Fundamental Stock Analysis in COVID-19 Vaccines Industry

Zixuan Xiong[1, *]

[1]Morrissey College of Arts and Sciences, Boston College, Boston, United States

*Corresponding author: xiongzf@bc.edu

Abstract. The COVID-19 keeps rampant in the human society from 2018 till now. Under the spread of the contagion, coronavirus vaccines are crucial factors to control the outbreak of the disease. Meanwhile, whether investing in companies developing COVID-19 vaccines becomes the research focus among investors. In this paper, fundamental stock analysis is applied as a method to investigate which companies in COVID-19 vaccine industry has the most promising prospect and will perform better in the future. The analysis of stocks is based on four aspects: valuation, profitability, growth, and payout, where the corresponding indicators are price to earnings ratio, earning per share growth, return on asset and equity, and dividend yield. After comparison of indicators of the main companies in the U.S. vaccine industry, suitable underlying assets are suggested to different types of investors. However, there are some limitations for using financial ratios to predict the future stock price in consideration of social fluctuations and fiscal policies. Therefore, further research ought to focus on how to combine fundamental stock analysis with technical method and social factors. These results shed light on guiding further exploration of stock selection based on fundamental analysis.

Keywords: Fundamental Stock Analysis; Quantitative Analysis; Relative valuation techniques; COVID-19 Vaccines.

1. Introduction

Fundamental analysis is a basic investment method, involving performing a quantitative analysis based on financial indicators in the aspects of assets, liabilities, revenue, profits, and shareholders' equity after thoroughly probe into companies' financial statements [1-5]. Financial analysts work on estimating stocks' intrinsic value based on public data and compare the value with the stocks' current market price to find and invest the undervalued stocks to earn profits. As shown in Fig. 1, the analysis starts with the macroeconomic factors (e.g., the overall condition of economy and the prospect of stocks' industries); then, analysts focus on micro aspects of the stocks they select (e.g., the efficiency of the companies' management and the value of financial ratios) [6-8]. Thus, by combining the macro and micro view, investors can use profits margins, return on equity, and other data available in companies' financial statement to estimate the companies' underlying value and gain insight into the future performance of the stocks.

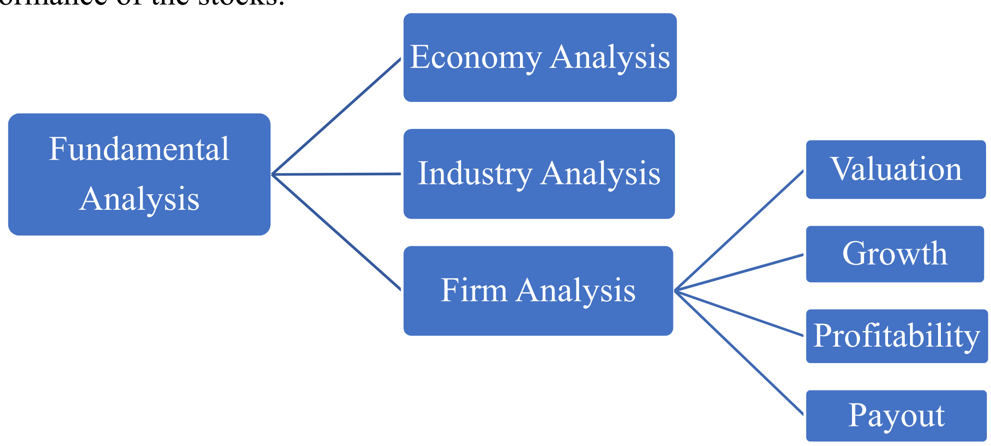

Fig. 1 Process of Fundamental Analysis

Under the circumstance of spreading COVID-19, the coronavirus vaccines become the central point among both society and financial market. Although there are different ways of predicting stock performance, fundamental analysis is a frequently used tool among common people who want to adapt to the situation and invest the companies providing COVID-19 vaccines. Compared to technique analysis that mankind needs to gain insight into computational method, fundamental analysis is simpler and it saves more time for ordinary people who have jobs.

