The EVA Evaluation and Prediction: An Empirical Analysis on the Case of Enterprise in the NEEQ

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Abstract

This paper investigates the application of the EVA value evaluation model in the NEEQ. In recent years the NEEQ in China has achieved great development, and the number of listed companies increased rapidly. However, the stock trade in the NEEQ is inactive and the market liquidity is poor. Therefore, the NEEQ needs to improve and perfect the relevant trading system. And it's necessary to establish a scientific evaluation system to activate the value discovery function of the listed companies, in order to attract more capital into the NEEQ. This paper uses the balance sheet and income statement data of company A, evaluates and predicts the EVA of the company using the EVA value evaluation model, and discusses the calculation method of current value of the company.

Keywords: EVA Value Evaluation Model, Prediction, Enterprise Value, NEEQ.

1. Introduction

The NEEQ is short for National Equities Exchange and Quotations. As a unique product of China's Over-the-Counter(OTC) market，the NEEQ was initially established to solve corporate shares circulation problems of STAQ and NET systems．In order to solve capital-raising dilemma of minor enterprises，it was reformed in 2006．The NEEQ experienced its first expansion in 2012 with a rapid increasing number of listed companies and circulation stocks．After finishing nationwide expansion in 2014，the NEEQ turned to be a significant composition of China's capital market．Especially after implementing Market Making System in the NEEQ，securities brokers，investors and enterprises actively flooded into the market．Listed companies and total market value set new records consistently and brought unprecedented prosperity into the NEEQ．On June 31st,2015，the NEEQ officially became independent of OTC market and covered by floor trading market．In May 2016，the NEEQ carried out hierarchical management, and all the listed companies were divided into foundation enterprises and creation enterprises．Based on different levels，diverse supervision would be implemented．Until the end of 2017，listed companies in the NEEQ were up to 11630, in which 1343 companies carried out the system of Market Making and the others implemented the system of Agreement Transfer, and the total market value was over 4.94 trillion．

Nowadays in China, the small and medium-sized enterprises (SEMs) are facing three major financing problems: single financing channel, high financing cost, and low success rate. Therefore, the government is actively broadening the financing channels, and actively building a rational and multi-level capital market structure, so as to support and encourage SEMs to finance directly. The NEEQ sticks to the idea of providing financing platform for high-grown and high-tech enterprises which cannot meet the listing stands of main board market and GEM Board. The NEEQ not only provides a directional financing platform for SEMs, but also promotes diverse financing ways for listing enterprises implicitly, which is the key power to solve difficult problems of SMEs financing in China, especially playing an important role to incubate and cultivate the high-tech and innovative enterprises.

Since 2006 set up in China, the NEEQ developed rapidly in short eleven years, the positive influence for the cultivation and support of the development of SEMs is amazing.

At the present stage，the NEEQ absorbs nationwide companies．Once meet standard requirements，companies could enter NEEQ and start stock trade．However, even though the directional placement and issuance increase year by year, compared with the national main board market and GEM Board, there is still a huge gap. The financing effect of low liquidity in NEEQ has to be improved. In addition, the trading system of NEEQ is still not perfect, the layering and delisting mechanisms are absent, and the transferring board mechanism is lacked. These are disadvantages which will impede the NEEQ playing an important role in financing. As a result, it's necessary to improve the relevant trading system, and establish a scientific value evaluation system in order to promote the transaction of the NEEQ and improve the market liquidity. Also it will activate the value discovery function of the listed enterprises in the NEEQ, and provide scientific reference for investors to make decisions and attract more capital into the market.

2. EVA Research in China

In 1980s, Economic Value Added (EVA) was come up by the United States Stern Stewart's company, and became a performance evaluation and management system based on market value of the enterprises. In China, the research on value valuation theory started from the end of twentieth Century, when the basic theory frame of value evaluation was preliminarily perfect, thus it was difficult to make contributions for our country, and the research results lag behind the international top level. The related literature of value assessment in our country was mainly divided into two categories: first was description and evaluation of the Western theory and methods, and the second was to verify the theories of value assessment, and research on the influence factors of enterprise value analysis.

