Enterprise Valuation Study: Taking Betta Pharmaceuticals as Evidence

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Abstract. China's Growth Enterprise Market (GEM) debuted on the international stage on October 30, 2009. As the main force of the ChiNext board, biopharmaceutical companies have been committed to the research and development of innovative drugs unlike traditional pharmaceutical companies that only do generic drugs, and because of this, the value evaluation of such enterprises will change to a certain extent. Such enterprises will turn more to value creation in their business models, and corporate integration will also be improved, which will lead to a further increase in mergers and acquisitions of GEM pharmaceutical companies, and these changes will also make the demand for valuation of biomedical companies listed on the GEM continue to increase. In this context, this paper combines various factors and decides to select Betta Pharmaceutical as a case to evaluate the value of the enterprise. The research in this paper has important practical significance for restricting the development of the industry.

Keywords: Corporate Value; R&D Investment; Betta Pharmaceuticals.

1. Introduction

In the valuation of enterprises, enterprises are often regarded as an entire economy, rather than the simple sum of each individual asset. Therefore, when evaluating the value of the enterprise as a whole, there is a big difference with the evaluation of individual assets. From the perspective of the overall value of the enterprise, the enterprise value evaluation often involves the correlation effect of the mutual influence of multiple assets within the enterprise, but the valuation of a single asset is relatively simple, without considering the comprehensive value of multiple asset portfolios. In addition, single asset valuation usually only starts from the value of book assets, and in reality, there may still be assets not included in the financial statements, so the value of the company is often larger than the sum of the assets on the book. This also shows that in the financial statements of enterprises, often do not reflect the residual income or off-balance sheet assets, the enterprise overall divided into a simple sum of individual assets is not appropriate. According to different evaluation purposes, there are two main types of enterprise value: market value and non-market value, divided from the evaluation method, absolute valuation method and relative valuation method are two main valuation methods. For example, discounted cash flow method and economic value-added method, which are all based on absolute valuation. The relative valuation method usually selects a specific index to measure the market value of the evaluated object, such as PE, PB and other indicators. In this paper, the EVA method is chosen to evaluate the existing value of the enterprise. The EVA method and the real option method have their own advantages and disadvantages and scope of application. The real option law mainly applies to emerging industries such as Internet companies and high-tech enterprises, while the application field of the EVA law is relatively broad. Select the specific case of Betta Pharmaceutical, and explain the representative of Betta Pharmaceutical in the biomedical industry of the GEM through the analysis of the basic situation of the enterprise, R&D innovation ability and real option characteristics. The EVA-BS model is used to value Betta Pharmaceutical, compare it with companies in the same industry, and introduce market value indicators to verify the applicability of the model. Different from the theory of shareholder's equity maximization, the theory of profit maximization takes more stakeholders into consideration, integrates the purposes of all parties, makes the benefits of all stakeholders reach a balance, and the returns of equity investment are correspondingly realized. However, because profit is reflected based on historical data, as a financial indicator, it cannot reflect the time value of funds and risks borne, let alone reflect the logic of

enterprise value creation. However, the one-sided pursuit of profit maximization often overshadows the vision of enterprise managers and leads to the separation of enterprises from their own strategic goals. Therefore, in practice, this theory usually does not occupy a major position in the theory of enterprise value. Based on the above two theories, the theory of firm value maximization should emerge from time to time. This theory starts from multiple perspectives, fully considers the interests of all parties, breaks the limitations of the above two theories, and takes into account the interests of shareholders, time value of funds, risk factors, and so on. It reflects the development potential and profitability of the company to a great extent. However, its difficulty lies in the complexity of operation and the need for a large amount of data support, which leads to the theory can only be used by listed companies. At the same time, because corporate value is difficult to define, a variety of theories and methods have been developed. According to Professor Liu Yapping (2015), enterprise value evaluation is a complete process in which authoritative asset appraisers in the industry analyze and estimate the overall value of the enterprise and the value of all shareholders' equity on the basis of laws, regulations and evaluation criteria, and issue professional evaluation opinions on the base date of evaluation.

