

Valuation Analysis of the Banking Industry based on DCF, P/E and EBITDA Valuation

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Abstract. Contemporarily, banks play a significant role in the global financial system, and by conducting valuation research on the Chinese banking sector. It is possible to determine whether the country's financial market is operating in a stable and efficient manner, whether Chinese banking stocks offer investment potential at this stage in the sector's life cycle, and other issues. This study examines the discounted future cash flow model, the P/E model, and the EBITDA valuation method on evaluation of the banking sector. The research findings lead to the conclusion that there is little chance of significant changes in the stock price of China's banking sector, that relevant stock risks for investors are minimal, and that stable dividends can be obtained annually. The industry is at a mature stage in its life cycle, therefore there are little opportunities for rapid, extensive growth. Overall, these results shed light on guiding further exploration of the valuation of China's banking industry and banking valuation methods.

Keywords: China's banking industry; valuation analysis; cash flow discount model; P/E model, EBITDA model.

1. Introduction

Banks, being a significant part of the global financial system, play a crucial role in the global economy. Thus, the efficient functioning of the global economy is tied to the banking sector's healthy development. Almost 90% of the total assets of the financial industry in China are comprised of the banking sector. As can be observed, the stability of China's banking sector affects the health of the country's financial system as a whole [1]. The asset size of various types of Chinese banks has dramatically expanded since China joined the Global Economic and Trade Organization. 50 banks were listed on stock exchanges in Hong Kong or mainland China as of 2017 [2].

Based on relevant research on China's banking industry, it is possible to explore whether China's financial market operates stably and effectively, whether there is investment value in China's banking stocks during the industry's life cycle, and so on. In the existing research on the banking industry, researchers have placed more emphasis on the analysis of banking strategies and policy adjustments, and the current research on banking valuation is not yet sufficient. This study will estimate the entire banking industry through the valuation of China's top banks, and further explore the current banking industry valuation. The objects of this article are Bank of China, Industrial and Commercial Bank of China, and China Construction Bank. As one of the four largest state-owned banks, Bank of China has already had a relatively large scale. Based on the analysis of the four major capabilities of banks, including profitability, liquidity, solvency, and development ability, except for the slight decline in the two indicators of profitability, namely, return on net assets and return on total assets, other indicators have performed well [3]. Nowadays, among the main profit indicators of Industrial and Commercial Bank of China, basic earnings per share have slightly increased, the growth rate of net assets per share has remained stable, the return on total assets has slightly decreased, and the capital adequacy ratio has remained stable, with a relatively stable overall performance [4]. After experiencing a period of decline in profitability, China Construction Bank now maintains a growth rate of profitability [5]. These three banks are three of the four largest state-owned banks, with large scale and strong stability, which to some extent can represent the current situation of China's top banks.

This research uses the discounted future cash flow model, P/E model, and EBITDA valuation method to evaluate the Bank of China. The dividend discount model is selected as the future cash

flow discount model. The dividends paid during the holding period of the stock holder and the capital gains when the stock is sold are the future cash flows received. If the stock holder holds the stock indefinitely, the total discount can represent the stock value [6]. Regarding whether the future cash flow discount method is affected by different interest rates, Chen conducted that the low discount rate brought about by the macro environment of low interest rates will bring great uncertainty, which makes the DCF model lose its certainty in evaluating the value of enterprises [7]. Compared with the yield of Treasury bond bonds of China, the United States, Britain, Japan and Europe in recent five years, the yield of Treasury bond of China has remained relatively stable, and there has been no significant reduction in the yield. The P/E ratio valuation method is a commonly used method for evaluating the value of stock investment in mature foreign securities markets. When earnings are high and relatively stable, using the P/E ratio model for valuation is relatively accurate, and its error may be less than the error of using the constant growth dividend discount model for valuation [8]. Li, Zhang, and Liu concluded that when a company's earnings per share is negative, it is not possible to use a P/E ratio for valuation, and it should not be superstitious about the P/E ratio results. Judging the investment value of a company based solely on the P/E ratio is not scientific [9]. However, they have certain limitations as a single indicator. Therefore, combining the P/E ratio valuation method with other valuation methods is more conducive to making a correct judgment on stocks. EBITDA valuation method, also known as enterprise value multiplier valuation, Jan et al. have shown that the EBITDA valuation method cannot represent profitability, cash generation ability, liquidity risk, and credit risk, so many values related projects are excluded from the calculation of EBITDA, which makes it less likely to reflect the company's economic performance [10].

However, it is suitable for comparison between companies with completely different capital structures. Compared to other cash indicators, it is usually the highest. From another perspective, it can be understood as the total cost of acquiring a company. Thus, it can be used as the analysis method in this article. In order to conduct a valuation analysis of China's top banks, this study will investigate the financial situation of the three selected banks. The results and process of this article are expected to provide reference for similar research on banking valuation in the future.