Zhang Baolu, Liu Xianshun(1991) introduced the concept of determinant factors and quantitative calculation of enterprise value in the book《A brief discussion on Enterprise value》. Qiu Juliang(1997) explored the method of value evaluation in the process of privatization of Chinese enterprises and introduced the capitalization of profits, analyzed the future profit discount and industry comparison methods, and the advantages and disadvantages of the various methods. Zhou Changqing (2001) introduced the theoretical framework of EVA, and put forward a comparison with the traditional performance evaluation index that EVA would alleviate the behavior of earnings management and short-term investment, and pointed out that there would be some problems in the implementation of EVA in China from the perspective of management accounting.

Zheng Ming, Lin Panying(2006) introduced EVA into the value creation research of commercial banks, and analyzed the driving factors of value creation. The results showed that optimizing capital structure was helpful to improve the value of banks. Li Yanxi, Chen Jinghui and Luan Qingwei(2011) analyzed the common valuation methods, and put forward the enterprise value evaluation model based on EVA. Wang Ying(2007) made a comparative analysis of the characteristics and problems of valuation methods, and pointed out that the income approach was a more appropriate choice, and carried on the preliminary discussion of introducing EVA to the enterprise value appraisal. Wang Jie(2013) carried on the research of the listed company enterprise value, found that the single evaluation method was not reliable, used cash flow method and non-financial indicators to provide a reference for the valuation of listed companies. Liu Renzheng(2013) chose the data of listed companies in China, compared the DCF model with the RIV model, and found that the RIV model had a stronger ability to explain the value of the enterprise. Feng Hongmei (2016) found a real option method to evaluate the asset value of national enterprises.

3. EVA Value Evaluation Model

The basic idea of EVA is the creation of enterprise value. When the enterprise's post-tax operating profit is greater than its capital cost, the EVA is positive, indicating that the shareholder wealth of the enterprise is actually increased. If the EVA is negative, it indicates that the shareholder's wealth has been lost. While EVA is 0, it indicates that the value of the enterprise has not increased in the year. The formula of EVA is:

$$EVA = NOPAT - WACC \times TC \quad (1)$$

where $NOPAT$ is the enterprise's net operating profit after tax. $WACC$ represents the weighted average cost of capital of the enterprise. TC represents the total investment capital of the enterprise. Based on the calculation of EVA, the value of the enterprise can be evaluated using predicted EVA value for future years. The value evaluation model can be expressed as:

$$V = TC + \sum_{t=1}^{n} \frac{EVA_t}{(1+WACC)^t} \quad (2)$$

where V is the value of the enterprise. TC represents the total investment capital of the enterprise. EVA_t represents the economic added value of the enterprise for the t year. $WACC$ represents the weighted average cost of capital of the enterprise. The EVA model not only calculates the debt cost but also takes into account the opportunity cost of the shareholder's equity investment cost, which will truly reflect the real profitability of the enterprise. The basic assumption of EVA value evaluation model includes: assuming that the enterprise is continuously operated, the enterprise can maintain steady growth in the future at the management level, the efficiency output remains unchanged, and the company technology has no significant change, etc. Meanwhile, it is assumed that the enterprise maintains a relatively stable capital structure, and the external environment of the enterprise remains the same. The basic EVA value evaluation model includes:

3.1 Single Stage Model

Ⅰ.The Fixed Growth Model assumes that the growth rate of the enterprise in the future is expected to be stable, and the EVA grows steadily with a fixed growth rate of g . That is:

$$\begin{aligned} EVA &= \sum_{t=1}^{n} \frac{EVA_t}{(1+WACC)^t} \\ &= \frac{EVA_1}{1+WACC} + \frac{EVA_1(1+g)}{(1+WACC)^2} + \frac{EVA_1(1+g)^2}{(1+WACC)^3} + ... + \frac{EVA_1(1+g)^{n-1}}{(1+WACC)^n} \\ &= \frac{EVA_1}{WACC-g}\left[1 - \frac{(1+g)^n}{(1+WACC)^n}\right] \end{aligned} \quad (3)$$

