

# Predictions for the Revenue Status and Valuation of Biotechnology Companies Based on PEG Model

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**Abstract.** By the time of 2023, the world is recovering from the pandemic of COVID-19. The infection of COVID-19 has become regular and under governments' control, the world is entering post-pandemic era. During the time of the pandemic, the crisis had led to a significant increase in the revenue and valuation of biotechnology companies. However, the peak of demand has been reduced, the market is concerning about the future of these companies. This study will investigate the revenue status and valuation of biotechnology companies now, by using PEG model. According to the current situations and data, the predictions of the future will be presented as well. Based on the analysis, the peak of revenue gained and valuation of biotechnology companies have passed. The pandemic has laid an excellent foundation for them, some of the firms may successfully transfer their production capacity into other medical products also demanded in post-pandemic era, maintaining their level of revenue and valuation. However, for the most companies in this industry, it is expected that they will experience a downward trend. Overall, these results shed light on guiding further exploration of significance for the prediction and analysis of the future development of biotechnology companies and the further exploration of the way that investors choose good biotechnology companies as value investment targets.

**Keywords:** Biotechnology companies; valuation; PEG estimation.

## 1. Introduction

By the end of 2019, there is a global epidemic of COVID-19 that is out of control and widely spread. In the beginning, there is no specific medicine to treat this disease. Therefore, many biotechnology companies launched the program to develop medical supplies to reduce the viral transmission. As a result, many biotechnology companies experienced a significant increase in their market value and stock. Same trend also experienced by the market size year by year. With the gradual improvement of epidemic prevention and control, the average income of citizens is also rising sustainably. COVID-19 has not only increased volatility in the stock market, but also creates hidden opportunities. In this environment, white horse stock with excellent performance showed a stronger and more sustainable trend, making more investors realized the importance of making value investment. Huilin Song and colleagues consider value investment can reduce the fluctuations of stock market [1]. At present, the Chinese economy is recovering gradually due to new epidemic prevention and control policies. In the post-epidemic era, the new policies guide enterprises to focus on themselves and return to the origin of investment, making value investment more viable [2].

There are very few essays investigating the effect of the outbreak of COVID-19 on biotechnology companies which is one of the major beneficiaries. This paper will take Chongqing Zhifei Biological Products Co., Ltd., Beijing Wantai Biological Pharmaceutical Co., Ltd., Chengdu Kanghua Biological Products Co., Ltd. and other typical profitable enterprises as examples. Mainly, the market capitalizations of this type of companies had experienced a significant increase. However, by the year of 2023 the virus is under control. Doubts of the long-term profitability and worries of over estimation has occurred in the market. Investors start to afraid the impact of decreasing demand of biotechnology

products. So, it is not only necessary but also extremely urgent to discuss about the current status as well as making prediction to the future development of biotechnology companies [3].

To summaries the rough perspectives, by studying price-earnings ratio and net profit growth rate, the market of biotechnology companies has showed a heathy environment and attract more and more investors, thus making the money flow stronger. Using these funds will be very beneficial to the research and development of new products as well as enhancing the exist product ecology. It also laid an excellent foundation for exploring new profit points and derivatives when the demand for medical products declined in the post-pandemic time as well as improve the ability of companies to resist all kinds of risks in the market.

To describe the structure of the essay, this paper will further analyze and predict the valuation of biotechnology companies in the post-epidemic time. First, the impact of the post-epidemic environment on the market and capital reserves of sample companies will be examined. Then, the PEG valuation model is used to value the sample enterprises. In addition, this study will also predict the market value of the sample companies and the future development of the industry in the post-epidemic period. Finally, the end of the article will discuss how investors pick a good biotechnology company as the target of value investment [4].

## 2. Methodology

We mainly use PEG valuation method in our analyzation. The Price/Earnings-to-Growth (PEG) valuation method is a financial analysis tool used to measure the relative value of a stock based on its current earnings and future growth prospects. The PEG ratio is calculated by using a company's Price-to-Earnings (P/E) ratio divided by its net profit growth rate [5]. To calculate the PEG ratio, first, one needs to find the P/E ratio of the company, which is calculated by dividing the market price per share by earnings per share (EPS). In the calculations, all the market price per share appeared will be the price when the annual report of the companies been released. Then, we need to find the earnings growth rate of the company over a specific period. All the data is obtained from financial statements announced and Sina Finance.

