

How Vaccine News Affects the Analysis of Its Company's Stock Market: Based on Pfizer's Big Data Analysis

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Abstract: The COVID-19 epidemic is a devastating public health crisis around the world and many countries are suffering from the spread of its virus. In the COVID-19 pneumonia epidemic, China and the United States are the two most concerned countries in the world. A breakthrough has been made in the development of a vaccine for COVID-19. However, the COVID-19 vaccine's false and misinformation symbiosis, the public opinion environment is bad, for the public. There are many adverse reactions to the effectiveness of the COVID-19 vaccine and vaccination. There are widespread concerns. But the countless challenges that media organizations face in journalism. In the face of war and crisis, he showed his tenacity and adaptability. Noodle in such an environment, how should the public media treat vaccine reports? There should be a continuing demand for the COVID-19 vaccine in the industry of vaccines and drugs. Taking the Pfizer company as an example, this paper discusses in detail how vaccine production affects its companies' stock market.

1. Introduction

The COVID-19 epidemic is a severe public health crisis in the whole world. Statistics have shown that there were 175,284,099 cases of infection and 3,785,243 cases of death last year [1]. The whole world is suffering from spreading the virus and trying to come out with solutions. Since the end of 2019, the virus has been found in Wuhan, the capital city of Hubei Province in China. On 11 February 2020, the World Health Organization officially named the disease "Coronavirus Disease 2019 (COVID-19)" [2]. After a year, Pfizer, Moderna, and Johnson & Johnson, invested in the US, had been approved by FDA Emergency Use Authorization (EUA). With the development and deployment of the vaccines, how does the production affect its companies' stock market? Has Pfizer, as the world's largest pharmaceutical company, been affected by the news in the vaccine industry?

This article combines qualitative and quantitative methods based on agenda-setting theory, and analysis of the mainstream media of China and the United States, Xinhuanet and The New York Times, in the COVID-19 epidemic. Miao's news report topics start from the attribute level and compare topics from the reporting perspective, understanding the macro mechanism of media construction of information. This article links the agenda-setting theory with the guidance of national public opinion.

In the future, the media will provide a scientific basis for emergency public opinion control and external communication. It is conducive to strengthening the scientific communication capabilities of the media and prompting the media and the government to form as a result of collaborative crisis management.

Financial securities have become an important part of China's national economy. Undeniably, an important sign of market system reform has achieved a decisive victory, but also realize that market is a long-term process, for the "new plus track" characteristics are still obvious Chinese stock market, from "policy guidance" to "market leading" has a long way, the news media have the impact on the stock market, only the market system, investors mature investors, listed companies, "market leading" is possible. At present, "the market structure is unreasonable, the news media information disclosure is not standardized, the investor behavior is lack of rational, the degree of marketization is not high,

the stock market is affected by the policy characteristics of excessive trading, soaring and tumbling phenomenon often appears, many immature securities market characteristics in China's stock market influence still exists.

2. News Impact Stock of Pfizer

From the Candlestick chart of Pfizer (NYSE: PFE), the trend from March 2020 to May 2021 had gone up and down in the whole period. Some of the news on vaccines had potentially stimulated the stock price of Pfizer. On Nov 9, 2020, Pfizer and Biotech announced the vaccine candidate against COVID-19 is more than 90% effective in preventing the virus. Pfizer's stock price began to soar nearly 8% on Monday and fell 1.33% on Tuesday. On Nov 11, 2020, the CEO of Pfizer, Albert Bourla, sold \$5.6 million worth of stock which is 62% of his stock, the stock price on Nov.11 decreased by 1.81% [3]. On Dec 2, 2020, Pfizer and Biotech achieved the first authorized vaccine against COVID-19 in the UK [4]. The stock price reached 40.80 USD per share which increased 3.5% from Dec.1st. Same on Dec.8th, Pfizer officially started the vaccination in the UK and the US regulator provided a positive review on the Pfizer vaccine which bring the stock price to another peak of 42.56 USD per share [5]. The stock between December 2020 to March 2021 is mostly on a downward trend with less breaking news on the development of vaccines. On March 9th, the study supported the Pfizer vaccine maintains the high effectiveness on the newly discovered contagious variant in Brazil. The stock price started to climb stably. Recently, on May 5th, the Biden Administration decided to waive intellectual property protections with other world leaders for COVID-19 vaccines [6]. This action was opposed by many vaccine manufacturers including Pfizer. The stock price decreased by 1.26% on the next day. In general, the breaking news of vaccines does affect the stock market of the vaccine producer. As shown in Figure 1, Pfizer's share price has been affected and fluctuated.