If the enterprise is continuously operated, thus

$$EVA = \lim_{n\to\infty} \frac{EVA_1}{WACC-g}\left[1 - \frac{(1+g)^n}{(1+WACC)^n}\right] \quad (4)$$

while $WACC > g$, $V = TC + \frac{EVA_1}{WACC-g}$

and $WACC < g$, $V = +\infty$

Ⅱ.The Zero Growth Model is suitable for the enterprises that the operating income of all periods, the financial situation and other aspects are remaining the same, that is, the EVA in the future are equal to the history EVA. That is:

$$\begin{aligned} EVA &= \sum_{t=1}^{n} \frac{EVA}{(1+WACC)^t} \\ &= \frac{EVA}{1+WACC} + \frac{EVA}{(1+WACC)^2} + \frac{EVA}{(1+WACC)^3} + ... + \frac{EVA}{(1+WACC)^n} \\ &= \frac{EVA}{WACC}\left[1 - \frac{1}{(1+WACC)^n}\right] \end{aligned} \quad (5)$$

If the enterprise is continuously operated, thus

$$EVA = \lim_{n\to\infty} \frac{EVA}{WACC}\left[1 - \frac{1}{(1+WACC)^n}\right] = \frac{EVA}{WACC} \quad (6)$$

$V = TC + EVA$

3.2 Two Stage Model

The Two Stage Model is suitable for the enterprises with a rapid growth. The rapid growth of enterprises will continue for a long period in the future. Then the enterprises turn to the stable stage of development and will grow at a steady pace. The formula is:

$$EVA = \sum_{t=1}^{m} \frac{EVA_t}{(1+WACC)^t} + \frac{1}{(1+WACC)^m} \sum_{i=m+1}^{n} \frac{EVA_i}{(1+WACC)^i}$$
$$= \sum_{t=1}^{m} \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{m+1}}{(WACC-g)(1+WACC)^m} \quad (7)$$

and

$$V = TC + \sum_{t=1}^{m} \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{m+1}}{(WACC-g)(1+WACC)^m} \quad (8)$$

3.3 Three Stage Model

At the first stage, the enterprise is in a stage of rapid development, and the speed will continue for a period of time. At the second stage, the enterprise keeps growing and developing, and the growth speed will slowly drop. At the third stage, the enterprise's growth rate declines, and finally the growth rate tends to be steady. The formula is:

$$V = TC + \sum_{t=1}^{m} \frac{EVA_t}{(1+WACC)^t} + \sum_{i=m+1}^{n} \frac{EVA_i}{(1+WACC)^i} + \frac{EVA_{n+1}}{(WACC-g)(1+WACC)^n} \quad (9)$$

4. The calculation of EVA

4.1 The calculation of Net Operating Profit after Tax ($NOPAT$)

The Net Operating Profit after Tax refers to the net profit after the tax according to the Cash basis, and is the net operating profit obtained by the company's normal operation. It is usually based on the net profit of the financial statement plus the interest expense, and adjusts some items, such as the impairment provision for goodwill, deferred income tax, bad debt preparation, research expenses and non-recurring profit and loss, etc. The purpose of the adjustment is to eliminate the impact of accounting standard accrual system and capital structure, and the net operating profit after adjustment is the net profit after tax that has nothing to do with the capital structure. The formula is:

$$NOPAT = NF + ME + I(1-T) + IG + IR + RD + CB - IE - FV \quad (10)$$

where NF is the net profit, ME represents minority shareholders' equity, I represents interest expense, T is the income tax rate, IG represents impairment of goodwill this year, IR represents increase in reserves this year, RD represents amount of R&D expense, CB represents deferred income tax credit balance increase, IE represents non-operating income and expenditure, FV represents fair value change profit and loss.

4.2 The calculation of Weighted Average Capital Cost ($WACC$)

The Weighted Average Capital Cost is generally weighted and calculated according to the proportion of various long-term capitals, which is an important index to measure the total capital cost of the enterprise. The formula is:

$$WACC = R_d \times \frac{D}{S+D} \times (1-T) + R_e \times \frac{D}{S+D} \quad (11)$$
$$R_e = R_f + \beta \times R_g$$

where R_d : pre-tax debt capital cost.