The general idea behind this method is that a company's P/E ratio should be in line with its expected earnings growth rate. A PEG ratio of 1 indicates that the company is fairly valued, while a PEG ratio of less than 1 indicates that the company may be undervalued, and a PEG ratio of more than 1 indicates that the company may be overvalued [5]. When it comes to the assumptions for the results of valuation. Same as Allison Gatlin, we think companies' stock price, earnings per share and retained profit, as the factors of valuation are highly related to the market demand for the medical resources [6]. In the prospective, the demand for medical related resources have experienced 3 stages. In stage one, during the end of 2019 to the first half of 2020, the demand was exceeded. Obversely, the medical industry all around the world had no prepare for such a great pandemic, so when the virus was first reported in China Wuhan, the central government of China had to allocate the resources nationally to assist Wuhan [7]. One can take Chongqing Zhifei Biological Products Co., Ltd as an example, because it is the company that has longest history on the market among the 3 examples. The most significant rise appear was experienced during June and July of 2020. The stock price was 100.15 CNY on 30th of June, but on the 31st of July, the price per stock has reached 186.00 CNY. So, it can be proved that the stock price of biotechnology companies is highly related to the demand for the medical resources as well as the development of the epidemic. As a result, it proves that we can determine the stock price of biological firms by looking for the trend of the demand of the medical resources.

In the second stage, the world sees the profitability of biotechnology industry. So, the stock price rose continuously and reached a peak of 225.45 CNY per stock on 30th of April of 2021. After that and until now, we are experiencing the third stage. The human society is trying our best to get recover from the COVID-19 and has already gain controlled from the endless mass spread of the virus [8]. Thus, in the predictable future, the demand for medical resources will decrease to a stage that above

2019 but below 2021. One of the most the most intuitive manifestation of this situation, which is also our assumption, the valuation of biotechnology industry will experience a downward trend. In fact, after April 30th of 2021, the stock price of Chongqing Zhifei Biological Products Co., Ltd showed a decreasing trend and fluctuated between 80 and 90 CNY during November of 2022 to February of 2023. However, there is always chances for biotechnology companies to maintain a strong trend in stock market as well as high valuation. COVID-19 has brought people's attention on the importance of medical resources. Hence, a great market has already be formed for biotechnology companies, if they can successfully transform their business from COVID-19 to other kinds of diseases and sicknesses. Apparently, not all companies got the chance to success in this kind of transformation. So, we consider the whole biotechnology industry will still experience an overall downward trend on their valuation and stock price.

### 3. Results & Discussion

#### 3.1 Chongqing Zhifei Biological Products Co.,Ltd.

According to the announcement releases by Chongqing Zhifei Biological Products Co.,Ltd. on 2023.1.12 [9], the data is obtained as shown in Table. 1, where the PEG value can be calculated as 50.65. A patent is invented by company individually and has been applied to related products. It may not have a great influence on the profit of the company recently, but it has laid a good foundation for the extension and derivative of the projects in the future. The announcement of 2023.1.19 has showed that recombinant mycobacterium tuberculosis fusion protein made by Zhifei has been involved in the medical insurance of China, it will contribute greatly to the market promotion and selling in the future [10]. Additionally, further develop the synergistic effect of the core products, building the consumer confidence of the firm and create positive effects, helping the government to control the spread of diseases. As a result, making more profit for Zhifei eventually.

