Literature Review on the Value Evaluation of Unicorns on Science and Technology Innovation Board

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Abstract: When the Science and Technology Innovation Board was set up, the unicorn's edge was slightly exposed. With the establishment of Science and Technology Innovation Board and the country's great emphasis on the field of technological innovation, a number of unicorn enterprises appear in Science and Technology Innovation Board capital market. This kind of enterprise is different from the traditional enterprise in innovation mode, industry attribute, life cycle and so on. The inapplicability of traditional valuation methods has gradually emerged. Therefore, the valuation of Science and Technology Innovation Board Unicorn Enterprise has become a new hot issue. On the basis of sorting out and summarizing the relevant literature on the valuation of Science and Technology Innovation Board Unicorn Enterprises, this paper puts forward a new thinking of constructing the valuation method of science and Technology Innovation Board Unicorn Enterprises. It is expected to provide a new research perspective and path reference for the follow-up research on the value evaluation of Chinese Sci-Tech Innovation Board Enterprises, and also provide suggestions for the direction and focus of the valuation of Sci-Tech Innovation Board Unicorn Enterprises.

KeyWords: SSE STAR market; unicorn enterprise; valuation method; start-up enterprise; value characteristics

1. Introduction

In July 2019, the Science and Technology Innovation Board officially opened for trading on the Shanghai Stock Exchange, focusing on supporting high-tech and strategic emerging industries such as new-generation information technology, high-end equipment, new energy, new materials, energy conservation, environmental protection and biomedicine. The Science and Technology Innovation Board has carried out many institutional innovations, especially the introduction of the "Market value" index for the first time, weakening the "Profit" standard, and greatly enhancing the smarket inclusiveness. Therefore, since the opnening of the Science and Technology Innovation Board, there has been a large number of start-up and growth-oriented unicorn enterprises to apply for listing.

However, the requirements and standards for listed enterprises on the Science and Technology Innovation Board are quite different from those of other boards. The unicorn enterprises listed on the Science and Technology Innovation Board are generally in the initial stage and growing stages, with more intangible asset and more investment in R&D. It limits the use of conventional valuation methods as a reference. The emergence of unicorn companies on the Science and Technology Innovation Board means that the existing valuation methods need to be changed and innovated. And the investment risk of Science and Technology Innovation Board Unicorn Enterprise is bigger. How to evaluate the value of Science and Technology Innovation Board Unicorn Enterprise reasonably and effectively becomes more and more urgent.

In this paper, the existing literature at home and abroad will be sorted out from three aspects: the traditional enterprise valuation methods, the characteristics and valuation of Science and Technology Innovation Board Enterprises, the characteristics and valuation of unicorn enterprises. And then, it puts forward the outlook for the future research on valuation methods of unicorn companies on the Sci-Tech Innovation Board.

2. Traditional Methods of Enterprise Valuation

At present, the methods of enterprise value evaluation at home and abroad mainly have the following common types:

2.1. Cost Method

The cost method is the method of determining the fair value by determining the replacement cost of assets or liabilities and considering various impairments of value [1], the valuation amount under the cost method usually refers to the current replacement cost [2]. The cost method has advantages and disadvantages. The advantage is that the valuation is simple and easy, but the disadvantages are also obvious. It neglects the overall profitability of the enterprise and is unable to consider the actual value of brands, word of mouth, etc. Guo Taiyue thought that it is also difficult to accurately assess the overall operating environment. Therefore, the cost method is applicable to companies in bankruptcy liquidation [3], or enterprises with relatively small intangible asset [4].

2.2. Market Method

The market method is the common method for IPO of enterprises at present. Market methods usually include PE method, PB method, and PS method. Zeng Zhen and Shen Weitao believed that the advantage of the market method is simple and easy to understand, with a higher comprehensive. So it has become the most commonly used method in the valuation of listed companies in China. The most important thing in the market method is the choice of the comparable company. Yue Gongxia's essay explains that in the past, the low efficiency of Chinese capital market has influenced the rationality and reliability of the choice of the comparable company in the market method. In recent years, domestic scholars have introduced fuzzy mathematics theory based on the heterogeneity of enterprises, and finally determined the comparable company by constructing the fuzzy set of characteristic index, providing new ideas for selecting and valuing comparable companies [5].