2. Valuation Methods

The principle of the discounted future cash flow model can be summarized as follows. First, investors invest now and expect to receive returns in the future; second, the investment value is equal to the discounted value of future cash flows. Based on the above two points, two future cash flow discount models are introduced. The dividend discount model is established on the assumption that the company can operate permanently and the intrinsic value of the stock is equal to the discounted value of future dividends, namely:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} \quad (1)$$

Here, V_0 represents the value of the stock at the time $t=0$, D_t represents the dividend forecast for the year t , assuming that the dividend is paid at the end of the year, and r represents the required rate of return for shareholders. The above formula is derived from the following formula, namely:

$$V_0 = \frac{D_1}{(1+r)^1} + \dots + \frac{D_n}{(1+r)^n} + \frac{P_n}{(1+r)^n} \quad (2)$$

V_0 is the value of the stock at the time $t=0$, D_n is the dividend of the stock in year n , and p_n is the selling price of the stock at the end of year n . The company is on the premise of sustainable operation, so when n approaches infinity, the impact of P_n on V_0 can be ignored. Hence, the formula can be simplified to the above formula.

In addition to the assumption of sustainable operation, if two assumptions are also satisfied, namely, that dividends grow indefinitely at a sustainable growth rate and that the dividend growth rate is smaller than the required return rate. The Gordon growth model can be applied. Namely:

$$V_0 = \frac{D_1}{r-g} = \frac{D(1+g)}{r-g} \quad (3)$$

Where V_0 is the intrinsic value of the stock, D_1 is the dividend at time $t=1$, D_0 is the dividend at time $t=0$, g is the growth rate, and r is the required return rate. The formula is derived as follows

$$V_0 = \frac{D_0(1+g)^1}{(1+r)^1} + \frac{D_0(1+g)^2}{(1+r)^2} + \dots + \frac{D_0(1+g)^n}{(1+r)^n} \quad (4)$$

Extracting the common factor D_0 of D_0 , one obtains

$$V_0 = D_0 \left[\frac{(1+g)^1}{(1+r)^1} + \frac{(1+g)^2}{(1+r)^2} + \dots + \frac{(1+g)^n}{(1+r)^n} \right] \quad (5)$$

Because $r > g$, $-(1+g) < 1+r$, the original formula can be considered as an infinite proportional sequence, and the sequence converges. Therefore, the original formula can be simplified according to the summation formula of the number sequence, i.e.

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g} \quad (6)$$

Dividend D is equal to net profit per share multiplied by (1-retained earnings ratio), $D = (1-b) \text{EPS}$. The dividend growth rate is equal to the retained earnings rate multiplied by the return on shareholders' equity, i.e., $g = \text{RR} \times \text{ROE}$. The required rate of return, r , can be derived from the CAPM model.

The P/E ratio model is a commonly used method of market valuation, i.e., the P/E ratio is the stock price divided by the company's net profit. The enterprise value multiplier is determined by dividing the enterprise value by EBITDA

$$EV = \frac{\text{Enterprise value}}{\text{EBITDA}} \quad (7)$$

The enterprise value is equal to the market value of common stock, preferred stock, and debt minus cash and cash equivalents: *Enterprise value = Market value of common stock + Market value of preferred stock + Market value of debt – Cash and cash equivalents*. Enterprise value can be seen as the total cost of acquiring a company

3. Valuation Analysis of Bank of China

This study imports the dividend data of Bank of China from 2007 to 2021 into Excel, draws a scatter chart, and performs regression analysis and fitting. As shown in Fig. 1, except for the three years 2013, 2014, and 2015, the dividend distribution showed a downward trend, and the other years showed an upward trend, consistent with the assumptions of the Gordon growth model. Therefore, this paper uses the Gordon growth model to analyze it.

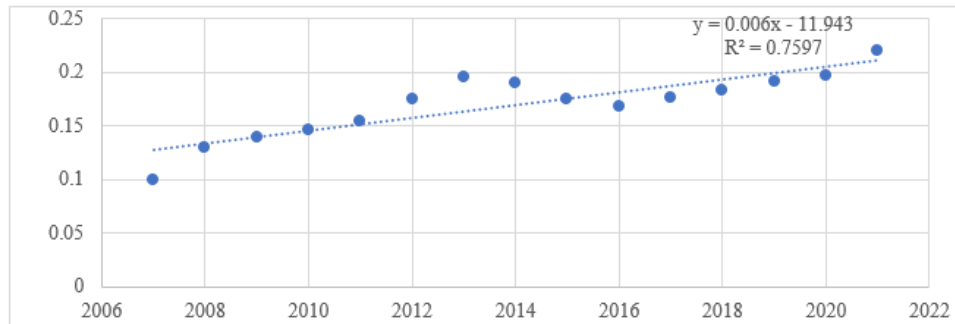


Fig 1. Bank of China Dividend Data.