The theory of enterprise valuation has experienced the embryonic stage, growth stage and maturity stage. It originated from the capital value theory in the early 20th century, and the emergence of MM theory in the 1960s meant that the theory of enterprise valuation began to grow and take shape. During this period, the capital asset pricing model took shape. With the emergence of a more perfect and scientific discounted cash flow model, the enterprise valuation system has also been constructed. The capital value theory proposed by Fisher, an American economist, mainly studies the relationship between capital and income. He points out that enterprise value is the discounted cash flow generated by future income, puts forward the discounted idea of future income, and constructs the standard and system of enterprise value quantification. Benjamin Graham (1934) went further on Fisher's basis and put forward the basic analysis method, which has been widely applied [1]. Franco Modigliani and Merton Miller (1958) kept pace with The Times and proposed MM theory to extend and improve the theory of enterprise value evaluation. They considered uncertain factors for the first time and focused on studying the transmission mechanism of the influence of two major factors, corporate income tax and transaction costs, on enterprise value [2]. According to William F. Sharpe (1964), market returns are positively correlated with risks, that is, the higher the rate of return on earnings, the greater the risk, or the greater the risk, the greater the risk compensation required, and the higher the market returns obtained by investors [3]. Stern Stewart (1982) innovated the way of enterprise valuation, and pointed out that enterprises could use the economic value added (EVA) evaluation method to evaluate the investment value of enterprises [4]. At the same time, real option pricing theory has been gradually applied to enterprise value evaluation since the 1970s. Aswath Damodaran (2013) introduced the tools of value evaluation in detail, and pointed out that the life cycle of a company would have different assessments on the enterprise value, analyzed the different life cycles of a company, and pointed out the challenges faced by the company according to the different life cycles and life cycle stages of the company. And take the relevant influencing factors into consideration [5]. In recent years, Chinese scholars have also begun to carry out more comprehensive and detailed research on enterprise valuation. Du Shengli (2001) introduced EVA model in detail, analyzed its evaluation principle according to the characteristics of EVA model, and pointed out that if enterprise value evaluation is carried out according to this model, accounting items need to be adjusted according to the actual situation, and otherwise the enterprise value evaluation will be biased. According to Du, both EVA model and enterprise valuation method have their own unique functions and shortcomings [6]. Similarly, Wu Shaoping (2005) also pointed out that the shortcoming of EVA is that it is easy to be manipulated by human beings. In case of human fraud, book profits can be easily changed, which highlights the limitations of the model, resulting in the deviation of the evaluation results from the reality, and the real value of the enterprise will be misestimated accordingly [7]. Cao Zhong (2012) then made a comparative analysis of various valuation methods and believed that ignoring future new value was the biggest drawback of the traditional income method. Since then, numerous research

