

A Comparative Analysis of the Valuation of Real Estate Companies Based on the Models of Dividend Discount, Income Method and Market Method

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Abstract: During the Covid-19 epidemic in 2020, as early as around 2018, the Ministry of Housing and Urban-Rural Development of the People's Republic of China (short as MOHURD), the People's Bank of China (short as PBOC) and other ministries and commissions emphasized the policy bottom line of "houses are for living in, not for speculation", which also led to the sluggish performance of real estate companies in the capital market and had a significant negative impact on market valuation. In this context, which model may be more suitable for valuing real estate companies? In this paper, the investment value of Vanke is estimated based on the models of dividend discounting, income method and market method. It can be seen that the estimated results of the FCF model (income method) and the dividend discount model can be close to the current share price of Vanke, but the average or median of industry P/E ratio is not applicable to the valuation of Vanke and is far away from its actual valuation. Therefore, this paper demonstrates the applicability of the income approach and the dividend discount model to the valuation of listed real estate companies, and it is worthy of further investigation by prospective scholars.

1. Introduction

The real estate industry is an important pillar of China's economic development and plays an indispensable role in the livelihood of society. Since the reform and the promotion of market-oriented development in real estate industry in 1998, the industry has ushered in an unprecedented wave of development, and real estate prices have stepped into a golden period of rapid growth, which has spawned a series of large listed real estate companies, such as Vanke, Country Garden, Evergrande, China Overseas Building, Sunac, etc. However, the high housing prices have not only driven the growth of the real economy but also attracted speculative demand and formed a real estate price bubble, which has a crowding out effect on the rigid housing demand of common people. In recent years, the Chinese government has also issued a number of policies to regulate real estate enterprises, including a series of price and sales restrictions, which have had a certain impact on the operation and management of the real estate industry.

During 2021, the People's Bank of China (short as PBOC), China Banking Regulatory Commission (short as CBRC), and the Ministry of Housing and Urban-Rural Development of the People's Republic of China (short as MOHURD) have maintained strict regulatory policies, which has not only constrained the debt financing ability of real estate companies, but also made it difficult for many real estate companies to de-stock. Moreover, the lack of price recovery in the real estate market after the epidemic has also constituted a double decline in cash flow and operating profit of real estate companies, resulting in valuation fluctuations of listed real estate companies. From the perspective of value evaluation, both the stock market and real estate in China were in a bubble at one time. Indicators, such as stock price, P/E ratios, and P/B ratios, do not reflect the real value of real estate companies. In this study, the models of dividend discount, income method and market method will be selected to estimate the valuation of real estate companies, respectively, and the characteristics and applicability of different valuation models will be compared.

2. Literature Review

2.1 Relevant Research on Enterprise Valuation Models

Wood (1986) used the P/E model for valuation in his analysis of valuation methods for listed companies [1]. The author concluded that the estimation of company stock price was relatively accurate when the industry-integrated ROE or the industry-integrated total assets were used as criteria for classifying companies. David (2000) also valued list companies through P/E, P/B and P/S ratios, and found that such relative valuation indicators had positive errors [2]. Thomas Plenborg (2002) applied residual income and discounted cash flow models to value listed companies [3]. In the comparative analysis, the author found that the residual income model is more applicable. Paul Pignataro (2013) used a discounted cash flow model to value Wal-Mart [4]. The author believes that the difficulty of the discounted cash flow model lies in the estimation of the discount rate. Keth Skogsvi (2013) argued that residual earnings and abnormal earnings growth could be used as parameters for company valuation [5].