D : long-term debt capital.

S : equity capital.

T : corporate income tax rate.

R_e : equity capital cost.

R_f : market risk-free rate of return.

R_g : market risk premium.

4.3 The calculation of Total Capital investment (TC)

The Total Capital investment includes equity capital and debt capital, and the equity capital includes common equity and minority interests. The debts that do not need to pay and the assets that will not put into production should be removed, including accounts payable, commercial credit debt, construction in process and other subjects. The purpose of adjusting these related subjects is to reflect the economic value of the business capital better. That is:

$$\begin{aligned} TC &= EC + DC + CA \\ &= CE + ME + L_1 + L + L_s + BP + RD + IG + R + DI - DA - IE - CP \end{aligned} \quad (12)$$

where EC represents Equity capital, DC represents debt capital, CA represents investment capital adjustment items, CE represents common equity, ME represents minority shareholder equity, L_1 represents long-term loans due within one year, L represents long-term loans, L_s represents short-term loans, BP represents bonds payable, RD represents capitalized amount of R&D expenses, IG represents impairment of goodwill, R represents reserves, DI represents deferred income tax charges, DA represents deferred income tax assets, IE represents non-operating income and expenditure, CP represents net construction in progress.

5. An Empirical Analysis on the Case of Company A from NEEQ

Company A is located in Jiangsu Province in China. It is a national high-tech enterprise researching on professional mobile communication base station antenna and mobile communications accessories and the production and sales. The company A was listed in the NEEQ in June 2014, and implemented the market-making transfer system, belong to the creation enterprises. This company has strong scientific research and development strength, complete production equipment and testing instruments, and excellent self-design ability to develop new products. The number of patent applications has reached 130, including 38 patents for invention and 78 patents for utility models. The company A has strong strength in China's mobile communications accessories, and has been selected as the supplier of Huawei, ZTE and other companies. Meanwhile, many system operators in China, such as China Mobile, China Unicom, China Telecom and other operators choose its products. The company A meets the conditions recognized by high-tech enterprises and implements a preferential income tax policy of 15%.

5.1 The calculation of NOPAT

Table-1 Net Operating Profit after Tax of company A RMB million

YEAR	**2012**	**2013**	**2014**	**2015**	**2016**
Operating Income	370	376	704	850	687
Net Profit	7	26	76	117	92
Minority Shareholders' Equity	1	1	4	4	0
Interest Expense	0	0	0	0	0
Impairment of Goodwill	0	0	0	0	0
Increase in Reserves	-1	5	6	17	2
R&D Expense	11	12	25	48	40
Deferred Income Tax Credit Balance Increase	0	0	0	0	0
Non-operating Income and Expenditure	1	0	4	1	4
Fair Value Change Profit	0	0	0	0	0
NOPAT	**17**	**44**	**108**	**185**	**131**

5.2 The calculation of TC

Table-2 Total Capital investment of company A

RMB million

YEAR	2012	2013	2014	2015	2016
Common Equity	188	213	285	554	647
Minority Shareholder Equity	18	9	13	0	3
Long-term Loans due within One Year	0	20	0	0	19
Long-term Loans	24	0	0	0	25
Short-term Loans	121	77	210	324	326
Bonds Payable	0	0	0	0	0
R&D Expenses	11	12	25	48	40
Impairment of Goodwill	0	0	0	0	0
Reserves	-1	5	6	17	2
Deferred Income Tax Charges	0	0	0	0	0
Non-operating Income and Expenditure	1	0	4	1	4
Net Construction In Progress	6	6	10	115	119
TC	**354**	**330**	**526**	**827**	**940**