2.3. Discounted Cash Flow Method

Discounted cash flow method is widely used in value assessment in recent years. Strictly speaking, the discounted cash flow method is a kind of income method, but its estimation is based on the future cash flow. The American scholar Cornell, B. introduced the theory of discounted cash flow systematically for the first time. Then domestic and foreign scholars began to prove the feasibility and applicability of the discounted cash flow method, and constructed a complete evaluation framework from the perspective of practice. It also describes the practical steps of using the cash flow discount method to estimate the value of non-traditional industries such as high-tech companies [6]. In terms of applicability, the discounted cash flow method is suitable for the situations where the capital market is effective, the accounting system is sound, and the information disclosure is true and effective [7]. Liu Lu et al. found that in the case of high growth of the company, using the discounted cash flow method can focus more on the company's growth opportunities and future value.

2.4. EVA Method

Economic Value Added (EVA) is the remaining profit after deducting the cost of debt and equity from the net operating profit after tax. Gu Yinkuan and Zhang Hongxia concluded that the advantage of the EVA method is that data can be easily obtained from annual reports. Liu Yijuan and Zhang Yumeng summarized that its disadvantages are that the calculation of economic value added can not go beyond the financial aspect, and the expected period for the future can not exceed three years, otherwise there will be a large deviation. Existing research results have improved EVA model based on user value, which can be used to evaluate internet enterprises with high growth, high risk, light assets and uncertain income [8]. EVA method can also be combined with technology added value (TVA) to estimate the potential economic added value of basic research projects [9].

2.5. Real Option Method

Fischer Black and Myron Scholes proposed the B-S option pricing model, which can quantify the value of European options and greatly promote the development of the financial industry. Then the concept of "Real option" was derived by Stewart Myers from option pricing model, and then Mason and Merton extended the real investment decision to evaluate the whole enterprise. The real option method is applicable to the valuation of companies in M&A [10] and the valuation of specific items in the enterprise. For example, the real option method can bring the production line construction and product innovation of the pharmaceutical industry into the value measurement, and can tap the potential project value brought by the project uncertainty to a greater extent, more focused on the option value of pharmaceutical technology achievements [11]. In addition, the real option method is used to evaluate the value of high-tech enterprises, which is helpful to improve the accuracy of the evaluation of Internet Enterprises [12].

2.6. PFM-Real Option Model

PFM model is a model used to predict the credit default of unlisted companies in recent years. It was first proposed in 1990, and then gradually began to be used in enterprise valuation. Nyberg considered that there is a strong correlation between the firm value and the volatility of the unlisted and listed firms in the same region and industry, and the PFM model came into being on the basis of this view. Jinhui and Wu Panpan combined the real option model and the PFM model effectively and solved the difficulty of calculating the volatility of the non-listed companies' equity value by means of analogy and empirical regression, and it is a major improvement on the real option model. Furthermore, adding non-financial factors to the PFM real option model can greatly improve the applicability and stability of the model in the valuation of growing firms [13]. In addition, Wang Yichen held the view that the PFM real option model modified by the method of multi-level fuzzy comprehensive evaluation can be more suitable for the valuation of growing innovative enterprises in private equity investment.