results have also proved that the traditional income method does have shortcomings. Because it cannot accurately evaluate the potential value of enterprises, the traditional income method is gradually replaced by the real option method [8]. Lu Hao and Zhu Lin (2016) believed that the "discounted cash flow" problem, which had not been solved by the traditional income method, was readily solved by the real option method. DCF method is the most accepted and frequently used method by the public, which lays a foundation for the subsequent value evaluation theory.However, at present, the market method is not widely used in China [9]. Yue Xiukui and Ji Min (2005) focused on the classification of market methods, compared price-earnings ratio and price-to-book ratio, and described the detailed calculation steps of price-to-book ratio multiplier method [10]. Liu Ran (2011) made A detailed analysis of the P/E ratio of the A-share market and found that the P/E ratio was in A depressed state on the whole, and the P/E ratios of different industries were not comparable, and there was A big difference in their mean values.Based on the industry P/E ratio, enterprises in the industry have broad development prospects, but the law has not been widely applied in the domestic securities market, and the investment concept has not been fully accepted by domestic investors. Therefore, it is biased to use P/E ratio to reflect the development potential of enterprises. Due to the limitations of P/E index, it is not used to evaluate the development potential and profitability of enterprises [11]. Zhang Xiujin (2015) believes that diversified evaluation indicators such as market to book ratio, market rate and market to sales ratio should be used in the application of market method, which not only improves the accuracy of market method evaluation, but also improves the quality of financial information disclosure [12]. Taking Dongfeng Electric as the research object, Pan Qiurong (2016) constructed a perfect discounted free cash flow (FCFF) model, selected the discounted cash flow model to evaluate the case, compared the results with the closing price of the stock market, and concluded that FCFF could be used for the valuation of listed enterprises [13]. At present, there are few domestic and foreign research literatures on the value evaluation of biomedical enterprises on GEM, due to the following two reasons: firstly, GEM is a unique plate in China, and secondly, pharmaceutical enterprise value has not been a hot research topic before. In recent years, domestic scholars have only begun to deepen their research on GEM listed companies and biomedical enterprise value evaluation. Research on the value evaluation of enterprises listed on GEM. David and Albert (2012) believed that the valuation methods suitable for listed companies with stable income are not necessarily suitable for entrepreneurial enterprises. If these valuation methods are blindly selected, the accuracy of valuation results will not be guaranteed, and wrong market signals may be released to investors and managers, thus causing decision-making risks [14]. Gu Mengdi (2013) further studied the valuation risks of enterprises on GEM, carefully analyzed the factors influencing the valuation risks of enterprises listed on GEM, and introduced risk quantification methods in a targeted way. On how to avoid valuation risks of enterprises on GEM, Gu Mengdi put forward reasonable and feasible suggestions and countermeasures [15]. Hang Qianwei (2014) selected HM Company as the research object and selectively adopted the price-earnings ratio method and discounted cash flow method, which were more in line with the characteristics of GEM listed enterprises, to evaluate the enterprise value [16]. Cui Yu (2016) selected Tongyuan Petroleum as the study case; constructed EVA model to scientifically evaluate the value of enterprises listed on GEM, and vertically compared the EVA index of four enterprises listed on GEM: Tongyuan Petroleum, Xuanyuan Hengxin, Hemo Technology, and Hengtai Aipu. EVA index reflects the operation of enterprises and serves as the basis for managers to make decisions. With the help of EVA index, enterprise value can be evaluated comprehensively and objectively [17]. Qu Xiaojuan and Zhang Hua (2019) built a special model to evaluate the value of enterprises listed on GEM based on the characteristics of enterprises on GEM, combined with grey prediction model and real option model [18]. Research on the value evaluation of biomedical enterprises: Ao Shiwen and Gao Yaxiang (2014) selected pharmaceutical enterprises listed on GEM in 2010 as the research object, and evaluated the value of pharmaceutical enterprises by optimizing and improving the residual income method. Through regression analysis and Pearson correlation test, it was found that compared with the residual income method, the improved residual income method was more suitable for the value evaluation of

pharmaceutical enterprises [19]. Feng Fang and Huang Chao (2017) selected innovative enterprises in the domestic biomedical industry as the research object, constructed the Schwartz-Moon real option model to evaluate the value of enterprises, and provided constructive suggestions for enterprises to improve their value [20]. Ke Jian and Zhang Xiaoqing (2018) constructed the valuation model of market research rate, which was specially used to evaluate the value of pharmaceutical enterprises with high R&D investment, and proved that the valuation results of market research rate and market value were basically identical through specific cases [21]. Wen Subin, Jiang Angel and Liu Yijuan (2018) selected representative pharmaceutical enterprises in China as samples and modified the financial indicators of enterprises based on EVA theory. By comparing the real stock price and estimated value, they believed that pharmaceutical enterprises should pay attention to financial characteristics when creating value. They put forward scientific and feasible suggestions and countermeasures [22].