As shown in Figure 1, after importing and fitting the dividend data of Bank of China, the regression equation $y=0.006014286x-11.94317143$ is obtained. By substituting $x=2023$, $y=0.224$, that is, $D1=0.224$, can be obtained. Based on the derivation, $g=RR \times ROE$ is obtained. Looking up the data of Bank of China in the past 12 months, one can obtain a return on net assets (ROE) of 9.4% and a dividend payout rate of 31.57%, i.e., a retained earnings ratio (RR) of 68.43%. Therefore, the dividend growth rate $g=0.0642$. The required rate of return can be acquired based on the CAPM model as follows.

$$r = R_f + \beta(R_m - R_f) \tag{8}$$

Here, R_f takes the yield of the nearly five-year one-year treasury bond as 2.224% β value is 0.7064, R_m is taken as 14.23% of the average yield of the Shanghai Composite Index from 2002 to 2017 [6]. According to the CAPM model, $r=10.705\%$. Based on the above data, $P=5.2336$ yuan. According to the P/E ratio model, the price is $P=P/E * \text{earnings per share}=2.458$. Since the 2022 annual report was not released, accounts receivable in the first three quarters of 2022 were used instead. As a banking enterprise, Bank of China can basically ignore depreciation and amortization. $EBITDA=Net Profit Income + Tax + Interest + Depreciation + Amortization = 52275400$. Enterprise value=common stock (market value) +preferred stock (market value) +debt (market value) - cash and cash equivalents=2449489000. The result is $EV=46.857$.

4. Analysis of the Other Two Leading Banks

4.1 Industrial and Commercial Bank of China

As shown in Fig. 2, the fitting equation is obtained, and the relevant data is obtained according to the formula, $D1=0.316$, $ROE=8.47\%$, $RR=69.13\%$. Therefore, $g=RR \times ROE=0.05855$. Based on literature review, it can be seen that the β the value is 0.6397, so it can be obtained based on the CAPM model, $r=0.0992$. Therefore, $p=7.774$ yuan. $P=P/E * \text{Earnings per share}=2.46$ yuan, ICBC $EBITDA=745277$, Enterprise=34424782, $EV=34424782 \div 745277=46.1906$.

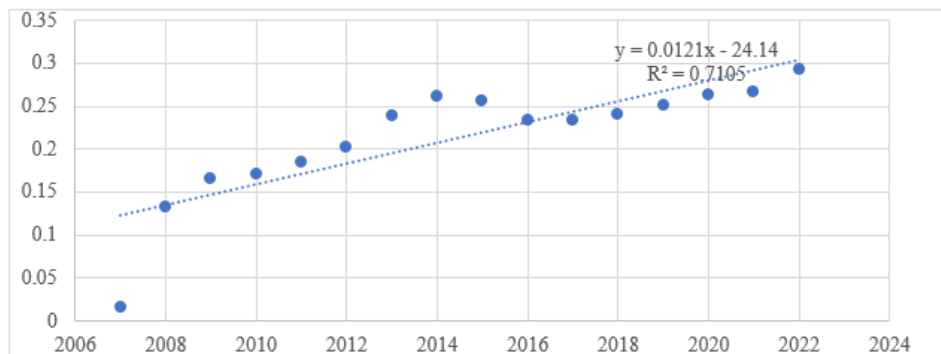


Fig 2. Industrial and Commercial Bank of China Dividend Data.

4.2 China Construction Bank

As shown in Figure 3, importing the dividend data of China Construction Bank into Excel, the regression result is $y=0.017059x-34.1186$. Taking 2023 into account, $D1=0.3918$, $ROE=9.58\%$, $RR=1-30.59\%=0.6941$, $g=RR * ROE=0.0665$. Based on literature review β the value is 0.9227, which can be obtained from the CAPM model, $r=2.224\%+0.9227 * 0.11078=0.1045$. Therefore, $p=10.31$ yuan. According to the P/E ratio model, $p=P/E \times \text{earnings per share}=4.257$. EBITDA of China Construction Bank=663552. Enterprise value of China Construction Bank=29915625, EV=45.084.