3. Characteristics and Valuation of Science and Technology Innovation Board Enterprises

3.1. Characteristics of Science and Technology Innovation Board Enterprises

The Science and Technology Innovation Board mainly serves the science and technology innovation enterprises which conform to the national strategy, break through the key core technology, and are highly recognized by the market. In terms of financial indicators, science and technology innovation enterprises have the following characteristics: high ratio of money to capital, low ratio of assets and liabilities, incomplete measurement of intangible asset, high gross profit rate, non-linear growth, high volatility of profits, and the financial characteristics of the large proportion of non-operating income. In terms of value influencing factors, the four key factors necessary

for technological innovation in science and technology enterprises are entrepreneurship, R&D capabilities, market demand competition, and government policies [14]. Huang Yan et al. concluded that external and internal social capital can positively promote the resource assembling behavior of science and innovation enterprises, and then promote the growth performance of enterprises. Qiu Guodong and Wang Siyang discovered that the actual controller of the Science and Technology Innovation Enterprise with the background of intellectual capital will improve the effect of corporate governance, which can help the innovation activities of the enterprise and enhance the value of the enterprise.

3.2. Valuation of Science and Technology Innovation Board Enterprises

At present, the disclosure of valuation method is too simple in the prospectus of the listed companies on the Science and Technology Innovation Board. In 2019, more than half of the Science and Technology Innovation Board listed companies did not disclose their valuation methods, while nearly half of the companies that did disclose their valuation methods used the market method [15]. However, Herman Hu et al. believed that the uniqueness of the Science and Technology Innovation Board makes it difficult to simply copy the methods of the A-share listed companies in the enterprise valuation. At present, the valuation methods of the listed companies on the Science and Technology Innovation Board are simple, and lack of consideration of the factors affecting the value and neglect of non-financial factors [16].

In view of the present valuation situation of enterprises on the Science and Technology Innovation Board, many scholars also express their opinions on the valuation methods of some industries. In the valuation of Science and Technology Innovation Board, the traditional FCFF valuation model can be modified by the 5P valuation model combined with the unique valuation factors of pharmaceutical enterprises [17]. For the new material industry, PS method can be used in the initial stage, and attention should be paid to such factors as equity incentive mode, market capacity and growth rate, and technological advantages of enterprises; the PE method can be used in the development stage, focusing on the rationality of the growth rate selection in combination with the industry development prospects and enterprise technological advantages; in the mature stage, we can use the market method based on PB, PE, enterprise value/EBITDA, and so on, focusing on the comparability of comparable companies, market price fairness and so on; for the transition performance decline or loss of enterprises, the PB method can be used. For companies on the Science and Technology Innovation Board that are listed at a loss, Zhu Rong et al. believed the potential value of the company can be evaluated based on the income method and the real option method. Generally speaking, it is necessary to establish a perfect value evaluation system from life cycle, industry characteristics, non-financial factors and national economic policy for the valuation of the Science and Technology Innovation Board Enterprise [16].

4. Characteristics and Valuation of Unicorns

4.1. The Characteristics of Unicorns

The concept of unicorns was first coined by venture capitalist Aileen Lee to define a start-up with a valuation of more than $1 billion within 10 years. The existing research shows that the traditional enterprise valuation method is not suitable for evaluating the value of Science and Innovation Board Unicorn Enterprise. Alfredo De Massis summarized the key to unicorns' success are the leadership team, the business model and liquid asset-light model. At present, the number of unicorn enterprises in China is increasing rapidly, the number of technology-driven Enterprises is increasing, the spatial distribution and agglomeration coexist, and the emergence and development of unicorn enterprises have a unique law [18]. Therefore, a new valuation system should be set up according to the unique characteristics of the unicorn enterprise, combining with the existing valuation methods and relevant theories.

