

Biopharmaceutical Companies: The Winner of the Stock Market During the Covid Period

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Abstract: Developing a so-called "green economy" garners more support in the current climate of uncertainty and danger. Since the beginning of the 21st century, we have recognized that the drive to develop the economy causes irreparable harm to the planet's ecosystem. After the Covid pandemic, a new intermediate industry, the biopharmaceutical industry, has emerged to reduce the tension between the human ecology and the earth's ecosystem. This industry devised a successful response to the health, economic, and social issues of the pandemic age. This paper aims to examine the financial performance of two renowned biopharmaceutical companies, Pfizer and Moderna, which have been permitted to distribute the mRNA vaccine worldwide. This paper concludes the investigation into the stock performance of these two companies prior to and throughout COVID. Besides, examination of the technology market index, market volatility, and investor sentiment reveals the various fluctuations. In addition, the data reveals an effect of contagion between the two enterprises and the technology market. Thus, the research gives useful information for the development of public health economics, policy, and administration.

Keywords: biopharmaceutical companies, sustainability, COVID, health finance, green economy

1. Introduction

COVID encourages countries to develop emergency responses and interventions such as restrictions on movement or the closure of schools and places of employment; economic policies such as income support for the unemployed or international assistance; and health policies which including emergency healthcare spending, mass testing and contact tracing policies, as well as government investment in the production of vaccines [1]. In certain instances, these delayed steps to combat the spread of the virus cause additional economic and societal issues.

Using the U.S. market as an example, financial markets have contributed to the stock market's high volatility [2]. Additionally, COVID has direct and indirect effects on fundamental industries such as agriculture, water, electricity, and food, among others. It presents the issue of "spiral of contradiction" [3]. This calls for an analysis of interdepartmental cooperation and the distribution of resources to sectors that have the potential to avert and lessen the impact of crises like the COVID-19 pandemic.

Searching for an effective vaccine is a tremendous challenge to the biopharmaceutical industry and represents the largest wager for governments, companies, and the general public [3]. This study

compares and contrasts the financial performance and investor sentiment of two significant firms, Pfizer and Moderna, in order to draw a conclusion on both companies' return on investment. This paper also includes recommendations for future investors, policymakers, and society regarding the design of emergency policies and tactics to maintain sustainable economic growth.

2. Analysis

The first major concern of the public relates to the environment because sustained economic expansion and a lack of knowledge of the interaction between humans and the environment will render the existing life model obsolete in the future. The second concern is that society has entered a 'paradoxical spiral' phase [3], in which the steps taken to avert a pandemic drive changes and cause damage in associated sectors, which in turn influence other sectors and generate uncertainty. Consequently, the answer lies in determining how to resolve this occurrence and develop a future policy that is sustainable.

2.1. The Pfizer and Moderna Performance during the Pandemic

Similarities between Pfizer and Moderna are the basis for their selection. Pfizer and Moderna are both publicly traded corporations based in the United States that have developed RNA technology. The two companies differ in terms of their size, accomplishments, and financial sources. Thus, the comparison can concentrate primarily on the economic impact of RNA vaccines and market sedimentation, with minimum consideration of the technology market.

Table 1: Correlations pre COVID period [1].

	PFE	MRNA	NDQ	VIX
MRNA	0.2213*			
NDQ	0.4905*	0.2144*		
VIX	-0.4531*	-0.1865*	-0.8122*	
ISEE	0.0880	0.1144*	0.1700*	-0.1704*

PFE: Pfizer returns; MRNA: Moderna returns; NDQ: NASDAQ returns; VIX: variation of VIX; ISEE: ISEE returns. Significance level: * 0.1. Period range: January 3, 2019 – March 10, 2020.

Table 2: Correlations during COVID [2].

	PFE	MRNA	NDQ	VIX
MRNA	0.1302*			
NDQ	0.5475*	-0.0166		
VIX	-0.4634*	0.0101	-0.6676*	
ISEE	-0.1146*	0.0253	0.0551	-0.0288*

PFE: Pfizer returns; MRNA: Moderna returns; NDQ: NASDAQ returns; VIX: variation of VIX; ISEE: ISEE returns. Significance level: * 0.1. Period range: March 11, 2020 – February 12, 2021.

Tables 1 and 2 illustrate the correlation relationship before and during the COVID epidemic. The graph demonstrates that Moderna has a positive correlation with NASDAQ and ISEE, but an inverse correlation with VIX. During the COVID, the correlation coefficient has no significance. In contrast to Moderna, Pfizer is in a different position. Pfizer is in the same position that Moderna was prior to the COVID.

Table 3: GARCH estimation results pre-COVID period [3].

Variables	PFE	MRNA
Mean equation		
NDQ	.2057554**(.005)	.7472199**(.005)
VIX	-0.434238***(.000)	-0.625397*(.059)
ISEE	-00.14641(.535)	.0205305*(.053)
Cons	-0.0001788(.714)	.0006702(.750)
Variance equation		
ARCH	.5918407***(.000)	.4805702***(.000)
GARCH	.1514514**(.019)	.1975124**(.041)
Cons	.0000488***(.000)	.0007873***(.000)
Log likelihood	935.3257	529.0618

PFE: Pfizer returns; MRNA: Moderna returns; NDQ: NASDAQ returns; VIX: variation of VIX; ISEE: ISEE returns; ARCH: ARCH: parameter; GARCH: GARCH parameter; Cons: constant. Significance level: ***0.001, **0.05, *0.1. N: 299. Period range: January 3, 2019 – March 10, 2020

Table 4: GARCH estimation results COVID period [4].