2.2 Related Research on Real Estate Investment Value

Chen Jun (2011) examined the investment value of listed real estate companies through AHP hierarchical analysis, and the analysis model adopted financial indicators such as solvency, operating capacity, and profitability, etc., and calculated the investment value by determining the weights through AHP [6]. Zhang Hong et al. (2014) used Tobin's Q to calculate the investment value of listed real estate companies [7]. In this model, the authors found that the accuracy of the investment value discrimination of the sample companies was 78.9%. Cao Danni and Yu Yongsheng (2015) estimated the investment value of Binjiang Real Estate Group by discounted cash flow, and it concluded that this method can overcome the impact of the inflated bubble premium less than traditional ones [8]. Cui Xin and Deng Guixia (2021) chose Vanke as a study case and estimated its investment value through the EVA model [9]. Wang Xia (2021) applied a discounted cash flow model to estimate the investment value of a complex building transfer project in Luoyang City [10]. Guo Lihua and Guan Jingfeng (2021) [11] estimated the real estate location value through comprehensive analogy quantitative pricing method.

2.3 Literature Review

In the review of the previous literature, it can be found that the relative valuation method and the discounted cash flow method are the most frequently used models in the valuation of listed companies, while in the literature related to the value of real estate investment in China, scholars have used a wide variety of methods, including the AHP method, Tobin's Q value, and discounted cash flow. However, there is no study comparing the differences of multiple methods at the same time. In this paper, the dividend discounting, income approach and market approach models will be selected to estimate the valuation of real estate companies separately to fill the gaps in the existing literature.

3. Current Situation of the Real Estate Industry

During the Covid-19 epidemic, the relevant regulatory policies have not been relaxed. As in table 1, in the symposium on real estate enterprises held by the MOHURD and PBOC in August 2020, it was proposed that the asset-liability ratio of real estate companies after excluding advance receipts should not exceed 70%, the net debt ratio should not exceed 100%, and the cash short-term debt ratio should be greater than 1, which is the "Three Red Lines" for the supervision of real estate enterprises. In November 2020, the CBRC strengthened supervision over the inflow of insurance funds, trust funds and other funds into the property market.

In figure 1, first of all, from the perspective of the China's National Property Prosperity Index, it has been in a trend of growth followed by decline from 2017 to 2022. During 2017-2018, the index was above 100 in all time periods, which indicates that the development of the real estate market was still moderately upward. However, the outbreak of Covid-19 epidemic in 2020 has lowered the index by one notch, with reaching a low of 97.39 in February 2020. Despite being in a difficult recovery

from March 2020 to March 2021, therecord high only stayed at 101.29 in March 2021, and then began to enter a downward cycle. In March 2022, it fell to 96.66, which was at a historical low in 2017-2022, showing that the Covid-19 epidemic has brought severe negative impact on the real estate industry. Therefore, the Covid-19 epidemic has prompted the real estate industry to enter a downward cycle, resulting in a slow growth in the sales of housing products. In addition to the slow start and resumption of real estate development projects in 2020, and the Shanghai epidemic in 2022 has also impacted the sales of Shanghai real estate market to enter a downward cycle, so more and more listed real estate companies' debt have began to accumulate, and there was a concentrated outbreak phenomenon, including China Fortune Land Development(short as CFLD), China Evergrande, ST Taihe, Sunshine City, etc. in 2021, all of which were "insolvent". In May 2022, the Shenzhen Stock Exchange also inquired about more than ten real estate companies in China [12].

Table 1 Real Estate Market Regulation Policies

Time	Department	Regulation
August 2020	MOHURD; PBOC	"Three Red Lines"
November 2020	CBRC	Restrict insurance capital, unlisted companies, and trust institutions' capital from flowing into the property market
January 2021	PBOC; MOHURD	Continue to do a good job of "six stability" and "six guarantees"
March 2021	CBRC	"Notice on Preventing Business Loans from Flowing into the Real Estate Sector"
July 2021	MOHURD; PBOC	Land purchase amount limit on enterprises in the "Three Red Lines"
December 2021	PBOC; CBRC;China Securities Regulatory Commission (short as CSRC)	Emphasis on maintaining market stability and promoting the resolution and prevention of financial risks