4.2. Valuation Method for Unicorns

From the perspective of customer value theory, the core of valuation is the customer. Bauer and Hammerschmidt combined the financial factors with the cash flow that the customer can create in the future, and constructed a customer-centered real option model, which opened up a new idea for analyzing valuations of start-up Internet unicorns with a high percentage of customer relationships. From the perspective of financial management, the valuation of unicorn enterprises can be constructed from four aspects: management mode, management subject, subject characteristics and target attributes [19]. From the point of view of resource dependence theory, Chen Huifa thought the higher the capital of the unicorns' founders, the bigger and stronger they are. In terms of the basis and framework for the valuation of unicorns, media coverage, dynamic development and transformation of business types, lineage, institutional environment and institutional entrepreneurship and community are the five key elements that should be focused on when valuing unicorns [20]. There are two views on the fundamental factors driving the growth of unicorn firms' value. The first one is the growth potential and financing environment [21], and the second is the number of patent applications and venture financing [22]. In terms of the growth relationship of unicorns, founder characteristics, corporate innovation capabilities, corporate growth years and regional factors are the four key factors for the valuation of growth unicorn enterprises [23]. From the perspective of the cultivation path of unicorns, the synergy of emerging industry, business environment, platform support and financial support is conducive to the incubation of unicorn enterprises, and is also a factor to be taken into account in unicorns' valuations [24].

5. Summary and Outlook

On the basis of a large number of studies, combing and comparison of domestic and foreign literatures, we find that domestic and foreign scholars have made a lot of

beneficial explorations on the methods of enterprise value assessment and the related fields of Science and Technology Innovation Board Unicorn Enterprises. It provides an important reference and enlightenment for the research of this paper, but there are still some defects to be improved.

In the research of value assessment methods, foreign scholars started earlier and more deeply, and all kinds of theoretical models and methods have been fully perfected. The research of Chinese scholars is mainly based on the foreign advanced research results. And then they improved them according to the domestic specific facts. However, each existing valuation method has certain assumptions and limitations. For traditional industries, these restrictions have little effect, but they will encounter various difficulties in the use of emerging industries. The birth of the Science and Technology Innovation Board makes many models and methods "Invalid", which shows that the traditional valuation methods have certain limitations and one-sidedness. And the appraisers usually only use a single valuation method in the practice of enterprise valuation. Even though the Securities Regulatory Commission requires at least two methods to be used when valuing companies on the Science and Technology Innovation Board, most of the companies listed on the Science and Technology Innovation Board use the market method, which inevitably leads to incomplete valuation.

At present, scholars at home and abroad have made beneficial explorations on the valuation of Science and Technology Innovation Board and Unicorn Enterprises from different perspectives and theories in terms of their characteristics and valuation research. The existing research has also mentioned the Science and Technology Innovation Board Enterprise and the unicorn enterprise existence value appraisal difficulty. However, at present, most of the current scholars' suggestions stay on the qualitative level, failing to construct a systematic evaluation index system and lacking the concrete application of evaluation indexes. Its science, rationality and operability still need to be tested and evaluated by concrete examples and cases, which is the difficulty that the future research needs to overcome. In addition, since both the Science and Technology Innovation Board and the unicorn are relatively new things, the research on the valuation methods of Science and Technology Innovation Board Enterprises is still at the initial stage, and the related research on the valuation of Science and Innovation Board Unicorn Enterprises is even less. Moreover, a series of system settings on the Science and Technology Innovation Board will also affect the listing and valuation of unicorns. So it is necessary to analyze them together and break through the difficulties of valuation.

On this issue, this paper believes that although there is no literature that unifies the two concepts of "Science and Technology Innovation board" and "Unicorn" to study and analyze, unicorns are innovative, forward-looking and growth-oriented enterprises, and their valuation should take full account of their growth stage, value attributes and financial management. Therefore, we can classify the

unicorns on the Science and Technology Innovation Board from their innovation model, life cycle and financial status, and combine the above-mentioned scholars' emphasis on the valuation of unicorns, and then evaluate the value of different types of Science and Technology Innovation Board Unicorn Enterprises. To sum up, how to choose appropriate valuation methods according to the characteristics of different types of Science and Technology Innovation Board Unicorn Enterprises? How to introduce and construct quantifiable dimension indexes? This will be the focus of the next research on the valuation method of the Science and Innovation Board Unicorn Enterprises.

Acknowledgment

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