Figure 1 Pfizer stock price.

3. Pfizer Stock and Market Competition

3.1 Analysis of the Trend of BNT162b2 in Pfizer Stock

Pfizer is a large biopharmaceutical company with a variety of income-generating businesses. The BNT162b2 vaccine candidate developed by Pfizer in cooperation with BioNTech became the first company in the United States to be approved for emergency use. According to the Full Year 2020 result from Pfizer, the revenue of 2020 is \$41.9 billion excluding Upjohn, a pharmaceutical manufacturing firm founded in 1886 in Kalamazoo, Michigan. On Nov 16, 2020, Pfizer made the transactions to combine Upjohn with Mylan N.V. from Viartis Inc which Pfizer officially spin off the Upjohn business. Pfizer stockholders will own 57% shares of Viartis stock, and Mylan stockholders own 43% of shares of Viartis stock after the transaction is concluded [7]. In the third quarter of 2020, Upjohn contributed \$1.9 billion which is 15% of its quarterly revenue of Pfizer. After splitting the Upjohn business, Pfizer will own more shares in Viartis and reduce corporate management expenses.

In the fourth quarter of 2020, Pfizer's revenues were \$11.7 billion which increased 12% from the fourth quarter of 2019. The BNT162b2 vaccine contributed \$154 million in sales [8]. The proportion of BNT162b2's income is 1.316% of the quarter's revenue.

In the first quarter of 2021, Pfizer is stronger than market expectations, and significantly improved its financial guidance. From the report, BNT162b2 gained 3.5 billion in revenue, leading Pfizer to increase the 2021 financial guidance of the BNT162b2 vaccine. Compared with the fourth quarter of 2020, BNT162b2 increased by 3.346 billion, over 22 times growth. Since the huge success of the COVID-19 vaccine, Pfizer recently updated its financial guidance from 70.5 billion to 72.5 billion [9]. It potentially determines that Pfizer is confident in the current vaccine market, and the future development of BNT162b2, even other types of vaccines. In 2021, with the recovery of the world economy, most countries will present a high demand for the COVID-19 vaccine. Pfizer is the leading medicinal company, UK, the US, Singapore, and Canada are the major countries deploying BNT162b2. Based on the potential of the COVID-19 vaccine, it will give the company significant benefits and advantages in a short time, but in the long run, dividend yield may become a large part of Pfizer's revenue. However, the future of COVID-19 vaccines is still immeasurable.

3.2. Competition with Other Vaccine Developers

During the world epidemic, COVID-19 vaccine-related stocks are highly sought by Stockholders. Moderna was established in 2010 and listed on NASDAQ in 2018. It is one of the global COVID-19 vaccine research and development companies. On November 30, 2020, Moderna announced that the effectiveness of the COVID-19 vaccine mRNA-1273 reached 94.1%, and the effective rate against severe COVID-19 pneumonia reached 100% and would apply to the U.S. Food and Drug Administration (FDA) on the same day Emergency use of the vaccine [10]. The stock continually increased to \$152.74 per share from Nov 24, 2020. Compared with the stock trends between Pfizer (PFE) and Moderna (mRNA) from Nov 9, Pfizer and Biotech announced more than 90% effectiveness of BNT162b2 to Dec 8, both the stock price of Pfizer and Moderna is climbing. It mainly contributed to the rapid development of COVID-19 Vaccines, the authorization of EUA by the FDA, and its recognition in nations.