**Table 1.** Chongqing Zhifei Biological Products Co., Ltd.2018-2021 annual report.

Data\Year	2018	2019	2020	2021
EPS (CNY)	0.91	1.48	2.06	6.38
The closing price by the day The report was released (CNY)	45.69	77.85	186.72	93.72
Retained profit (CNY)	1,451,366,528.14	2,366,438,733.29	3,301,326,830.15	10,208,548,452.56
Net profit growth rate	N/A	63.05%	39.51%	209.23%

Meanwhile, announcement showed Zhifei has deliberated through the proposal about renew the contract with Merck & Co., Inc. to supply, sell on commission and co-promotion [11]. The renewed contract has mainly extended the basic price of 5 vaccine products that already being allowed to sell in Mainland China from Merck & Co., Inc.. This action further insured the basic supply of the products. If it is proceeded normally, it will create a positive affect to the future profit and greatly improve the consumer's impression of Zhifei and market strength. On the other hand, the increased profit can be allocated to the research and development department, the increasing innovation of technology will make Zhifei a company that has stronger comprehensive strength. The investor relations activity sheet on 2023.2.13 has made public that the value of the renewed contract about 5 kind of vaccine products of Merck & Co., Inc. including HPV vaccine and pentavalent rotavirus vaccine is over 100 billion CNY [11]. It has ensured the basic supply of the related products in the next 4 years. Meanwhile, it enhanced the certainty of the company's development, this contract will provide a basic protection. To sum up, from the information provided, it can be illustrated that Zhifei has an optimistic revenue status, the structure of the company has being comprehended. Comparing with the value of PED, the end of great pandemic will only create a relatively small influence on its earnings.

### 3.2 Beijing Wantai Biological Pharmacy Enterprise Co.,Ltd

According to the annual reports announced by Beijing Wantai Biological Pharmacy Enterprise Co.,Ltd. the following data is shown in Table. 2, where the PEG value can be obtained as 75.35. In the 2021 annual report from Beijing Wantai Biological Pharmacy Enterprise Co.,Ltd., the data of earning per share is recounting by new criteria published. As a result, the data is different from it in 2020 one. In calculation, the data used is taken from the 2021 one. In addition, the Static price/earnings ratio is used, so in calculations the price of the stocks is the closing price by the day the annual reports were released.

**Table 2.** Beijing Wantai Biological Pharmacy Enterprise Co., Ltd 2018-2021 annual report.

Data\Year	2019	2020	2021
Earnings per share (CNY)	0.38	1.15	3.33
The closing price by the day the report was released (CNY)	N/A	248.85	275.99
Retained profits (10,000 CNY)	N/A	67,699.73	202,146.77

In the announcement of 2023.2.13, it was mentioned that Wantai has received the notification of clinical trial approval of 20-valent pneumococcal polysaccharide conjugate vaccine sent by National Medical Products Administration [12]. Recently, the vaccine has begun the period I clinic trial and recruited the first group of volunteers. Meanwhile, Wantai is confident that its nasal spray vaccine for COVID-19 will earn a significant number of revenues for Wantai. According to the announcement on 2022.12.6, it was confirmed that the nasal spray vaccine for COVID-19 invented with Xiamen University and University of Hong Kong has been approved for emergency use, it can be vaccinated as the 4<sup>th</sup> dose for COVID-19 [13]. The normalization of the virus will provide a sustainable demand for vaccines. Meanwhile, the nasal spray of COVID-19 vaccine provides mucosal immunity, which have differentiated competitive advantage and may result in increase of revenue. Moreover, the Wantai is making excellent progress in the research for the nine-valent HPV vaccine, new chickenpox and PCV20, these has increased its competitive potential. 2023.1.20 Wantai released 2022 performance report as shown in Table. 3, which can be considered as evidence of its excellent management. For example, the revenue was 11.185 billion yuan, increased 94.51% compared to 2021 and the net profit was 4.739 billion yuan, which also rose 134.44% [14]. Net profit excluding non-recurring gains and losses was 4.525 billion. The production of HPV vaccine which in high demand may be considered as one of the main reasons of the rapid growth of the salary of Wantai. Especially, Wantai is taking the lead of bivalent vaccine market. During 2022, the nucleic acid testing products are in high demand due to the governments' zero-covid policy [15]. Therefore, related raw materials and testing reagents have earned high revenue.