Source: Author Collection

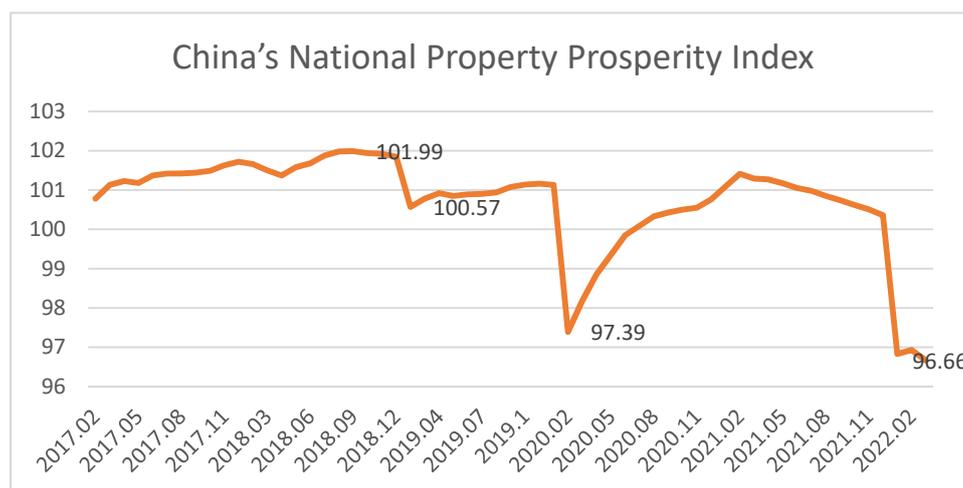


Figure 1 China's National Property Prosperity Index

Source: Qianzhan Industry Database

4. Case Study of the Investment Value of Listed Real Estate Companies - Vanke as an Example

4.1 Research Design

4.1.1 Reasons for Case Selection

Vanke is the short name for China Vanke Co., Ltd.. Founded in 1984, Vanke is a leading real estate

company in China, with its main business including real estate development and property services, and its development strategy focusing on urban areas. According to the ranking of "Top 500 Chinese Real Estate Development Enterprises" in 2021, Vanke is ranked No. 1 in China, so it is a good representative of the real estate industry.

4.1.2 Model Introduction

The market method model is also known as the market valuation model or relative value model. It is based on the principle of finding the valuation indicators of listed companies in the same industry, with the advantage of better comparability. The price-earnings ratio(P/E), price-to-sales ratio(P/S), and price-to-book ratio(P/B) are the most common market valuation models, which are calculated as follows:

$$P / E = \frac{\text{Market Value}}{\text{NetProfit}} \quad (1)$$

$$P / B = \frac{\text{Market Value}}{\text{NetAsset}} \quad (2)$$

$$P / S = \frac{\text{Market Value}}{\text{GrossRevenue}} \quad (3)$$

The income method is a calculation model based on the discounted future cash flow of the enterprise, and the classic FCFF model will be adopted in this paper. Specifically, historical financial reports, industry reports and other information are used to predict future net profit, changes in working capital, depreciation and amortization, etc. Meanwhile, the weighted cost of capital (WACC) is calculated based on the equity and debt capital structure, and the discounted theoretical value is calculated based on the WACC as the discount rate. According to the following formula, PV represents the theoretical value of the company being valued, T represents the forecast length of time (normally chosen as 3 years), t represents the year, FCFF_t represents the expected free cash flow of the company being valued in Year t, and WACC represents the discount rate calculated based on the weighted cost of capital, and g represents the expected free cash flow perpetual growth rate. The formula for calculating the weighted cost of capital (WACC) is expressed by (4), where K_d represents the interest rate on debt capital, K_e represents the annualized rate of return on equity capital, W_d represents the proportion of negative debt capital, W_e represents the proportion of equity capital, and TAX represents the tax rate on equity capital.