In the existing coronavirus vaccine industry, there are four top companies playing crucial roles in developing effective vaccines to reduce the rate of infection: Pfizer, BioNTech, Moderna, and Johnson & Johnson. The vaccine developed by Pfizer and BioNTech is the first vaccine to receive FDA Emergency Use Authorization (EUA) in 2020, and the Moderna vaccine follows. The Pfizer-BioNTech vaccine and Modena vaccines are tied as the most widely known and administered vaccines in the United States, and the three companies are the key beneficiaries in the fight against COVID-19. Johnson & Johnson's vaccine is the third to gain EUA in America, but unlike Moderna vaccine and Pfizer-BioNTech vaccine, investors only need to take a single dose to take effect. Although J&J's vaccine is not as widely administered as other two vaccines, it is still a popular investment target among long-term investors because of its diversified pharmaceutical and medical devices. For exploring the most promising stock among the four companies which all have advantages in different aspects, many experts in financial realm have already done analysis of these companies. However, seldom researches compare the popular coronavirus vaccine stocks together.

In order to explore the stocks worth investing in vaccine industry, the fundamental analysis is utilized in this study to compare the financial indicators of top 4 vaccine companies and an investment suggestion will be given to investors. The rest part of the paper is organized as follows. The second part will introduce the common fundamental indicators used in analysis, and the third part is the comparison of each companies' fundamental indicators in the aspects of valuation, growth, profitability, and payout. Besides, this paper will represent limitations of using fundamental analysis and prospects of improvement, and finally will reach a conclusion.

2. Fundamental Indicators

For assessing companies' performance of business operation, fundamental analysts always utilize few outstanding financial ratios of the firm in 4 dimensions as shown in Fig. 2. The following is introduction of indicators that will be used in the further analysis of 4 vaccine stocks.

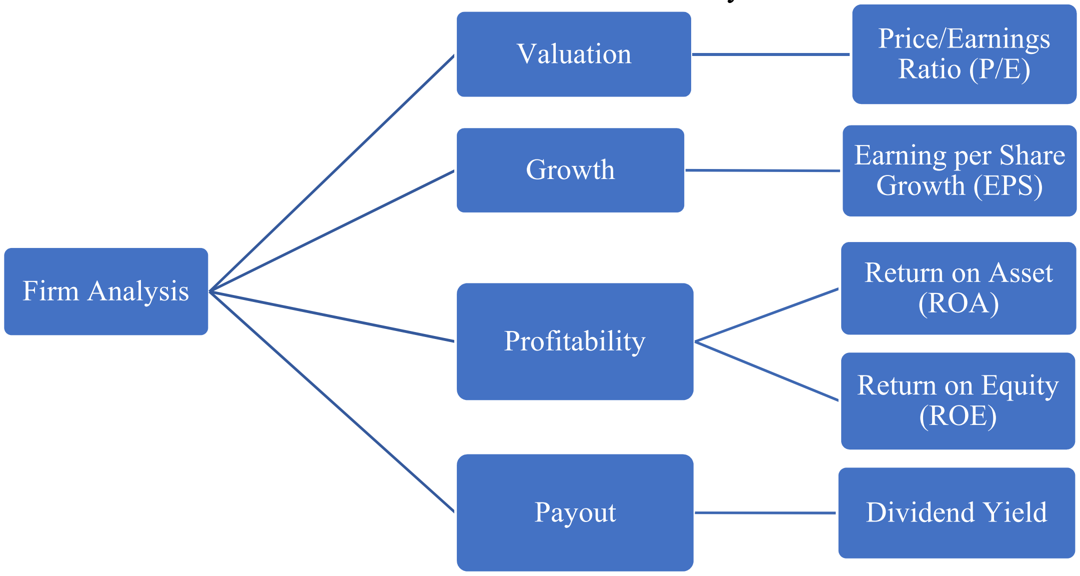

Fig. 2 Process of analyzing firm

Price to earnings ratio is widely used in evaluating the value of stocks within same industry and with similar features. It measures stocks' market price relative to their per-share earnings, indicating whether a stock is overvalued or undervalued in the market. A low P/E ratio means a company is probably undervalued or the company is performing well in relation to its past outstanding performance, which is attractive to investors [9]. Moreover, it is shown that P/E is significantly negative indicators of firm performance by using the ordinary least square regression logarithm.