5.3 The calculation of WACC

Table-3 Weighted Average Capital Cost of company A

RMB million

YEAR	2012	2013	2014	2015	2016
Short-term Loans	121	77	210	324	326
Long-term Loans	24	0	0	0	25
Rate of Short-term Loans（%）	6	6	5.6	4.35	4.35
Rate of Long-term Loans（%）	6.55	6.55	6.15	4.9	4.9
Pre-tax Debt Capital Cost（%）	6.09	6.00	5.60	4.35	4.39
Long-term Debt Capital	24	0	0	0	25
Equity Capital	206	222	298	554	650
Corporate Income Tax Rate（%）	15	15	15	15	15
Market Risk-free Rate of Return（%）	3.58	4.63	3.64	2.86	3.07
Market Risk Premium（%）	7.90	7.80	7.30	6.90	6.70
β	0	0	0.68	0.55	0.52
Equity Capital Cost（%）	3.58	4.63	8.60	6.66	6.55
WACC	**3.75**	**4.63**	**8.60**	**6.66**	**6.45**

where the Market Risk-free Rate of Return is the 10-year treasury bond interest rate, and China's GDP growth rate is selected as an alternative to Market Risk Premium. Since the company A was listed on the NEEQ in 2014, it is assumed that the company's equity capital cost is equal to market risk-free interest rate in 2012-2013, and after 2014 the Beta coefficient of the shares in the securities market is selected as the value of β.

5.4 The calculation of EVA in the year of 2012-2016

Table-4 Economic Value Added of company A

RMB million

YEAR	2012	2013	2014	2015	2016
NOPAT	17	44	108	185	131
TC	354	330	526	827	940
WACC（%）	3.75	4.63	8.60	6.66	6.55
EVA	**4**	**29**	**62**	**130**	**69**

5.5 The prediction of EVA in the year of 2017-2021

During the period of 2012 to 2016, the average growth rate of operating income of company A is 16.7%, and the average annual growth rate of net profit is over 90%.

It shows that the company A has maintained a good development trend of great increase under the current situation of domestic economic environment and the development of the communication industry. Considering the future development trend of the communication industry in China and the economic facing downward pressure, we assume that the average growth rate from 2017 to 2021 is 12%, where maybe 15% in 2017-2019 and 9% in 2020-2021, and is 4.7 percentage points lower than the average growth rate from 2012 to 2016. According to the forecast of China's economic development, it is assumed that the economic growth rate of China will keep between 6.5% and 7%, and will maintain the medium and high speed growth for a long period.

As described in the frond, the EVA value evaluation model includes three kinds of models: single stage model, two stage model, and three stage model. This paper argues that the company A should be suitable for the two stage model. In the period of 2017 to 2021 the company A will maintain a high growth rate, and in the period after 2022, the company A will enter a stable period with a stable growth rate g of 3%. Besides, we assume that WACC will maintain as 6.02 for a long period of time, which is the average WACC in the period of 2012-2016. We also assume that the identification of high new technology enterprises will continue for several years, and the income tax rate of the company A is 15%.

Table-5 Assumptions in the balance sheet and income statement of 2017-2021

ITEMS	**Method of Estimating**	**Assumptions**
Operating Income	Based on the average growth rate and corporate development for 2012-2016.	12%~9%
Net Profit	Projected as the average level relative to operating income 2012-2016.	9.35%
Minority Shareholders' Equity	Maintain average 2012-2016.	2
Interest Expense	Zero for 2012-2016 and assumed as zero.	0
Impairment of Goodwill	Zero for 2012-2016 and assumed as zero.	0
Increase in Reserves	Projected as the average level relative to operating income 2012-2016.	0.84%
R&D Expense	Projected as the average level relative to operating income 2012-2016.	4.24%
Deferred Income Tax Credit Balance Increase	Zero for 2012-2016 and assumed as zero.	0
Non-operating Income and Expenditure	Projected as the average level relative to operating income 2012-2016.	0.31%
Fair Value Change Profit	Zero for 2012-2016 and assumed as zero.	0
Common Equity	Projected as the average level relative to operating income 2012-2016.	61.46%
Minority Shareholder Equity	Average level relative to operating income 2012-2016.	1.91%
Long-term Loans due within One Year	Average level relative to operating income 2012-2016.	1.62%
Long-term Loans	Average level relative to operating income.	2.03%
Short-term Loans	Average level relative to operating income.	33.72%
Bonds Payable	Zero for 2012-2016 and assumed as zero.	0
R&D Expenses	Average level relative to operating income.	4.24%
Impairment of Goodwill	Zero for 2012-2016 and assumed as zero.	0
Reserves	Average level relative to operating income.	0.84%
Deferred Income Tax Charges	Zero for 2012-2016 and assumed as zero.	0
Non-operating Income and Expenditure	Average level relative to operating income 2012-2016.	0.31%
Net Construction In Progress	Average level relative to operating income 2012-2016.	7.10%