2. Theory Research

Enterprise value is essentially the market evaluation of enterprise assets. Because the enterprise may have goodwill, its actual value usually cannot be reflected in the financial statements, resulting in the inherent value of the enterprise is not equal to the book value disclosed in the financial statements. Therefore, the calculation of the overall value of the enterprise can not only rely on the total book assets of the enterprise to determine. In general, the discounted cash flow method is usually used to estimate the value of the enterprise, which is a kind of income method. This evaluation model is based on the actual operating conditions of the company to predict the future cash flow of the company, and then choose an appropriate discount rate to discount the present value, that is, the evaluation value of the company. Using this model, the future sustainable management ability can be seen in the process of predicting the future earnings of the enterprise, and the selection of the discount rate is the comprehensive reflection of the time value of the enterprise capital and the risk. Precisely because the model can truly reflect the company's operating conditions and risks, the obtained results can often be used as a reference for the company's financial and strategic decisions, but also as a basis for mergers and acquisitions. As for enterprise value, there are three core theories. First of all, shareholders' equity is the core of the theory of shareholder value maximization, and equity investment is the key to the creation of enterprise value. This view holds that shareholders are the risk bearing party and the benefit distribution party. The ultimate goal of a company is usually to give priority to shareholders' interests and make every effort to maximize profits for owners. However, when this view is applied to practice, there will be a possibility that shareholders cannot withstand the temptation to harm the interests of the company and other stakeholders for more interests. Therefore, this theory should be used cautiously in the current enterprise value theory. Different from the theory of shareholder's equity maximization, the theory of profit maximization takes more stakeholders into consideration, integrates the purposes of all parties, makes the benefits of all stakeholders reach a balance, and the returns of equity investment are correspondingly realized. However, because profit is reflected based on historical data, as a financial indicator, it cannot reflect the time value of funds and risks borne, let alone reflect the logic of enterprise value creation. However, the one-sided pursuit of profit maximization often overshadows the vision of enterprise managers and leads to the separation of enterprises from their own strategic goals. Therefore, in practice, this theory usually does not occupy a major position in the theory of enterprise value. Based on the above two theories, the theory of firm value maximization should emerge from time to time. This theory starts from multiple perspectives, fully considers the interests of all parties, breaks the limitations of the above two theories, and takes into account the interests of shareholders, time value of funds, risk factors, and so on. It reflects the development potential and profitability of the company to a great extent. However, its difficulty lies in the complexity of operation and the need for a large amount of data support, which leads to the theory can only be used by listed companies. At the same time, because corporate value is difficult to define, a variety of theories and methods have been

developed. According to Professor Liu Yaping (2015), enterprise value evaluation is a complete process in which authoritative asset appraisers in the industry analyze and estimate the overall value of the enterprise and the value of all shareholders' equity on the basis of laws, regulations and evaluation criteria, and issue professional evaluation opinions on the base date of evaluation.1. In the valuation of enterprises, enterprises are often regarded as an entire economy, rather than the simple sum of each individual asset. Therefore, when evaluating the value of the enterprise as a whole, there is a big difference with the evaluation of individual assets. From the perspective of the overall value of the enterprise, the enterprise value evaluation often involves the correlation effect of the mutual influence of multiple assets within the enterprise, but the valuation of a single asset is relatively simple, without considering the comprehensive value of multiple asset portfolios. In addition, single asset valuation usually only starts from the value of book assets, and in reality, there may still be assets not included in the financial statements, so the value of the company is often larger than the sum of the assets on the book. This also shows that in the financial statements of enterprises, often do not reflect the residual income or off-balance sheet assets, the enterprise overall divided into a simple sum of individual assets is not appropriate. According to different evaluation purposes, there are two main types of enterprise value: market value and non-market value, divided from the evaluation method, absolute valuation method and relative valuation method are two main valuation methods. For example, discounted cash flow method and economic value-added method, which are all based on absolute valuation. The relative valuation method usually selects a specific index to measure the market value of the evaluated object, such as PE, PB and other indicators. In this paper, the EVA method is chosen to evaluate the existing value of the enterprise.

3. Evaluation of Betta Pharmaceutical's value

3.1 Calculate Total Capital

TC = long-term borrowing + current liabilities due within 1 year bonds payable + short-term borrowing, minority shareholders' equity and common stock shareholders' equity + deferred tax credit balance, the cumulative goodwill + market development fee + cost + new reserve personnel training development capitalization + operating lease fixed assets, deferred tax debit balance, net value of projects under construction by the above formula. By sorting out the financial data of Betta Pharmaceutical from 2016 to 2020, the total capital amount of the historical calculation period can be obtained in table 1.