The business size and character decide the development of a company. Pfizer was originally founded in New York in 1849 by Charles Pfizer and Charles F. Erhart. It has grown from the early mass production of citric acid and penicillin and has become a major pharmaceutical company through the development and production of drugs and vaccines in the field of immunology, oncology, cardiology, endocrinology, and neurology. Pfizer has been at the forefront of the global mass production of drugs before the launch of the first new COVID-19 vaccine. Pfizer's product lineup brings steady revenue extension. Its operational growth is strongly supported by Vyndaqel/Vyndamax, Eliquis, Oncology Biosimilars, Ibrance, Prevenar 13, Inlyta, Xeljanz, and Xtandi [8]. In the first quarter of 2021, BNT162b2 contributed approximately one-third of the quarterly revenue which boosted 45% from \$10 billion to 14.6 billion in last year's Q1. Moderna is a biotechnology company established in 2010 which is located in Massachusetts. It primarily focuses on the development of mRNA technology. As stated by the First Quarter of 2021 Financial Results from Moderna, the product of mRNA-1273 gained \$1.7 billion in the first quarter of 2021 with a total revenue of \$1.9 billion [11]. The contribution of mRNA-1273 accounted for 89.47% of total income in Q1, 2021. The revenue ratio of the COVID-19 vaccine for Pfizer and Moderna is approximately 1:3. Subsequently, the revenue difference and degree of profit between the vaccine companies is vastly conspicuous.

According to the data results on the topic of the "Scientific Achievement" of the COVID-19 Vaccine, in order to avoid potential conflicts of interest from being questioned by the public, the mainstream media of the two countries emphasized the attribute of "professional authority" when reporting the results of vaccine research and development. Xinhuanet used the internationally recognized authoritative medical journal "The Lancet" countered the false speculations about China's vaccine achievements by the country, and the New York Times emphasized that the federal government's law enforcement agency, the US Food and Drug Administration (FDA),'s authoritative certification shows that the vaccine's safety and effectiveness reason. Faced with the public's concern

about the rapid development of vaccines and doubts about their effectiveness, Xinhuanet ranked "data", "clinical trials" "volunteers" and other essential experimental steps in front of the attributes, indicating vaccine research. At the same time, it refers to the positive emotional attribute words such as "effective" and "safe" to convey safety signals to the public. The New York Times returned to science itself, popularized the development process of mRNA vaccines to the public, and bridged the knowledge gap in scientific communication. The media of both countries used scientific evidence and professional guarantees to make vaccines pregnant. The false rumors of the doubters are self-defeating, enhancing good public opinion guidance and the social consensus

4. The Impact of Information on Pfizer Shares

This study is about news events, so when selecting samples, the event first determines the policy behavior of the management authorities (such as changes in stock trading rules, adjustment of stamp duty, and important remarks made through the news media, etc.) There is some impact on performance. Policy events may or may not have an impact on the entire stock market, exploring only the policy events that should have an impact on the stock market here. The so-called "should have influence" refers to the theoretical analysis, of this kind of policy events on the stock market securities issuance speed and scale, capital supply, listed company profits, shareholder interests, transaction costs, and volume, such as suspension of stock issuance notice, company tax reduction, limit policy events such as stock policy events. This study only addresses the impact of epidemic event news on Pfizer Company, while policy events on other stocks are not used as a sample of analysis.

Table 1 Effect on the stock market by categories case.

Event type	Number of events	Number of significant events	Rate of significant events	Average return volatility
Supply of funds	29	5	17.2%	0.017
Interest rate adjustment	25	4	16.0%	0.006
Supply of securities	16	4	25.0%	0.028
Media articles	6	3	50.0%	0.012
Market Rules	32	4	12.5%	0.024
Trading Rules	14	2	14.3%	0.078
Trading Fee Rate Adjustment	13	0	0.0%	0.007
Regulations	5	2	40.0%	0.007
Market Regulation	20	3	15.0%	0.014
Other	11	1	9.1%	0.002
Total	114	20	17.5%	0.020

As can be seen from Table 1, changes in trading rules such as rise and fall restrictions have the biggest impact on the market, with average return fluctuations as high as 0.078.

5. Conclusion

During the world epidemic, there may be continued demand for the COVID-19 vaccine in the industry of vaccines and drugs. In general, the news does impact the stock market in the short term. The stock price of vaccine companies is based on their phased research process and major success in development. Besides other products, COVID-19 vaccine revenue may account for a larger proportion of the company's total revenue, and elucidate advantageous benefits to the companies in the next three quarters of 2021. The whole trend of Moderna and Pfizer is relatively stable with the

potential possibility of climbing in the following years until a significant improvement in the global epidemic.

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