Variables	PFE	MRNA
Mean equation		
NDQ	.3367661**(.000)	.400188**(.083)
VIX	-0.0491411**(.005)	.0308231(.641)
ISEE	-0.11166**(.008)	-.0027696*(.816)
Cons	-.0008985(.410)	.0057009(.114)
Variance equation		
ARCH	.0672161*(.082)	.240279**(.002)
GARCH	.8161816***(.000)	.6770661***(.000)
Cons	.0000357***(.254)	.0003265**(.035)
Log likelihood	622.6255	356.9946

PFE: Pfizer returns; MRNA: Moderna returns; NDQ: NASDAQ returns; VIX: variation of VIX; ISEE: ISEE returns; ARCH: ARCH: parameter; GARCH: GARCH parameter; Cons: constant. Significance level: ***0.001, **0.05, *0.1. N: 299. Period range: March 10, 2020 – February 12, 2021

The ARCH in Tables 3 and 4 demonstrates that the volatility of T₀ has an effect on the volatility of T₁. In addition, a comparison of the GARCH for Pfizer and Moderna demonstrates that various corporations react differently to market volatility during the COVID. The GARCH model also provides a comparison between the pandemic's onset and its duration. Prior to the pandemic, the volatility of T₀ was greater than that of the market; however, during the pandemic, the situation was reversed. According to the research conducted by Backer, the reason may be the COVID-related constraints on the mobility of traders [4]. Moreover, data indicates that Pfizer is more affected by market volatility than Moderna. This statistic further demonstrates that corporations respond differently in the stock market compared to the general market.

2.2. The Market Sentiment Influence on the Returns of Pfizer and Moderna

In recent years, researchers have discovered that investor sentiment about the market has a strong correlation with the stock's financial performance. The impact of sentiment on U.S. markets, such as the S&P 500, has been analyzed [4]. The satisfaction of investors has become a crucial aspect for examining the reasonable market state, particularly in the face of major occurrences such as COVID. In 2011, the ISEE sentiment index was utilized to assess traders' perspective on international stock exchanges with extended put options. Numerous earlier research have demonstrated that investors make irrational decisions as a result of media-hyped news about big occurrences. Haroon and Rizvi discovered a high positive correlation between panic and the volatility of indices of industries most impacted by the pandemic [5]. In addition, the confidence of investors in biopharmaceutical firms has led to a polarization of the financial products portfolio.

The association between ISEE, VIX, and NASDAQ decreases prior to and during the COVID, as shown in Tables 1 and 2. This information substantially supports the claim that Moderna's returns are significantly influenced by investor opinion.

The influx of market-appearing data is a further element that influences investors' outlook on the market as a whole. During the COVID, the public's interest in biopharmaceutical firms accelerates. According to the research of Huberman and Regev [6], despite the fact that there is still a time lag between when events occur and when they are reported in the media, the public is still extremely interested in all company-related news. This phenomena explains why investor sentiment has such a substantial impact on the stock market.

3. Discussion

The analysis comes to a close with a comparison of how well two different biopharmaceutical companies performed on the stock market before, during, and after the pandemic. This article goes into market sentiment as well as the market volatility index (VIX) (ISEE). Pfizer's return was impacted by the VIX; however, during the COVID period, the ISEE was more closely tied to the return. Since the return on investment for Moderna Company has already been affected by VIX and ISEE, the return is not going to be affected by any new variables. Investors believe that investing in Pfizer can help them maximize the value of their portfolio more than investing in Moderna can. This belief is based on the information presented here.

More evidence has shown that sentiment is an important factor influencing investors' attitudes toward the market during the pandemic. Because Moderna is defined by the ISEE factor, investor decisions about this stock are heavily influenced by media coverage. Pfizer and Moderna's stock prices skyrocketed in the aftermath of the mRNA vacancies being announced. Furthermore, the rising trend will last for a long time, outlasting news sensitivity. This fact raises an interesting point: even if other biopharmaceutical companies do not have such exciting news about vacancies, general market prices continue to rise during the period. This fact demonstrates that there is a correlation between different biopharmaceutical companies, also known as the 'contagion effect' [3]. The GARCH model also showed that the Pfizer NASDAQ and the Moderna NASDAQ were both affected by the pandemic's contagion.

4. Conclusion

This paper concludes the work on quantifying the stock market performance of biopharmaceutical companies. The concept of the 'paradoxical spiral' raises the question of which researchers want to solve or find a better answer [3]. Although the results show that VIX and ISEE differ in the returns of Pfizer and Moderna, the overall significance of the biopharmaceutical sector cannot be overstated.

Thus, policymakers could use these figures to develop a more reasonable and long-term strategy for realizing the 'green economy'.

This paper, however, has some limitations. To begin, there has been other research on stock market performance in other sectors, such as tourism and food, that are closely related to the pandemic crisis, and this article does not include this information as a variable of contagion effect. Second, during the COVID period, at least 20 representative companies in the biopharmaceutical sector are authorized to offer the vaccine. Further research on these various companies from various countries could be conducted to gain a broader perspective of market performance prior to and during the pandemic. Finally, the ARCH and GARCH models used to analyze the volatility of return for the market and company are not always adequate in real-world situations [7]. Because the market is more dynamic and complicated, the model discussed in this paper is insufficient to provide a comprehensive picture of biopharmaceutical companies in the period of pandemic.

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