

## Research Review of Enterprise Value Assessment Methods

zhangxian Wang<sup>1,a</sup>, \* yougan Zhu<sup>2,b</sup> and yushuang Zhang<sup>3,c</sup>

<sup>1</sup> Beijing Institute of Fashion Technology, Beijing, China

<sup>2</sup> Beijing Institute of Fashion Technology, Beijing, China

<sup>a</sup>wzx6820@163.com, <sup>b</sup>zyg2368@sina.com, <sup>c</sup>zys196376@163.com

\*Corresponding author

**Keywords:** Value evaluation, Methods, Review.

**Abstract.** This paper summarizes the most commonly used basic methods and theoretical models of enterprise value evaluation, and divides enterprise value evaluation methods into four categories: cost method, income method, market method and option pricing model. It aims to help investors correctly evaluate the real value of enterprises and avoid investment damage when the domestic securities market is a weak limited capital market and the intrinsic value of enterprises deviates from the market value.

### 1. Introduction

The value of an enterprise is divided into intrinsic value and market value. The stock price on the stock market reflects the market value of the company. According to the theory of capital market effectiveness, capital market can be divided into weak effective market, semi-strong effective market and strong effective market due to the different influences of stock price on historical information, public information and internal information. Only in a strong and efficient market, that is, a market where the stock price of a company can reflect not only historical information but also all public information, can the intrinsic value of an enterprise be consistent with the market value.

China's securities market began in the early 1990s, only 30 years of history. Zhang jianbin (2010) conducted an empirical test on the effectiveness of shenzhen securities market in China through the random walk model, and drew a conclusion of weak effectiveness. Therefore, it is of great theoretical and practical significance to study the principles and methods of enterprise valuation model to correctly evaluate the intrinsic value of enterprises.

### 2. Development process of enterprise value evaluation theory

Reviewing the literature over the years, the research of enterprise value assessment has a history of more than one hundred years, and the theory of value assessment has gradually become its own system. Taking the real estate appraisal in the middle and late 19th century as the beginning of the modern asset appraisal, the appraisal theory keeps adapting to the development of The Times and constantly revising and adjusting its appraisal methods for the new enterprises in the future, which makes the theory more and more mature.

The appraisal theory originated from the real estate appraisal method proposed by Marshall, an economist. He discounted the fixed assets, buildings, machinery and equipment and other real estate according to their income, and then determined their value. In his book *the nature of capital and income*, irving fisher proposed that the value of capital is the discounted present value of future income cash flows. This theory has made a great contribution to the development of enterprise value evaluation, thus many evaluation methods and theoretical models have been developed. In 1938, Williams proposed the dividend discount model. Then, based on this theory, many valuation methods are derived. Some famous theories put forward by later scholars include Meyels' adjusted present value method, the economic added value method put forward by stern and Stuart, and the option pricing theory put forward by Pindick and Dixit, all of which have a significant impact on enterprise value evaluation.

### 3. Common methods of enterprise value assessment

#### 3.1 Cost method

The principle of cost method is relatively simple, which is based on each asset of the target enterprise to evaluate its value. This method mainly relies on the balance sheet of the enterprise and other financial data, the main methods are book value method, replacement cost method, liquidation price method.

Book value, that is, the value of the owner's equity of the enterprise, that is, the net assets of the enterprise, is mainly calculated through the data on the financial statements. Since the plant, machinery, equipment and other fixed assets of an enterprise are recorded on the balance sheet at the time of purchase, according to the principle of prudence, the premium of assets in the later stage shall not be recorded. Therefore, this method reflects the historical value of enterprises and is a static m&a evaluation method.

Replacement cost, as the name implies, is the cost of purchasing the new assets of the evaluated enterprise at this moment, and then deducting the amount after the substantial depreciation, functional depreciation and economic depreciation of the enterprise, the evaluation value of the target enterprise can be obtained. Using this method to evaluate the value reflects the current market value of the enterprise, but ignores the future value of the enterprise.