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

$$WACC = W_d * K_d + W_e * K_e (1 - TAX) \quad (5)$$

The dividend discount model calculates the value of a stock based on the discounted dividend distribution of the stock. The specific calculation formula is as follows. V represents the intrinsic value of the stock, D represents the dividend in different periods t, and k represents the discount rate. Based on the dividend with a fixed growth rate g, a fixed growth dividend discount model can be obtained.

$$V = \frac{D}{(1+k)} + \frac{D(1+g)^2}{(1+k)^2} + \frac{D(1+g)^3}{(1+k)^3} + \dots + \frac{D(1+g)^t}{(1+k)^t} \quad (6)$$

$$V = \frac{D}{k-g}$$

4.2 Market Method Valuation Analysis

According to the closing price on August 26, 2022, the following relative valuation results of listed

companies in the real estate industry can be obtained. As in table 2, the latest closing price of Vanke is 15.83 Yuan, the P/E ratio is 8.12, and the P/B ratio is 0.78, while the median industry P/E ratio is 10.30 , and the average is 15.56, the median P/B ratio is 1.02, and the average is 1.48, which indicates that Vanke’s market-based valuation is lower than the industry. Therefore,in terms of the valuation distribution in the real estate industry, Vanke's market-based valuation is at a relatively low level.

Table 2 P/E and P/B ratios of Vanke and its peers

No	Abbreviation	Latest closing price (Yuan)	Earnings per share (Yuan)	P/E Ratio	P/B Ratio
Industry average (overall method)		6.01	0.02	15.56	1.48
Industry median		4.20	0.13	10.30	1.02
1	Poly Development	16.68	2.32	7.18	1.11
2	Vanke A	15.83	1.95	8.12	0.78
3	China Merchants Shekou	14.61	1.31	11.14	1.34
4	Gemdale Group	11.46	2.10	5.46	0.81
5	Seazen Holdings	20.14	5.56	3.62	0.76
6	OCT A	5.38	0.37	14.36	0.56
7	Greenland Holdings	3.09	0.15	20.23	0.46
8	Lujiazui	9.91	0.84	11.78	1.85
9	Shanghai Lingang	12.70	0.58	22.05	2.04
10	Binjiang Group	9.46	0.92	10.30	1.42

From the distribution of P/E ratio and P/B ratio, it seems that neither of the distributions in the real estate industry is normal, which to some extent indicates that the market valuation comparison using the average or median value may deviate from the real situation of the company, and may not be applicable to Vanke’s value analysis.

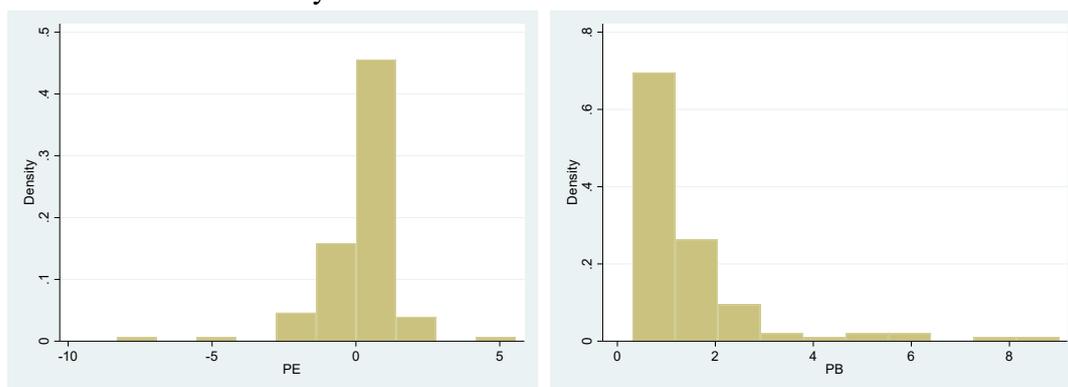


Figure 2 Distribution of P/E and P/B of the real estate industry

4.3 Income Method Valuation Analysis

As mentioned above, the WACC is calculated by summing the cost of equity capital and the cost of debt capital. The short-term debt capital cost is assumed to be 4.35%, and the long-term debt interest rate is 4.9%, which is also the legal long-term and short-term loan interest rate in China. In terms of the cost of equity capital, the univariate linear regression model is constructed by the Vanke share price and the Shenzhen Stock Exchange(SZSE) Index from 2020 to 2022, and the β coefficient of both can be calculated as 0.487, which indicates that when SZSE Index changes by 1%, the Vanke share price changes by 0.487% in the same direction in figure 3. Then it can be assumed that the average annual growth rate of the SZSE Index is 10% , and the equity capital of Vanke is 4.87% in the future period of 2022-2024. Based on what is shown in Table 3, according to the data of