Besides, there is a strong negative impact of P/E ratio on EPS and ROE, which means stock with lower P/E has higher EPS and ROE, the sign of worth-investing companies [9]. The formula of P/E is:

$$P/E = \frac{Market\ value\ per\ share}{Earnings\ per\ share} \tag{1}$$

The growth of earnings per share measures the growth of profitability of firms and it denotes that the profit earned by companies for each outstanding share. A higher EPS indicates that investors are willing to pay more for shares of the companies' stock, meaning investors have high expectation for the company to grow in the future. Stocks with higher EPS are considering more promising and more desirable for investors and shareholders. The formulae for EPS and EPS growth are:

$$EPS = \frac{Net\ income\ after\ tax}{Total\ number\ of\ outstanding\ shares} \tag{2}$$

$$EPS\ Growth = \frac{EPS\ in\ next\ year - current\ EPS}{Current\ EPS} \tag{3}$$

The ratio of return on asset is the product of net profit margin and asset turnover ratio. Return on equity is the product of ROA and financial leverage. Both ROA and ROE evaluate the profitability aspect of stocks and the companies' efficiency to use assets to generates profits. According to Liargovas and Skandalis, higher ROE and ROA have significant impact on increasing a firm's competitiveness [10]. The idea is further confirmed by researcher Tsiapa that more efficient management of total assets and higher financial leverage ratio correlate with higher profitability earned by companies especially during arduous period [11]. The formulae calculate ROA and ROE are:

$$ROA = Net\ profit\ margin \times Asset\ turnover\ ratio = \frac{Net\ income}{Revenue} \times \frac{Revenue}{Average\ total\ assets} \tag{4}$$

$$ROE = ROA \times Financial\ Leverage = ROA \times \frac{Average\ assets}{Average\ equity} = \frac{Net\ income}{Average\ Equity} \tag{5}$$

Dividend yield estimates investors' return of shares based on dividends paid relative to market price per share. Dividend is regarded as a sign that company managers have positive expectation for earnings in the future. Besides, dividend yield is important when compare companies with similarities in many aspects, and companies with increasing trend of dividend yield are more attractive for companies since it shows companies' ability to make payout to investors over time. Dividend yield is computed as follows:

$$Dividend\ yield = \frac{Dividend\ per\ share}{Current\ market\ price} \tag{6}$$

3. Analysis

3.1 Valuation Analysis

Pfizer performs better than others in the valuation aspect. Its P/E ratio are relatively stable for long period and lower than others, while BioNTech and Moderna only has few years history and their P/E value is negative, which means they have negative earnings, until year 2021 in which coronavirus vaccine they developed became a huge success. According to the data shown in Table. 1 provided by finbox, Pfizer's latest 1 year P/E ratio is 8.6x, which is much lower than that of past 6 years. It shows a decreasing trend of P/E for Pfizer, meaning that the firm's price is low compare to its earnings per share and the firm is probably undervalued. Therefore, it has the potential to bring investors profit in the future.

Table 1. P/E ratio of 4 vaccine stocks.

	2016	2017	2018	2019	2020	2021
Pfizer	31.4	22.1	10.6	13.4	965.1	17.0
BioNTech	N/A	N/A	N/A	-55.9	-39.2	7.3
Moderna	N/A	N/A	-16.8	-12.2	-69.2	14.6
Johnson & Johnson	19.7	23.7	224.5	27.1	24.4	25.2

3.2 Growth Analysis

From the growth aspect, earning per share of BioNTech and Moderna increases sharply in 2021 seen from Table. 2, which is 65228.1% and 1644.3% higher than the same time in 2020. Both Pfizer and Johnson & Johnson also have increasing EPS in 2021, although it's not as substantial as growth of EPS of BioNTech and Moderna. The similar aspect of the 4 companies is that their EPS value have fluctuations from negative to positive during 2016-2020. It's not clear which stocks are valuable for investing using EPS index until in 2021 there is explicitly ascend trend showing in stocks' price.

Table 2. EPS Growth of 4 vaccine stocks.