Liquidation price refers to the price at which an enterprise, faced with major financial difficulties and unable to continue operations, can only repay the debts of its creditors through bankruptcy liquidation. The value of such enterprises is the price of their assets after liquidation and sale, and the net amount after deducting the realization cost, bankruptcy cost and debt paid to creditors.

#### 3.2 Market method

Market method is called relative valuation method again, basically have 3 kinds of forms, the ratio of market price to net profit, net assets, business income to wait for financial index, get the P/E, P/B, P/S. The main step is to find benchmark enterprises similar to the evaluated enterprises in the same industry, the same size and the business model. will be evaluated the net profit of the enterprise, net assets, operating income and the benchmark enterprise p/e ratio, price-to-book ratio, price-to-sales ratio multiplied, the enterprise's valuation value.

P/E ratio is the ratio of enterprise stock price to earnings per share. P/e ratio is the most widely used method in enterprise value evaluation. Its evaluation process is simple and convenient, and the principle is easy to understand. The p/e model is expressed as follows:

$$P/E = \text{Price per share} / \text{EPS (earnings per share)} = \text{Total market value} / \text{Net profit}$$

The price-to-book ratio is the ratio of the stock price of an enterprise to its net asset per share. The price-to-book ratio method is applicable to the unprofitable and loss-making enterprises. Its model is as follows:

$$P/B = \text{Price per share} / \text{Net assets per share} = \text{Total market value} / \text{Net asset}$$

The price-to-sales ratio is the ratio of the stock price of an enterprise to its operating income, and is another evaluation index reflecting the value of the enterprise. The formula is as follows:

$$P/S = \text{Price per share} / \text{Sales per share} = \text{Total market value} / \text{Sales revenue}$$

One of the key driving factors for enterprise value evaluation with the market method is to find suitable comparable companies. The type and scale of comparable companies should be the same as and similar to the evaluated companies, so that the evaluation results will be accurate and reliable.

#### 3.3 Income Method

The principle of income method holds that the intrinsic value of an enterprise is discounted by the future cash flow of the enterprise through the appropriate capital rate. Income method has two key driving factors, one is cash flow, the other is the discount rate. The models proposed by this principle include dividend discount model and free cash flow discount model.

The dividend discount model was first proposed by Gordon and Williams in 1938, which believed that the intrinsic value of an enterprise could not be confused with market price. Intrinsic value is the

real value of an enterprise and should not change with the fluctuation of stock price. The enterprise value defined by this model is equal to the dividends distributed by the company over the years, which is obtained by discounting the expected rate of return. According to the different distribution of dividends over the years, it is divided into single-stage dividend discount model and two-stage dividend discount model. The discount model of fixed dividends is expressed as follows:

$$V = \frac{D_0(1+g)}{r-g} \quad (1)$$

V: The enterprise value  
 D<sub>0</sub>: First year dividend  
 r: Enterprise rate of return  
 g: Fixed growth rate

The so-called two-stage dividend discount model is because dividends present two growth stages, the first stage is the stage of ultra-long growth, and the second is the stage of sustainable growth. The model expression is as follows:

$$V = \sum_{t=1}^n \frac{D_0(1+g_s)^t}{(1+r)^t} + \frac{D_0(1+g_s)^n(1+g_l)}{(1+r)^n(r-g_l)} \quad (2)$$

V: The enterprise value  
 D<sub>0</sub>: First year dividend  
 r: Enterprise rate of return  
 g<sub>s</sub>: The dividend growth rate in the first stage  
 g<sub>l</sub>: Fixed growth rate

The concept of free cash flow discount model was first proposed by American economist rapaport in his book creating shareholder value in 1986. Since then, through the improvement of scholars such as copeland and Cornell, the current definition has been gradually formed. The so-called free cash flow, is its after-tax operating net profit plus non-cash expenditure depreciation and amortization, minus capital expenditure and working capital increase net amou.

