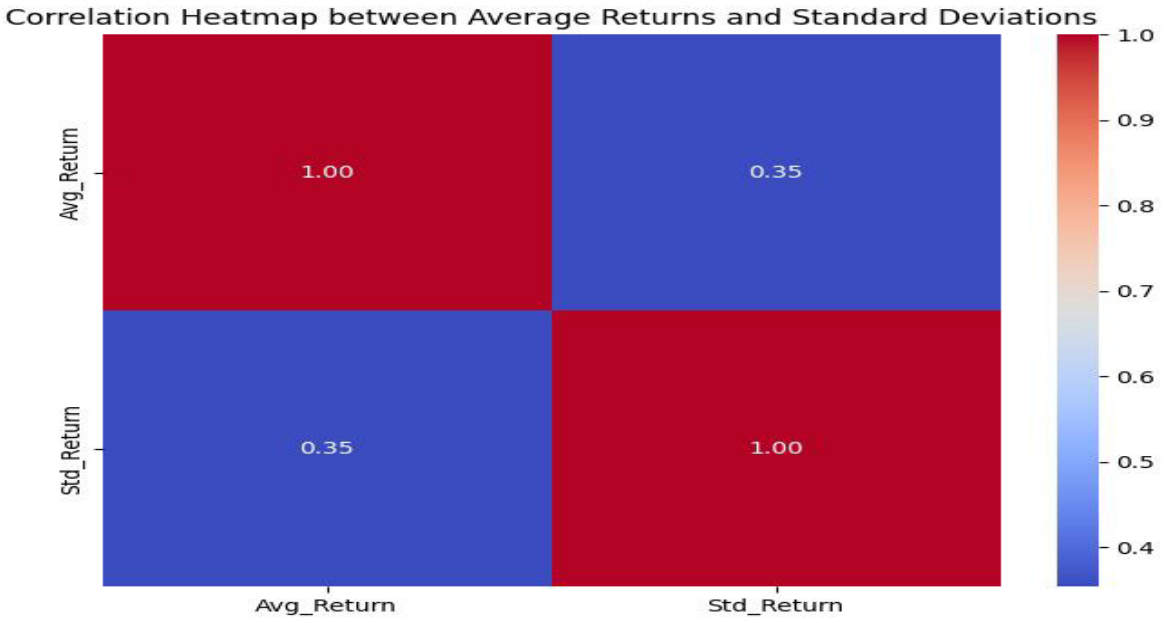
Chart-2; The Bar Chart shows the comparison of average returns and standard deviations:



Interpretation: The grouped bar chart compares average returns and standard deviations of ten healthcare companies over 2019-2023. The orange bars represent the average returns of each company. From the chart, it is evident that some companies, such as BIOCON and CIPLA, have consistently higher average returns compared to others. This suggests that these companies may have outperformed their peers in terms of generating returns for investors over the five-year period. The blue bars depict the

standard deviations of each company's returns. Standard deviation measures the volatility or risk associated with the returns of a company. Companies with higher standard deviations are considered riskier investments. In this chart, companies like CIPLA and BIOCON have relatively higher standard deviations, indicating higher volatility in their returns compared to others. However, as they demonstrate higher standard deviations, indicating greater volatility. Investors can balance potential returns and risks by considering both metrics, aiding in informed decision-making and portfolio diversification strategies.

Chart : 3; The Heat Map showing correlation between average returns and standard deviations:



Interpretation:

The correlation coefficient of approximately 0.354 indicates a positive correlation between average returns and standard deviation of returns, albeit weak. This suggests that companies with higher average returns tend to exhibit slightly higher volatility in their returns. However, the correlation is not strong, indicating that variability in returns does not strongly predict average returns, and vice versa. Investors should carefully balance risk tolerance with return expectations when considering investments. While higher returns may be associated with slightly higher risk, the weak correlation implies opportunities to manage risk without sacrificing returns or vice versa. It's crucial for investors to conduct further analysis considering factors like company fundamentals, industry trends, and macroeconomic conditions to make well-informed investment decisions.