Before the adjustment of TC used to represent the company's total capital commonly, and after the adjustment is in growth stage, according to the above is the amount of the capital of the gem biomedical companies have characteristics, with the amount of improvement, that is to say, now calculate contains the amount of the capital market development, personnel training and operating lease assets, This is a more appropriate method that can directly reflect the value generated by the company in the rapid growth period.In spite of the improvements made to the capex accounts, we can still see that the adjusted capex has increased in total, but the difference between the two is not significant. This suggests that by adjusting the subject amount compared with enough, also from another Angle shows that, with increased year by year and the larger the amount of the capital, the company in the field of personnel training and market development funding followed similar growth, increase the amount of the capital of pharmaceutical industry in 2020 in the two parts into respectively are nearly three times as much as 2016.Therefore, it is of great significance to include market development expenses and personnel training expenses in the total capital amount. In the past five years, the company's investment in scientific research has only increased, and each year is about 1.3 times that of the previous year. Betta insists on using the most cutting-edge technology to promote the development of new technologies, which shows that innovation is indeed the core of the enterprise.

Table 1. The total capital amount of the historical calculation period

	2016	2017	2018	2019	2020
Common equity	40100.00	40100.00	40100.00	40100.00	41316.00
Minority shareholders' equity	470.65	1456.87	1397.88	867.53	341.39
Short-term borrowing	0	20000	36000	36323.47	0
Long-term borrowing	0	10000.00	28000.00	28000.00	0
Bonds payable	0	0	0	0	0
Non-current liabilities due within one year	0	0	0	41.92	0
Provision for bad debt	3.41	9.51	0	2.75	0
Reserves for inventory declines	0	0	0	0	0
Provision for impairment of fixed assets	0	0	0	0	0
Provision for impairment of intangible assets	0	0	0	0	0
Capitalization of R&D expenses	858.11	27781.31	56414.98	91237.13	117144.38
Accumulated goodwill impairment	0	0	0	0	0
Deferred tax credit balance	8983.72	5464.2	6168.02	6305.0	6464
Deferred tax debit balance	671.82	715.92	780.86	2949.2	5522.32
Market development fee	373.64	351.97	406.35	338.96	498.77
Personnel training fee	212.52	111.52	404.35	539.92	461.45
Net Works in Progress	16948.80	40837.99	20477.02	11230.65	6311.84
Operating leased Assets	0	0	0	0	0
Total capital before improvements	23901.38	63258.03	146822.99	188697.91	153431.89
Total capital after improvement	24487.55	63721.52	147633.70	189576.79	154392.12

3.2 Calculation of Capital Structure

The cost of capital can be divided into two parts: debt and equity. The debt capital of Beda Pharmaceutical in 2016 was zero, because it was the first year of Betta Pharmaceutical's listing and it had not started borrowing or issuing bonds for financing. With the expanding business scope and increasing scale of Betta Pharmaceutical, its equity capital was also increasing rapidly.In the second year after listing, Betta Pharmaceutical took out long-term and short-term loans for the first time. As the enterprise increased market input, expanded its business scope and realized revenue growth.At the same time, the company also had a large number of outstanding contracts at the end of the year. In order to ensure that orders could be completed on time, the company's inventory kept increasing, which led to a significant increase in accounts receivable and inventory compared with the same period of the previous year and consumed the company's operating capital to a certain extent.

3.3 Calculate the weighted average cost of capital

3.3.1 Cost of debt capital

First on our debt capital cost estimates, by means of betta pharmaceutical debt capital structure analysis, found that short-term loans accounted for larger proportion, so, after combing the related data, the author thinks that the central bank short-term bank benchmark lending rate in terms of

stability and the scientific nature, short-term bank loans to the central bank benchmark interest rates instead of debt capital cost.

3.3.2 Cost of equity capital

For the calculation of the cost of equity capital data, the risk-free rate of return is calculated with the one-year Treasury bond interest rate as the benchmark reference, and the β value of Betta Pharmaceutical from 2016 to 2020 is selected.On the issue of risk premium in the domestic stock market, through literature review and referring to Wang Yintian and Zhu Yingzi's regression analysis and data test on the risk premium of all stocks in the A-share market, it is found that the market risk premium in the Chinese stock market is 6.38%.