Table-6 Prediction of Net Operating Profit after Tax

RMB million

YEAR	**2017**	**2018**	**2019**	**2020**	**2021**
Operating Income	884	1017	1170	1275	1390
Net Profit	83	95	109	119	130
Minority Shareholders' Equity	2	2	2	2	2
Interest Expense	0	0	0	0	0
Impairment of Goodwill	0	0	0	0	0
Increase in Reserves	7	9	10	11	12
R&D Expense	37	43	50	54	59
Deferred Income Tax Credit Balance Increase	0	0	0	0	0
Non-operating Income and Expenditure	3	3	4	4	4
Fair Value Change Profit	0	0	0	0	0
NOPAT	**127**	**146**	**168**	**183**	**199**

Table-7 Prediction of Total Capital investment

RMB million

YEAR	**2017**	**2018**	**2019**	**2020**	**2021**
Common Equity	544	625	719	783	854
Minority Shareholder Equity	17	19	22	24	27
Long-term Loans due within One Year	14	16	19	21	22
Long-term Loans	18	21	24	26	28
Short-term Loans	298	343	394	430	469
Bonds Payable	0	0	0	0	0
R&D Expenses	37	43	50	54	59
Impairment of Goodwill	0	0	0	0	0
Reserves	7	9	10	11	12
Deferred Income Tax Charges	0	0	0	0	0
Non-operating Income and Expenditure	3	3	4	4	4
Net Construction In Progress	63	72	83	90	99
TC	**871**	**1001**	**1151**	**1255**	**1368**

Table-7 Prediction of EVA

RMB million

YEAR	**2017**	**2018**	**2019**	**2020**	**2021**
EVA	75	86	98	107	117
Current Value factor	0.94	0.89	0.84	0.79	0.75
Current Value	70.63	76.35	82.56	84.74	86.99
Total Current Value	**401**				

According to the previous formula, in the stable period the growth rate g is 3%, thus：

$$EVA = \sum_{t=1}^{m} \frac{EVA_t}{(1+WACC)^t} + \frac{EVA_{m+1}}{(WACC-g)(1+WACC)^m}$$

=401+52

=453

V = TC+EVA

=940+453

=1393

As can be seen from the above calculation, we use the EVA valuation model to evaluate the Company A, and find that until December 31, 2016, the enterprise value of Company A is RMB 1.393 billion.

6. Conclusion

The NEEQ has attracted a large number of high-tech enterprises. Until the end of 2017, the number of enterprises listed in the NEEQ has reached 11630. With the expansion of the influence, it will become an important part of the multi-level capital market in China. With the rapid development of the NEEQ, it has many problems and the relevant system is still imperfect. The establishment of EVA model would have a positive effect on these aspects.

Firstly, it will help to establish a scientific evaluation system, and cultivate the activation of the NEEQ communication enterprise value discovery function. The stock prices in the NEEQ are often fluctuates a lot, because of lack of a scientific evaluation system. In this paper we base on the character of communication enterprises, establish an evaluating model in order to provide scientific basis and reference standard for investors, help increasing the trade volume of the NEEQ communication enterprise stocks.

Secondly, it will provide the basis for analysis and investment decision making, and is conducive to the establishment of a scientific management system and an incentive mechanism for management. The lack of investment attractiveness of the NEEQ is due to the low threshold for the company to list in the NEEQ, and the information disclosure is often inadequate, sometimes even disclosure errors or delayed disclosure. The establishment of the EVA evaluation model is conducive to the improvement of the company's management system.

Thirdly, it is conducive to promoting the sustainable development of enterprises. Taking the EVA evaluation into the performance appraisal, will encourage enterprises to pay more attention to the long-term interests, and focus on the business considering the long-term development requires. It will also be conducive to guide enterprises to increase investment in research and development of communication industry, avoid short-term behavior and realize the sustainable development of enterprises.

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