REVA-based Value Analysis on Listed Companies of Power Industry

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Abstract—The paper establishes the regression model based on the economic value added(EVA), refined economic value added(REVA), net profit, net cash flow and other indicators selected from the financial data of power industry. Correlation analysis indicates that, in comparison with traditional financial indicators, EVA and REVA are more efficient in studying the value of China's electric power enterprises. And the interpretation to enterprise value will be more persuasive when combining EVA, REVA with traditional financial indicators. The study also finds out that the interpretative power of EVA-related indicators to enterprise value has been gradually increasing over the past seven years.

Keywords—economic value added; refined economic value added; market value added; enterprise value

I. INTRODUCTION

In the 1980s, American company Stern Stewart proposed the theory on Economic Value Added(EVA). EVA reflects the incremental gains in consideration of capital (debt capital and equity capital) cost and the enterprise value incremental process from the aspect of multiple stakeholders. Thus, EVA is gradually introduced into enterprise value evaluation as a new index for evaluating company's operation performance. In 1997, after a series case analysis, Bacidore believed that enterprise value should primarily reflect market value instead of economic value and book value of assets. And in consideration of the complexity of economic value reckoning, he brought forward the concept Refine Economic Value Added(REVA) which replaces the capital's economic value with its market value and reflects the incremental gains.

In 1990s, with the acceleration of China's economic system development, enterprise value evaluation rapidly boomed. EVA, as a new indicator for enterprise evaluation, increasingly aroused the concern of Chinese scholars. Over the past two decades, numerous scholars have made a series of researches on EVA and REVA based on Chinese realities and received some achievements, such as Wang Qingfang used the Cross-Section Analysis to interpret the stock yields through EVA[1], traditional performance indexes and capital input of 174 non-financial enterprises listed in Shanghai and Shenzhen securities exchanges prior to 1994 based on their financial data between 1994 and 1998, and concluded that the EVA is obviously more accurate than traditional data in interpreting the fluctuation of China's listed companies, and the greater the capital is, the more impressive the situation will be. Du Jiang made empirical analysis to the relationship between EVA [2] , REVA and shareholder's wealth based on the financial data

of 804 companies listed between 2004 and 2005. He found that EVA and REVA are positively correlated with abnormal return, the shareholder wealth index, but EVA has a higher positive correlation with abnormal return than REVA does as REVA, in China, is not suitable to be a performance indicator for evaluating the wealth creation due to its uncertainty in influencing the wealth of shareholders. Rao Zhenrong made regression analysis on China's company listed in 2002 and found that both EVA and REVA are positively correlated with the company's market value while REVA is more significant (0.01) and can be deemed as a reference to evaluating the company's market value[3]. Data in early years are frequently used by Chinese scholars for EVA research because Stern Stewart suspended the EVA Ranking to Chinese listed companies in 2002.

In 2010, the State-owned Assets Supervision and Administration Commission (SASAC) introduced EVA with the weight of 40% to replace ROE (Rate of Return on Common Stockholders' Equity) as an evaluation indicator to the Central Enterprises. In 2013, the weight of EVA was further improved to 50% in the evaluation, indicating EVA's greater importance in evaluating the performance of Central Enterprises and state-owned enterprises (SOEs). Theoretically, REVA is more competitive than EVA in performance evaluation. However there are few REVA empirical researches based on timely data, especially in the electric power industry, the forefront of Chinese reform. This paper intends to, based on available researches in China, build a suitable model to analyze the relationship between EVA indexes, REVA indexes, traditional financial indexes and enterprise value and explore the effectiveness of EVA and REVA indicators in evaluating the performance of electric power companies.

II. THEORETICAL ANALYSIS

A company's market value equals to the sum of its equity value and bond value. Theoretically speaking, the market value is available at any time. Market value added refers to the A company's market value equals to the sum of its equity value and bond value. Theoretically speaking, the market value is available at any time. Market value added refers to the difference between the market value total and economic capital. Economic capital, also known as investment capital, refers to the fixed assets and net operating capital invested on the company[4,5].

Market value added (MVA) = Market value — Investment capital

From the view angle of investors, MVA is the best performance indicator of a company. According to Stewart, MVA, as an indicator for a company's cumulative performance, represents all net present value and capital items of the company in the stock market as of a certain time.

EVA, an internal performance evaluation indicator of a company, can boost MVA. EVA is the fuel of a company, said Stewart, it ignites MVA. EVA has a full consideration on capital cost (equity capital cost and debt capital cost).

$$EVA = (ROIC - WACC) * TC$$

ROIC: Return on Invested Capital

WACC: Weighted Average Cost of Capital

TC: Investment capital (beginning of the year)

The balance between ROIC and WACC is also called return balance. If the balance is positive, it means that the company's remaining return exceeded the capital cost and will be converted into a higher MVA. Another formula for EVA is:

$$EVA = NOPAT - (WACC * TC)$$

NOPAT: Net Operating Profit after Tax

Hence, the theoretical description for the connections between MVA and EVA is: MVA equals to the sum of EVA that the company will produce in the future, that is:

$$MVA = \text{the present value of the future EVA}$$

REVA is a refined value based on EVA. When researching enterprise value, we should consider more on an enterprise's market value instead of its book value. EVA, reflecting an enterprise's future value through its book value, will possibly neglect some subtle factors difficult to identify in the market. REVA replaces the book value in EVA with the market value,

$$REVA = NOPAT - (WACC * MV)$$

MV: Enterprise's market value

The indicator takes the market value of assets into consideration. Research in multiple aspects indicates that the market value of assets has a fairly powerful interpretation to an enterprise's value, owner's equity and investor's equity. In addition, as for listed companies, it is easier to get the market value than to obtain the book value.