8. Findings:

The study offers a comprehensive examination of performance of healthcare sector entities over a significant period, spanning from 2019 to 2023. Through meticulous analysis, it provides valuable insights into the relative risk and return profiles of selected companies within the healthcare industry, catering to the needs of investors, analysts, and policymakers alike. The findings underscore the importance of understanding the intricate dynamics of the healthcare market, given its susceptibility to regulatory changes and technological advancements. In terms of mean returns, Biocon Ltd emerges as the frontrunner, boasting a substantial mean return of 41.22%, followed closely by Sun Pharmaceutical Industries Ltd and Lupin Ltd. However, the study unveils a contrasting performance from Apollo

Hospitals Enterprise Ltd, which demonstrates a negative mean return, indicative of a decline in returns over the specified period. This disparity in mean returns highlights the diversity in financial performance among healthcare companies, underscoring the importance of thorough analysis in investment decision-making processes. Moreover, the analysis of standard deviations sheds light on the variability of returns across the selected companies. Biocon Ltd exhibits the highest variability, suggesting higher levels of risk associated with its investment. Conversely, Sun Pharmaceutical Industries Ltd demonstrates the lowest variability, indicating relatively stable returns. This variability in returns is further illustrated through variance analysis, where Biocon Ltd once again emerges with the highest variance, signifying greater dispersion of returns over the five-year period. Furthermore, the coefficient of variation (CV) analysis provides valuable insights into the relative variability of returns compared to mean returns. Companies like ICICI Lombard General Insurance Company Ltd exhibit higher CV, indicating extreme variability relative to their mean returns, whereas Sun Pharmaceutical Industries Ltd showcases a lower CV, suggesting more stable returns compared to its mean. The study also visualizes trends in annual returns through line plots, facilitating a better understanding of each company's performance trajectory over the five-year period. Additionally, a grouped bar chart comparison juxtaposes average returns and standard deviations of the selected healthcare companies, offering a holistic view of their performance dynamics. In interpreting these findings, it becomes evident that investors must carefully weigh the trade-off between risk and return when considering investment opportunities within the healthcare sector. While higher returns may be enticing, they often come with increased volatility and risk. Thus, the weak positive correlation observed between average returns and standard deviation underscores the need for cautious decision-making and the importance of diversification strategies in mitigating risk exposure. Overall, the analysis offers insights into historical returns and risk profiles, aiding potential investment decisions in the sector.

9. Suggestions:

Investors are advised to diversify their portfolios across various sectors and asset classes to mitigate risk, spreading investments across industries like technology, healthcare, finance, and commodities, and within each sector by incorporating a mix of large-cap, mid-cap, and small-cap stocks. Additionally, integrating non-correlated assets such as bonds, real estate, and alternative investments can further enhance diversification benefits. Embracing a long-term investment approach over attempting to time the market is emphasized, focusing on the fundamentals of companies and their long-term growth prospects to capitalize on compounding returns and withstand market volatility. Tailoring risk management strategies to individual risk tolerance and objectives is crucial, involving measures like setting stop-loss orders, diversification, and incorporating hedging techniques. Regularly reviewing and monitoring the portfolio to ensure alignment with changing market conditions and personal financial goals is also recommended, allowing investors to adapt to market dynamics and optimize their portfolios for long-term success.

10. Conclusion:

In summary, this research presents a comparative analysis of healthcare companies' stock performance on the National Stock Exchange (NSE) from 2019 to 2023. By utilizing secondary data and statistical tools, the study provides insights for investors to balance risk and return in their healthcare investments. Key findings highlight companies like Biocon Ltd and Sun Pharmaceutical Industries Ltd with strong

mean returns, while caution is advised for Apollo Hospitals Enterprise Ltd due to a negative mean return. Understanding risk levels, as indicated by standard deviations, is crucial for investors. Overall, this research contributes valuable insights for informed decision-making in the dynamic healthcare investment landscape.

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