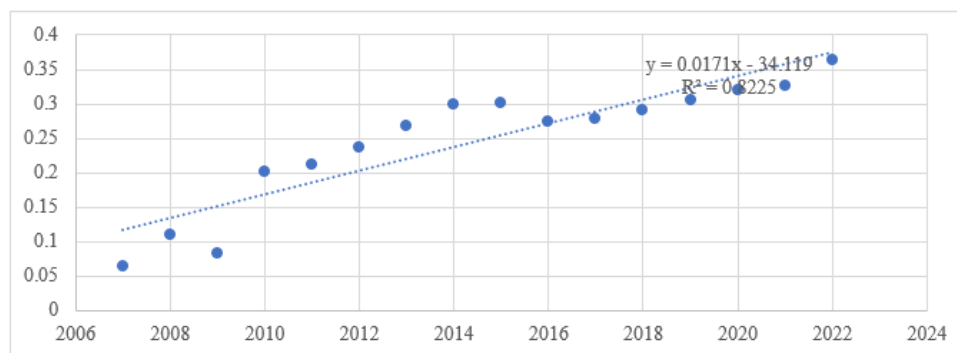


Fig 3. China Construction Bank.

5. Comparison

As presented in Tables 1, 2, and 3, the GGM valuations of the three banks are all higher than their actual stock prices, while the P/E ratios are all lower than their actual stock prices, while the enterprise value multipliers are all at high levels. Calculate the average of several valuations for the three banks, and obtain average of three banks (geometric average) GGM=7.486, P/E ratio=2.953, enterprise value multiplier=46.038, average market value=4.322.

Table 1. Bank of China Comparison.

Bank Of China	GGM Valuation	P/E Valuation	Enterprise Value Multiplier
Valuation	5.2336	2.458	46.857
Actual share price	3.27	3.27	

Table 2. Industrial and Commercial Bank of China Comparison.

Industrial and Commercial Bank of China	GGM Valuation	P/E Valuation	Enterprise Value Multiplier
Valuation	7.774	2.46	46.1906
Actual share price	4.33	4.33	

Table 3. China Construction Bank Comparison

China Construction Bank	GGM Valuation	P/E Valuation	Enterprise Value Multiplier
Valuation	10.31	4.257	45.084
Actual share price	5.7	5.7	

6. Conclusion

In summary, this paper calculates the GGM valuation of three banks: Bank of China is 5.234 yuan, Industrial and Commercial Bank of China is 7.774 yuan, and China Construction Bank is 10.31 yuan. The estimated P/E ratio of the three banks is 2.458 yuan for Bank of China, 2.46 yuan for Industrial and Commercial Bank of China, and 4.257 yuan for China Construction Bank. The enterprise value multipliers are 46.857 for Bank of China, 46.1906 for Industrial and Commercial Bank of China, and 45.084 for China Construction Bank. This study compares the above data with the actual situation

and finds that the GGM valuation is slightly higher than the actual stock price, and the P/E ratio valuation is slightly lower than the actual stock price, but the overall difference is not significant. This indicates that there is little possibility of significant fluctuations in stock prices in the future without special circumstances. From the perspective of enterprise value multiplier analysis, the three banks have high enterprise value multipliers, indicating that the three banks have high financial leverage and do not have the conditions for large-scale expansion in a short period of time. The three banks are relatively large and occupy a leading position in the Chinese banking industry, which can represent the relevant situation of the Chinese banking industry to a certain extent.

According to the above estimated characteristics, China's banking industry is in the mature stage of the industry's life cycle, and the industry has developed steadily. The main characteristics of this period are that the development trend is basically consistent with the economic trend, the entry barrier is high, and the industry stock price is relatively stable. If there is demand, it is possible to hold stocks of China's top banks, with less volatility and risk, and relatively stable dividends per year. This study uses three valuation methods to analyze and evaluate three domestic top banks, compares their valuations with actual stock prices, and draws a conclusion that the stock price of China's banking industry will not fluctuate significantly and that China's banking industry is in the mature stage of the industry, which is conducive to subsequent investors' adjustment of their investment portfolios and subsequent researchers' research on related valuations of China's banking industry.

Finally, the shortcomings of this article are discussed as follows. Primarily, the applicability of the cash flow discount model is small, the subjectivity of estimation and prediction is strong, and the uncertainty in the process is also strong. For example, the stock market changes greatly, and the CAPM model uses the return rate of the Shanghai stock market for several years to represent the required return rate, which has strong uncertainty. May increase the bias in valuation. Second, the P/E ratio model requires that the company's earnings must be positive. If the company's net profit is negative, it cannot be valued, and it cannot be arbitrarily selected when selecting a comparison object. Reduces the randomness of the results. Subsequent researchers can use the discounted corporate cash flow model instead of the Gordon growth model, and use WACC instead of the required return on equity, r , as the discount rate. This can take into account the impact of various factors such as corporate debt, preferred stock, and common stock, which is relatively more accurate than the Gordon growth model. Overall, these results provide guidance for the valuation of China's banking industry and the selection of valuation methods.

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