According to the range of free cash flow, it is divided into enterprise free cash flow and equity free cash flow. The so - called equity free cash flow, is in the enterprise free cash flow on the basis of the deduction to creditors of cash. Take the free cash flow of an enterprise as an example, the free cash flow discount model is introduced below. Similarly, similar to the dividend discount model, the enterprise free cash flow discount model is also divided into a one-stage growth model and a two-stage growth model according to the growth of the enterprise free cash flow. The one-stage growth model is expressed as follows:

$$V = \frac{FCFF_0(1+g)}{WACC-g} \quad (3)$$

V: The enterprise value  
 FCFF<sub>0</sub>: Free cash flow in the first year  
 g: Fixed growth rate  
 WACC: Weighted average cost of capital

The two-stage growth model is also formed because the growth of free cash flow of enterprises can be divided into two phases: the super-long growth stage and the sustainable growth stage. The model is expressed as follows:

$$V = \sum_{t=1}^n \frac{FCFF_t}{(1+r)^t} + \frac{FCFF_{n+1}}{(r-g)(1+r)^n} \quad (4)$$

V: The enterprise value  
 FCFF<sub>n</sub>: The free cash flow of the enterprise in the first n years  
 r: Enterprise rate of return  
 g: Fixed growth rate

### 3.4 Option Pricing Model

An option is an option to buy or sell a future underlying asset before the expiration date of the option, which is obtained by paying the option fee. According to the different exercise time, it is divided into European option and American option. An option is a contract in which the owner of the option has

only rights and no obligations. At present, the black-scholes option pricing model is widely used in enterprise valuation. (BS model) this model was first proposed by black and scholes in their paper *options pricing and corporate debt* published in 1973. The expression of this model is as follows:

$$C_0 = S_0 [N(d_1)] - X e^{-r_c t} [N(d_2)] \quad (5)$$

$$d_1 = \frac{\ln(S_0/X) + r_c t + (\sigma^2/2)t}{\sigma\sqrt{t}} \quad (6)$$

$$d_2 = d_1 - \sigma\sqrt{t} \quad (7)$$

$C_0$ : The current value of a call option

$N(d_1)$ : The probability that the deviation in the standard normal distribution is less than  $d$

$S_0$ : The current price of the underlying stock

$X$ : Strike price

$r_c$ : The risk-free interest rate for consecutive years of compound interest

$t$ : The time before the expiration date of the option

$\sigma$ : The volatility of the underlying asset

#### 4. Summary

This paper introduces some enterprise valuation methods commonly used in the capital market at present, mainly divided into absolute valuation methods such as free cash flow discount model, dividend discount model, option pricing model, and relative valuation methods such as price-to-earnings ratio, price-to-sales ratio, price-to-book ratio. The expressions and applicable scopes of these models are listed. It is hoped that this paper can provide some reference for the research of enterprise value evaluation.

#### References

- [1] Leamer, What's the Use of Factor Contents? *Journal of International Economics*, 2000 (50) :17-49.
- [2] Paul Krugman, *Technology, Trade, and Factor Prices*. NBERworking paper, 1995.
- [3] Wang zhaoliang, Yang huijie, meng hong. Literature review on enterprise investment value evaluation model [J]. *Modern economic information*,2018(14):79.
- [4] Bai chenjing. Review of approaches to enterprise value assessment and integration of theoretical framework [J]. *Journal of shijiazhuang university of economics*,2014,37(04):85-90
- [5] Guan wei. A review of theories and methods of value assessment of target enterprises in m&a [J]. *Modernization of shopping malls*,2016(20):203-205.
- [6] Zhuang bingli. *Research on valuation methods of m&a* [D]. Xiamen university,2008.
- [7] Zhou Lin, zhang qiusheng. Research review on value evaluation methods in enterprise merger and acquisition [J]. *Communications finance and accounting*,2003(07):6-8.
- [8] Tan xuan, yao hua. On the method of value evaluation of target enterprises in m&a [J]. *Shanghai management science*,2005(05):42-43.