3.4 Calculate net operating profit after tax

Table 2. Calculation results of relevant indicators

	2016	2017	2018	2019	2020
Earnings before interest and tax	42751.41	32097.68	20755.88	31451.12	70652.07
Income tax rate	15%	15%	15%	15%	15%
Profit before interest and after tax	37052.65	27693.87	18609.72	26657.97	63699.90
+ Minority shareholder profit and loss	470.64	1456.87	1397.88	867.53	341.39
+ Amount of R&D expenses capitalized	858.11	27781.31	56414.98	91237.14	117144.38
+ Increase in goodwill impairment this year	0	0	0	0	0
+ Increase in allowance for doubtful accounts	3.41	9.51	0	2.75	0
+ Increase in inventory impairment provision	0	0	0	0	0
+ Increased provision for impairment of fixed assets	0	0	0	0	0
+ Increase in allowance for impairment of intangible assets	0	0	0	0	0
+ Deferred tax credit increases	89.84	5464.25	6168.02	6305.03	6464.00
- Increase in deferred tax debits	671.83	715.92	780.86	2949.28	5522.32
+ Market development expenses	373.64	373.64	406.36	338.96	498.77
+ Personnel training costs	212.52	111.52	404.35	539.92	461.45
- After-tax receipts and expenditures	4937.13	5920.77	141.66	9.16	1190.43
- Non-operating gains and losses	6384.26	5737.40	2806.24	2250.49	27243.17
Net operating profit after tax before improvements	32865.70	55769.13	81668.08	122130.29	183317.78
Improved net operating profit after tax	27067.61	50516.89	79672.53	120758.68	157034.84

From the formula above, it can be known that:
NOPAT = before interest and tax profits and losses of the + minority shareholder (deferred tax credit increase in tax - deferred debit increase) + new reserves this year, this year's goodwill + r&d cost capitalization amount - non-operating income and expenses * (1 - average income tax) + market

development costs, staff training expenses - non-operating profit and loss before interest and tax profit = (Net profit + interest expense + income tax) × (1- average income tax rate).

After calculation, the following table 2 is obtained.

As can be seen from the table 2, the revised NOPAT value is lower than that before. The main reason is that compared with personnel training expenditure and market expansion expenditure, non-operating profit and loss account for a larger proportion and have a more significant impact on NOPAT. Government subsidy is the main source of non-recurring profit and loss. Therefore, it can be seen that China, as a biomedical enterprise with great potential in the growth stage, has given strong support to achieve the strategic goal of being among the forefront of innovative countries.

3.5 Predict

The EVA measurement method of Betta Pharmaceutical in the forecast period is as follows: Firstly, based on the past financial situation, historical information and actual operating status of Betta Pharmaceutical, the operating income of the forecast period is reasonably estimated;Next, according to the ratio between various costs and operating income in previous years to estimate the cost and expense, accurately estimate the net income in the forecast period, and then modify the net income in the forecast period to obtain NOPAT;The above principles are used to reasonably estimate the indicators of the balance sheet, and then the forecast period TC is obtained after adjustment and correction.Finally, the final EVA prediction result is obtained.

Finally, the EVA value of stable operation period is 976,592,100 yuan.

$$\mathrm{V} = \mathrm{TC} + \sum_{t=1}^{m} EVA_m/(1+WACC)^m + \frac{EVA_m(1+g_n)}{(WACC-g)(1+WACC)^m} \quad (1)$$

The result of V is 41685552.23.

4. Conclusion

The EVA and real option combination model is more scientific and applicable. The main assets of biomedical enterprises in the period of rapid growth include a large number of intangible assets, intellectual capital, independent innovation intellectual property rights, etc. At the same time, if the company wants to grow large-scale, it usually chooses to open up the market and increase R&D investment, which will inevitably lead to a significant increase in market development fees, personnel training fees and other costs. The income method is generally used to assess the enterprise value of intangible assets, and the key to asset value valuation is a reasonable prediction of the company's excess returns.

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