Vanke's annual report in 2021, the company's short-term liabilities are 1.4413 million Yuan, long-term liabilities are 15.4322 million Yuan, and shareholders' equity is 39.2773 million Yuan. Assuming that the income tax rate is 25%, the WACC capital cost can be obtained as 4.01%.



Figure 3 Univariate Linear Regression of Vanke and SZSE Index

Table 3 Discount Rate Calculation

Category	Amount (ten thousand Yuan)	Proportion	Cost
Short-term debt	144.13	2.57%	4.35%
Long-term debt	1543.22	27.48%	4.90%
Equity	3927.73	69.95%	4.87%
Tax Rate			25%
WACC			4.01%

In this paper, the annual historical financial data of 2018-2021 is adopted as a basis to forecast the financial situation of Vanke of 2022-2024, thereby estimating future FCFF flows. From the historical data, Vanke's revenue has increased from 297.67933 billion Yuan in 2018 to 452.79777 billion Yuan. However, considering the sluggish real estate market after the Covid-19 epidemic, it is assumed that the annual growth rate of 2021 will also be maintained in 2022-2024 at 8.04% in table 4. Meanwhile, Vanke's historical operating cost rate and operating expense rate are relatively stable, so it is assumed that Vanke's future main business cost rate and operating expense rate are the average of 2018-2021, which are 68.80% and 14.08%, respectively. In the meantime, the ratio of income tax expense to total profit is the 2018-2021 level, which is 29.01%.

Table 4 After-tax operating profit of 2018-2021

Subject/time	2021 Annual Report	2020 Annual Report	2019 Annual Report	2018 Annual Report
Operating income (10,000 Yuan)	45279777	41911168	36789388	29767933
Year-on-year growth	8.04%	13.92%	23.59%	-
Operating cost (10,000 Yuan)	35397714	29654069	23455033	18610422
proportion	78.18%	70.75%	63.75%	62.52%
Operating expenses	4913297	5397265	5977075	4832958
proportion	10.85%	12.88%	16.25%	16.24%
Operating profit before tax (10,000 Yuan)	4968766	6859834	7357280	6324553
Less: Income tax expenses (ten thousand Yuan)	1415310	2037764	2140767	1818791
Income tax share	28.48%	29.71%	29.10%	28.76%
Operating profit after tax (10,000 Yuan)	3553456	4822070	5216513	4505762

Table 5 shows the forecast results, in which the operating after-tax profits of Vanke for the next 3 years is 59,455,192,700 Yuan, 64,235,390,200 Yuan and 69399,915,600 Yuan, respectively.

Table 5: After-tax operating profit of 2022E-2024E

Subject/time	2024E	2023E	2022E	2021 Annual Report
Operating income(10,000 Yuan)	57102879.12	52853460.86	48920271.07	45279777
Year-on-year growth	8.04%	8.04%	8.04%	8.04%
Operating cost (10,000 Yuan)	39286780.83	36363181.08	33657146.5	35397714
proportion	68.80%	68.80%	68.80%	78.18%
Operating expenses	8040085.38	7441767.29	6887974.17	4913297
proportion	14.08%	14.08%	14.08%	10.85%
Operating profit before tax (10,000 Yuan)	9776012.91	9048512.50	8375150.41	4968766
Less: Income tax expenses (ten thousand Yuan)	2836021.34	2624973.48	2429631.13	1415310
Income tax share	29.01%	29.01%	29.01%	28.48%
Operating profit after tax (10,000 Yuan)	6939991.56	6423539.02	5945519.27	3553456

As shown in Table 6, it can be seen that the capital expenditure of Vanke in 2021 increased by 32.87% year-on-year, and the growth rate of depreciation and amortization is at a high and unstable level. Assuming that depreciation maintains the growth rate in 2021, and the amortization of intangible assets is the average value of 2019-2021, then the forecast capital expenditures, depreciation and amortization amounts can be obtained accordingly in Table 7.