A. Hypotheses

Based on the universal research results at home and abroad, we assume that China's power industry has the hypotheses as follows:

H1: Correlations exist between NP, NOCF, EVA, REVA and MVA;

H2: The correlations between EVA, REVA and MVA prevail that between EVA, REVA and traditional financial indicators NP and NOCF.

B. Modeling

With MVA as the dependent variable and NP, NOCF, EVA and REVA as the independent variables, the following models are built:

$$MVA_1 = \alpha_1 + A_1 EVA + C_1$$

$$MVA_2 = \alpha_2 + A_2 REVA + C_2$$

$$MVA_3 = \alpha_3 + B_1 NP + C_3$$

$$MVA_4 = \alpha_4 + B_2 NOCF + C_4$$

$$MVA_5 = \alpha_5 + A_3 EVA + B_3 NP + C_5$$

$$MVA_6 = \alpha_6 + A_4 EVA + B_4 NOCF + C_6$$

$$MVA_7 = \alpha_7 + A_5 EVA + B_5 NOCF + C_7$$

$$MVA_8 = \alpha_8 + A_6 EVA + B_6 NOCF + C_8$$

III. EMPIRICAL RESEARCH & ANALYSIS

A. Source of Samples and Data

The paper selected 79 listed electric power companies in A-share markets of Shanghai and Shenzhen securities exchanges, consisting of 39 listed in 2005 and 40 listed between 2006 and 2013.

EVA is directly sourced from the database of Guotai Jun'an Securities, and REVA is obtained through calculation. In REVA formula, the equity capital cost rate is calculated with the capital asset pricing model, i.e., Equity capital cost rate = Risk-free return rate + β * (market portfolio average return rate — Risk-free return rate). The five-year fixed term treasury bond rate is deemed as the risk-free return rate, and the average ROE of all A-share listed companies in the year as the market portfolio average return rate. β is a coefficient from the database of Guotai Jun'an Securities. The table below indicates that only the coefficients for EVA and REVA of the models in 2007 are positive and have a relatively high R^2 , which is due to the market value of all stock samples are high. The stock index was high in 2007, and the actual value of listed companies were fully displayed.

Models 1-3 indicate that the T value between 2007 and 2013 were significant and below 5%, proving that EVA, REVA and NP have obvious correlation with MVA, but, only impressive positive correlation in 2007 and 2008.

The significance level of Model 4 had exceeded 5% between 2005 and 2013, which is insignificant in statistics. As the results were based on the listed electric power companies, it has no practical use in evaluating value of electric power enterprises with NOCF alone. But, when verifying Model 8 with the 2007 fiscal year's data of electric power companies, it presents an acceptable goodness-of-fit at the 5% significance level. The line graphs for Model 6 and Model 8 are similar.

We can find out, from the table and figure, that the goodness-of-fit of Model 7 is better than those of Models 1,2,3 and 5 between 2007 and 2013 when the T value were significant and below 5%, such as, in 2007, Model7>Model2>Model5 >Model1>Model3; in 2008, Model5 >Model7>Model2>Model1>Model3; in 2009:

Model7>Model5>Model3 >Model2>Model1; in 2010, Model7>Model5 >Model2>Model1>Model3; in 2011, Model7>Model5>Model3 >Model2>Model1; in 2012, Model7>Model2>Model5>Model3 >Model1; and in 2013, Model5>Model1>Model7=Model3 >Model2.

This indicates that REVA and EVA, after integrating traditional financial indicator NP, are more powerful in interpreting MVA than a single indicator.

As for goodness-of-fit, a comprehensive analysis to Models 1, 2 and 3 shows that:

2007: REVA>EVA>NP;

2008: REVA>EVA>NP;

2009: NP>REVA>EVA;

2010: REVA>EVA>NP;

2011: NP>REVA>EVA;

2012: REVA>NP>EVA;and

2013: EVA>REVA>NP.

This proves that REVA is the most powerful interpretation indicator of all single indicators.

FIGURE 1. LINE GRAPHS FOR REGRESSION DATA OF MODELS

IV. CONCLUSIONS

To sum up, the paper makes conclusions as follows.

First, the correlation between NOCF and enterprise value has no statistical significance. It means that NOCF is not applicable in China's existing electric power capital market. Second, in electric and power industry, REVA has a high correlation with enterprise value, and is more efficient than traditional financial indicators and EVA in evaluating enterprise value to some degree. However, REVA's advantages are not quite obvious.

Third, in electric and power industry, EVA has a high correlation with enterprise value, but has few advantages in comparison with traditional financial indicators in evaluating enterprise value.

Fourth, the bi-directional indicators REVA and EVA, after integrating NP, are more powerful in interpreting MVA than a single indicator.

We believe that the main reasons for the aforesaid conclusions are as follows.

- The research objects are listed companies of electric power industry of China. Due to the special market in China, the electric power industry, under the reform, expansion and development period, needs great fund investment. So, it still needs further study to judge whether the cash inflow/outflow can effectively reflect the market value of China's electric power industry.

- Although Chinese scholars has made preliminary progress in EVA research, EVA still cannot completely match with China's market environment due to the short period from EVA's introduction to the country. Moreover, in order to cater for most investors' preference, traditional financial indexes are still dominant in financial statements, resulting in the poorer practicality of EVA.

- Most of the listed electric power companies are state-owned holding companies. Their development is influenced by China's macroeconomic and regional strategies and the market reform trend which have influence to the share markets on reflecting these company's market values and will lead to the correlation between REVA and MVA. Despite of these influences, the correlation between REVA and MVA is stronger than that of traditional financial indicators. Therefore, in the progress of increasing improvement of China's market economy, the research on EVA and REVA will have a fairly high practical value.

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