At present, the domestic demand for HPV vaccine is high, and the HPV vaccine is still experiencing a shortage. The bivalent HPV vaccine of Wantai is expected to release urgently. However, we must admit the research and develop of vaccine as well as examine and approve will take large amount of time and money. The future growth of Wantai is still uncertain. Even if the revenue of Wantai bivalent HPV vaccine can remain at current level, the overall environment will become more competitive. At present, Wantai may be experiencing a turning point of this stage. In fact, the financial statement of 2022 has already showed some hidden threat. It can be mainly concluded as the quarterly revenue has reached the ceiling, especially the revenue of the 1st quarter. (3.171 billion CNY). In addition, the receivables increased significantly in the first three quarters which mainly related to the vaccine marketing. Nevertheless, the development of the nine-valent HPV vaccine is experiencing clinical phase III and may become a new profit point. In conclusion, it is predicted that Wantai still got the chance to earn a good revenue, however it requires both time and opportunity.

**Table 3.** 2022 Annual performance.

Item	2022/Billion CNY	2021/Billion CNY	Growth Rate
Net profit attributable to shareholders of listed companies	47.39	20.2	134.44%
Net profit after deducting non-recurring gains and losses	45.25	19.46	132.59

### 3.3 Chengdu Kanghua Biological Products Co.,Ltd

According to the annual reports announced by Chengdu Kanghua Biological Products Co.,Ltd. the following data is shown in Table. 4, where the PEG ratio is 27.29. According to the information provided by Kanghua on 2023.2.6, the production capacity of ‘Kanghua vaccine production expansion project’ invested early is expected to be 6 million units per year [16]. Kanghua has accounted their development program on 2023.2.9. It was said that overall, Kanghua will make more effort on earning more market share, improving efficiency and building business reputation [17]. Subsequently, Kanghua will be concentrated in vaccine related services as well as enhance the quality control sector. To be exactly, Kanghua is taking further advantage of their existing foundation in rabies vaccine market. To achieve these goals, Kanghua is planning to keep increasing the spending on research or development sector, employing more high-valued developers and proceeding the existing projects by turning them into profit earned. Meanwhile, when optimizing the internal management, Kanghua is still seeking for the opportunity of external expansion, keeping a positive attitude towards to new profit points. In conclusion, all the decisions above is cutting the influence of decreasing demand for medical products in the post-pandemic period. Getting prepared for the reduction in revenue and help Kanghua to run sustainably in the future.

**Table 4.** Chengdu Kanghua Biological Products Co.,Ltd 2018-2021 annual report.

Data\Year	2019	2020	2021
Earnings per share (CNY)	4.15	7.77	9.21
The closing price by the day The report was released (CNY)	N/A	120.80	414.32
Retained profit (CNY)	186,686,665.96	408,046,268.44	829,477,810.74
Net profit growth rate	N/A	118.57%	103.28%

## 4. Suggestions & Implications

Accumulating large amount of funds and make sure of a healthy cash flow will be extremely important to prevent companies from facing very dangerous situation. In addition, when facing difficulties, they can make the company functioning normally. Overall, research and development sector will be well-worth investing after getting in to post-pandemic era, because improving strength in R&D will contribute to making new profit points and avoid companies from over relying on the revenue from providing COVID-19 products and services. On this basis, corroborating with universities and college may the most cost-effective way. Besides, it is also suggested that companies should enhance the management of firms, make ways to gain more market share, give a positive attitude towards exploring international exports and corporation with foreign investors, provide more innovative thinking when marketing, building a good reputation for the brand as well as improving emergency response for negative comments and news of the companies. Externally, over-watching the latest policies and direction of the country. These will make biological companies more competitive.

## 5. Conclusion

In summary, this paper investigates biotechnology companies based on PEG valuation method. According to latest situation, the demand for medical products, potential market, and total revenue will all be diminishing during the post-pandemic era. Nevertheless, the appearance of COVID-19 also reminds people about the importance of medical resources as well as biotechnology companies. So, the overall trend for these terms will be higher than 2019, bringing in more opportunity for biotechnology companies and making financing easier than ever before for them. As a result, it gives the chance for biotechs to develop more products and expanding production capacity. A buffer zone has been made for biotechs for facing the possible downward trend. Additionally, though the revenue of them cannot get back to the level during the pandemic in a short period of time, it has built an excellent foundation for biotechs to grow in the future. In this case, the future for the biotechs is still bright. These results point out the direction for the future development of enterprises to a certain extent, and provide guidance for investors to make rational investment judgments.

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