Table 6 Capital Expenditure and Depreciation and Amortization of 2018-2021

Subject\time	2021 Annual Report	2020 Annual Report	2019 Annual Report	2018 Annual Report
Capital expenditure (10,000 Yuan)	957791	720830	624419	589675
Year-on-year growth	32.87%	15.44%	5.89%	-
Depreciation of fixed assets and investment real estate (10,000 Yuan)	296185	265092	446679	169723
Year-on-year growth	11.73%	-40.65%	163.18%	-
Amortization of intangible assets (10,000 Yuan)	252016	220984	183881	122471
Year-on-year growth	14.04%	20.18%	50.14%	-

Table 7 Capital Expenditure and Depreciation and Amortization of 2022E-2024E

Subject\time	2024E	2023E	2022E	2021 Annual Report
Capital expenditure (10,000 Yuan)	957791.00	957791.00	957791.00	957791
Year-on-year growth	0.00%	0.00%	0.00%	32.87%
Depreciation of fixed assets and investment real estate (10,000 Yuan)	413116.42	369745.30	330927.50	296185
Year-on-year growth	11.73%	11.73%	11.73%	11.73%
Amortization of intangible assets (10,000 Yuan)	220984.00	220984.00	220984.00	252016
Year-on-year growth	-	-	-	14.04%

Table 8 shows the historical data and forecast of net working capital. It can be found that the level of change in net working capital in 2019 is relatively insignificant. Moreover, in 2020-2021, the

changes in net working capital are 63.5153 billion Yuan and 58.92747 billion Yuan, respectively. This paper assumes that 2022 -In 2024, the average of the two will remain at 61,221,385,000 Yuan.

Table 8 Net Working Capital Calculations of 2018-2021

Subject\Time	2021 Annual Report	2020 Annual Report	2019 Annual Report	2018 Annual Report
Operating assets (10,000 Yuan)	160026831	154738706	143898935	129507186
Year-on-year growth rate	3.42%	7.53%	11.11%	-
Operating liabilities (10,000 Yuan)	131144647	131749269	127261028	112191394
Year-on-year growth rate	-0.46%	3.53%	13.43%	-
Increase in operating working capital (10,000 Yuan)	5288125	10839771	14391749	-
Increase in operating current liabilities (10,000 Yuan)	-604622	4488241	15069634	-
Changes in net working capital (10,000 Yuan)	5892747	6351530	-677885	-

According to the calculation formula of the FCFF model, the results of the Vanke valuation model can be calculated. Table 9 shows the projected FCFF free cash flow of Vanke in 2022-2024. It can be seen that the FCFF of Vanke in 2022-2024 are 54,671,027,600 Yuan, 50,722,036,100 Yuan and 47,058,287,700 Yuan, respectively.

$$FCFF = EBIT(1 - \text{IncomeTaxRate}) - \text{ChangeInNetWorkingCapital} - \text{CapEx} + \text{DepreciationAndAmortization} \quad (7)$$

$$\text{Operating Profit After Interest And Tax} = \text{MainBusinessIncome} - \text{MainBusinessCost} - \text{OperationCost} - \text{CorporateTaxation} \quad (8)$$

$$\text{CapEx} = \text{Cash Paid For Purchase Of Fixed Assets} \quad (9)$$

$$\text{NetWorkingCapital} = \text{IncreaseInOperatingCurrentAssets} - \text{IncreaseInOperatingCurrentLiabilities} \quad (10)$$

Table 9 FCFF forecast of Vanke

Subject\Time	2024E	2023E	2022E
Net profit after tax from continuing operations (10,000 Yuan)	6939991.56	6423539.02	5945519.27
Capital expenditure (10,000 Yuan)	957791.00	957791.00	957791.00
Depreciation and amortization (10,000 Yuan)	413116.42	369745.30	330927.50
	220984.00	220984.00	220984.00
Changes in net working capital (10,000 Yuan)	4705828.77	5072203.61	5467102.76
FCFF(10,000 Yuan)	4705828.77	5072203.61	5467102.76