	2016	2017	2018	2019	2020	2021
Pfizer	5.1%	201.2%	-46.8%	51.5%	-42.7%	138%
BioNTech	N/A	N/A	N/A	-236.3%	107.6%	65228.1%
Moderna	N/A	-10.3%	-18.4%	68.7%	-26.3%	1644.3%
Johnson & Johnson	8.7%	-92%	1081.3%	0.2%	-2.2%	41.9%

3.3 Profitability Analysis

As given in Table. 3, for Pfizer and Johnson & Johnson, the return on asset in the last six years are all positive with relative higher stabilization, indicating that the two firms have higher management efficiency in using their assets to earn profits. On the contrast, for BioNTech and Moderna, only in year 2021 their ROA significantly increased to nearly one hundred percent. Similarly, when investors compare return on equity, Pfizer and Johnson & Johnson remained higher value of ROE than others from 2016 to 2020 (as summarized in Table. 4), while BioNTech and Moderna were explicitly on a huge upward trajectory and raised to near 150% in year 2021.

Table 3. ROA of 4 vaccine stocks 2016-2021

	2016	2017	2018	2019	2020	2021
Pfizer	4.3%	12.4%	6.8%	9.8%	5.7%	13.1%
BioNTech	N/A	N/A	N/A	-24.7%	1.0%	113.4%
Moderna	N/A	N/A	-25.3%	-28.9%	-16.7%	76.2%
Johnson & Johnson	12.0%	0.9%	9.9%	9.7%	8.8%	11.7%

Table 4. ROE of 4 vaccine stocks 2016-2021

	2016	2017	2018	2019	2020	2021
Pfizer	11.6%	32.6%	5.7%	16.9%	10.5%	31.9%
BioNTech	N/A	N/A	N/A	-47.2%	1.6%	155.2%
Moderna	N/A	N/A	-52.5%	-38.0%	-40.0%	146.1%
Johnson & Johnson	23.4%	2.0%	25.5%	25.4%	24.0%	30.4%

Moderna's huge increasing in return on asset and equity is because it was not well known in the pharmaceutical industry before the pandemic, but the development of the vaccine has led to huge profits and a soaring stock price for the company, i.e., Moderna's stock price increased from $19.56 per share on December 31, 2019 to $253.98 per share on December 31, 2021. For BioNTech, its headquarters was established in Germany in 2008, and its branch was listed in the US stock market in 2019, coinciding with the novel coronavirus spreading, and this explains the reason the company performs not well in 2019. It is extraordinary for a new company to make huge profits just two years after going public. Although BioNTech's success is largely depending on appear of COVID-19, the company quickly chose to cooperate with Pfizer and was able to produce a vaccine with 95% prevention capacity, reflecting the company's high vision and sufficient resources which may possibly lead growth of the company in the future.

3.4 Payout Analysis

Only Pfizer and Johnson & Johnson has dividend payout, and Pfizer seems more attractive for investors since it consistently pays high dividend to investors as shown in Table. 5. The reason why BioNTech and Moderna don't pay dividends is because they are in rapid growth and want to utilize more assets to invest as much as possible for further growth.

Table 5. Dividend Yield of 4 vaccine stocks.

	2016	2017	2018	2019	2020	2021
Pfizer	5.1%	4.7%	4.0%	4.5%	4.5%	2.8%
BioNTech	N/A	N/A	N/A	0%	0%	0%
Moderna	N/A	N/A	0%	0%	0%	0%
Johnson & Johnson	3.2%	2.7%	3.1%	2.8%	2.7%	2.5%

4. Suggestions

For value investors, they can invest in Pfizer and Johnson & Johnson because of their relative lower price to earnings ratio, relative stable high return on asset and return on equity, and consistent high dividend payout. For growth investors, they can choose Moderna and BioNTech, since they have enormous potential to develop in the future but this comes with more risk. However, the prospects of vaccine stocks are largely relying on the products they are planning to develop in the future. Some people may worry about whether vaccine stocks lose values after people's fear on COVID-19 wane, but in real life, the novel coronavirus has already mutated, and we cannot ensure whether it will mutate in the future. Therefore, the demand for vaccines will continue to exist for a long time, given the slow anti-epidemic progress in American society. In addition to novel coronavirus, many vaccine companies are developing other vaccines that still need investigation and research. According to U.S. News, researches for developing new vaccines against influenza, pneumonia, human immunodeficiency virus (HIV), monkeypox and cancer are in progress, and health care stocks are expected to get more returns in the second half of 2022. For example, now Moderna is delving into developing a new type HIV vaccine and starting clinical trials in Africa. Karen Andersen, Morningstar sector strategist, said that Moderna is undervalued because its potential to develop update COVID vaccines and additional respiratory virus vaccines in the near future. Moderna, Pfizer, BioNTech, and Johnson & Johnson are all in the progress of developing effective vaccines on other diseases, and their earnings depends on the effectiveness and authority of vaccines.