The FCFF valuation level of Vanke can be calculated according to the following formula. Since the real estate market is regulated by policies and the industry prosperity is not high, assuming that

the future FCFF growth rate is -10%, the market valuation can be obtained as 135.846 billion Yuan . As of August 26, 2022, the total market value of Vanke is 154.3 billion Yuan, a valuation level that is relatively close to the stock price.

$$PV = \sum_{t=1}^3 \frac{FCFF_t}{(1+WACC)^{t-1}} + \frac{FCFF_3 \times (1+g)}{(1+WACC)^3 \times (WACC-g)}$$

$$\begin{aligned} PV &= 5467107.76 * (1+4.01\%)^1 + 5072203.61 / (1+4.017\%)^2 + 4705828.77 / (1+4.01\%)^3 \\ &\quad + 4705828.77 * (1-10\%) / (4.01\%+10\%) / (1+4.01\%)^3 \\ &= 13584859.9 (\text{ten thousand yuan}) \\ &\approx 1358.46 (100 \text{ million yuan}) \end{aligned}$$

4.4 Dividend Discount Model

Table 10 shows the dividend distribution of Vanke of 2010-2022. It can be seen that the dividend per 10 shares of 2018-2021 has changed from 9.00 Yuan to 9.76 Yuan, and the record high is 12.50 Yuan in 2020. In this paper, it assumes that the future dividend yield growth rate is -5%, -2.5%, 0%, 2.5%, 5% of the valuation results, with a discount rate assumed to be 6%, as shown in Table 11. In assuming dividend growth of 0%, the dividend valuation is 16.27 Yuan per share, which is also closer to the closing price of 15.83 Yuan. Considering that the growth potential of the real estate market in the future is not as good as the past "Golden decade", and the dividend payment in 2021 has fallen sharply compared to 2020, it is reasonable to expect a perpetual growth rate of 0%.

Table 10 Dividend Distribution Data of Vanke

Announcement date	Dividend year	Dividend plan (per 10 shares)		
		Bonus	Increase	Dividend
2022-08-18	2021	--	--	9.76
2021-08-18	2020	--	--	12.50
2020-08-08	2019	--	--	10.17
2019-08-09	2018	--	--	10.45
2018-08-16	2017	--	--	9.00
2017-08-22	2016	--	--	7.90
2016-07-22	2015	--	--	7.20
2015-07-14	2014	--	--	5.00
2014-04-28	2013	--	--	4.10
2013-05-08	2012	--	--	1.80
2012-06-27	2011	0	0	1.30
2011-05-20	2010	0	0	1.00
2010-05-10	2009	0	0	0.70

Table 11 Future Prediction of Dividend Data of Vanke

Dividend growth rate	Dividend per share (Yuan)	Discount rate	Valuation
-5%	0.976	6%	8.87
-2.5%	0.976	6%	11.48
0%	0.976	6%	16.27
2.5%	0.976	6%	27.89
5%	0.976	6%	97.60

5. Conclusion

In this paper, the current property prosperity index and related policy documents are analyzed. Vanke is selected as a case study to estimate its investment value based on the models of dividend discount, income method and market method. It can be seen that the estimation results of FCFF model (income method) and dividend discount model are close to the current share price level of Vanke,

but the average or median of industry P/E ratio is not applicable, which is far from its actual valuation. Therefore, in this paper, it proves the applicability of the income method and the dividend discount model to the valuation of listed real estate companies, which is also worthy of further exploration by future scholars. However, the income approach and the dividend discount model are based on the research assumptions and parameter settings of scholars to a large extent, which may cause large valuation errors. Future research can consider exploring the methods of investment value assessment assumptions and parameter selection for real estate listed companies, as well as the improvement of model calculation methods to improve the accuracy of investment value assessment.

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