5. Limitations & Prospects

Although analyzing financial ratios is fundamental method for comparing stocks and it provide firms' past performances and help detect future performance for common investors, investors need to understand its limitation and problems. Firstly, the calculation of financial ratios can easily make mistakes that if some factors are missing or mis-collected when calculating, the financial ratios will in error [12]. Besides, firm managers could deliberately manipulate the data in financial statements to make the firm more attractive to investors, like changing the way of calculating depreciation to increase profits or assets [12]. In the meantime, financial markets are constantly changing, and sometimes one never knows the trend of certain stocks until a drastic change comes along.

On account of the existing inaccuracy and unpredictability, there is some improvements people can consider when they invest stocks in the future. To avoid inaccuracy, investors need to scrutinize notes of firms' financial statements, especially changing accounting principles or accounting estimates because of economic events [12]. To decrease unpredictability, researchers should find ways to avoid the effect of outliers when analyzing the trend of ratios, or investors could use more advanced technical analysis to help them make more rational decision. At the same time, the supervisor who makes the rules of the disclose of company's financial statements can strengthen the supervision and improve the rules to reduce the possibility of firms' fraud.

6. Conclusion

In conclusion, this paper investigates the difference in performance of vaccine stocks of Pfizer, BioNTech, Moderna, and Johnson & Johnson based on fundamental analysis. Specifically, few powerful financial indicators are introduced primarily. Then, the data on the firms' financial statements are gathered for calculation of indicators. After comparison of the indicators, the value investors can invest in Pfizer and Johnson & Johnson for its safe and stability, while growth investors could choose Moderna and BioNTech owing to their huge potential of prospect. Although the fundamental analysis has inaccuracy and some unpredictability, investors can decrease the mistakes by carefully paying attention on notes of financial statements. The fraud of financial statements can be avoided by increasing supervision of managers of GAAP. Overall, these results offer a guideline for further analysis and comparisons on vaccine stocks selection.

References

[1] Drakopoulou V. A review of fundamental and technical stock analysis techniques. Journal of Stock & Forex Trading, 2016, 5.
[2] Nti I K, Adekoya A F, Weyori B A. A systematic review of fundamental and technical analysis of stock market predictions. Artificial Intelligence Review, 2020, 53(4): 3007-3057.
[3] AS S. A study on fundamental and technical analysis. International Journal of Marketing, Financial Services & Management Research, 2013, 2(5): 44-59.
[4] Utami W, Nugroho L. Fundamental versus technical analysis of investment: Case study of investors decision in Indonesia stock exchange. The Journal of Internet Banking and Commerce, 2017: 1-18.
[5] Cohen G, Kudryavtsev A, Hon-Snir S. Stock market analysis in practice: Is it technical or fundamental?. Journal of Applied Finance and Banking, 2011, 1(3): 125.
[6] Janssen C, McClure B. Fundamental Analysis, 2015, retrieved from: https://www.investopedia.com/terms/f/fundamentalanalysis.asp.
[7] Mukherji S, Dhatt M S, Kim Y H. A fundamental analysis of Korean stock returns. Financial Analysts Journal, 1997, 53(3): 75-80.
[8] Abad C, Thore S A, Laffarga J. Fundamental analysis of stocks by two-stage DEA. Managerial and Decision Economics, 2004, 25(5): 231-241.
[9] Naknok Sakchai. Firm Performance Indicators as a Fundamental Analysis of Stocks and a Determinant of a Firm's Operation. International Journal of Economics & Business Administration (IJEBA), 2022, 10(1): 190-213.
[10] Liargovas P., Skandalis K. Factors affecting firm competitiveness: the case of Greek Industry. European Industrial Journal, 2010, 2: 184-197
[11] Tsiapa M. Performance of large firms in Greece during the unstable period of 2011- 2016: lessons from the weak parts of Europe. European Journal of Management and Business Economics, 2021, 31(1): 94-114.
[12] Joseph Faello. Understanding the limitations of financial ratios. Academy of accounting and financial studies journal, 2015, 19(3): 75-85.