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Research on Power Battery Enterprise Value Assessment Model: Taking CATL as an Example

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Abstract: To achieve carbon peak and neutrality targets, the construction of green, low-carbon and efficient energy system has become a trend. The power battery enterprise, as a green energy source, has attracted much attention and how to evaluate its value has become a hot topic. This paper aims to find a suitable value assessment model for power battery enterprises. The paper first examines the traits of power battery businesses before weighing the benefits and drawbacks of several assessment models so that select the best one for power battery businesses. Second, after conducting a detailed financial research of CATL (Contemporary Amperex Technology Co., Limited), we discovered that the company possesses the unique traits of power battery firms. Consequently, using the financial data for CATL in 2022 as an example, this study draws on the value assessment ideas of Metcalfe theory in the Internet business. We revises the Guotai Junan model, and offers fresh concepts for the value evaluation of power battery enterprises.

1. Introduction

In recent years, with the policy support of the State Council and other institutions, battery enterprises have received government subsidies and their costs have been decreasing. In 2022, the Ministry of Finance announced that new energy vehicles are exempt from VAT, which has increased the sales of new energy vehicles and thus the demand for power batteries to a certain extent. Compared with traditional enterprises, the market environment and business model of power battery enterprises have their unique characteristics. Therefore, the enterprise value assessment that only takes into account financial factors cannot accurately reflect the value of power battery enterprises. It is necessary to further adjust the enterprise value assessment model by combining industry characteristics, economic policies and other external factors.

At present, power battery enterprises in the development stage generally have problems such as high R&D costs and insufficient profitability. Their cash flow and other factors are also difficult to meet the requirements of traditional valuation models. These problems also pose certain difficulties for the value assessment of power battery enterprises. First of all, this paper conducts an in-depth analysis of the characteristics of power battery enterprises. After finding certain similarities between power battery enterprises and Internet enterprises, the value assessment idea in Metcalfe's theory of Internet industry was borrowed and the Guotai Junan model was modified to a certain extent. It was found that the resulting new model is more consistent with the characteristics of

power battery enterprises and can more accurately value power battery enterprises compared with other traditional models. Meanwhile, we conducted the value assessment using the financial information of CATL in 2022 as a model, which proved the feasibility and accuracy of this model in real cases and also provided new ideas and methods for the value assessment of the power battery industry.

2. Review of Literature

Many scholars have differed from one another regarding enterprise value assessment models after years of discussion.

The use of various valuation methods, such as the capital asset pricing model, gains method of property valuation, or price ratio method, is advantageous when evaluating listed companies. For non-listed companies, DCF (Discounted Cash Flow Technique) model and income approach can be used, etc. The selection of valuation methods varies somewhat due to the different characteristics of different industries. For example, the relative value method, DCF method, and real option method can be used in the appraisal of high-tech enterprises. Internet enterprises can be improved on Metcalfe model to further assess the value of Internet enterprises [1].

At present, scholars in China have conducted many studies on enterprise value assessment in traditional industries, but the power battery industry, as a new industry, still has fewer studies on its value assessment. When power battery enterprises are valued, the valuation based solely on financial indicators can no longer meet the status quo and cannot truly reflect the enterprise value. In the past, many scholars basically assessed the value of enterprises based on financial data, but this approach ignored the opportunity value of enterprises and neglected the influence of non-financial factors. Therefore, some scholars combine financial and non-financial factors in the value assessment of enterprises, and consider innovation, policies, employees, management team, company culture, brand value, and other factors. AHP (Analytic Hierarchy Process), dimensionless method and comprehensive index method can be used in the value assessment of lithium battery industry. By considering the value created by the choice of future investment opportunity, real option can supplement and perfect the traditional evaluation method [2]. Jiaxing Sun believes that a combination of modified EVA and the practice option method can be used to assess the value of power battery companies [3].For the value assessment of the power battery industry, less research has been conducted by scholars in China. Traditional value assessment models such as DCF and EVA all suffer from the problem that financial indicators cannot accurately reflect the actual value of power battery enterprises [4].For example, EVA-based assessment of enterprise value is easily influenced by appraiser preferences. The two valuation models rely heavily on report data, and if the reports do not reflect fairly, the accuracy of value assessment is affected. The value of power enterprises can be divided into economic value and carbon asset value, which can be evaluated by Monte Carlo model improved income method and B-S model respectively [5].

In addition, the power battery industry can adopt the system value assessment method, which can not only effectively avoid the limitations of the existing assessment methods such as single value assessment, multiple value assessment and quasi-cost, but also can evaluate the value of energy storage in a more objective and comprehensive way [6]. In order to accurately reflect the value of power battery enterprises, the author studied and analyzed enterprise value assessment models in different industries and finally proposed a suitable value assessment model for power battery enterprises inspired by Metcalfe's Internet value assessment model.

3. Analysis of Power Battery Enterprise Value Assessment Model

3.1. Analysis of Power Battery Enterprises

The characteristics of power battery enterprises include high capital demand, high risk, high technological threshold, technology-intensive, strong policy orientation and good development prospect. Therefore, the traditional value assessment model needs to consider more factors to accurately reflect the relevant enterprise value. In this context, influenced by Metcalfe's theory, this paper explores a suitable value assessment model for power battery enterprises based on the Guotai Junan model, and validates the modified model in a case study. The results show that the revised valuation results are higher and closer to the market value.

However, the model still has limitations, mainly the lack of theoretical support for the determination of parameters. Therefore, the model construction and case study can be optimized from the following three perspectives:

1) We can combine references from other industries to study the theoretical basis of the selected parameters in depth.

2) We should pay attention to the non-financial factors of power battery enterprises and include them in the consideration of valuation.

3) We can establish sustainability evaluation indicators to measure the long-term value and social impact of power battery enterprises.

Through these improvements and refinements, the precision and validity of the value assessment of power battery enterprises can be further improved to provide more favorable support and guidance for the development of the power battery industry.

3.2. Existing Enterprise Value Assessment Models and their Advantages and Disadvantages Analysis

3.2.1. DCF model analysis

DCF model calculates the present value of the enterprise by predicting the future cash flow and using a certain discount rate in reverse. The core of this method is the prediction of free cash flow, the determination of discount rate and the selection of evaluation period [7].The DCF model is based on the assumption of stable business operation, ignoring the business risk of the enterprise, while the power battery enterprise has the characteristics of high risk. If the DCF model is used to assess its enterprise value, it cannot accurately predict its future cash flow. Due to the uncertainty of the external environment, the magnitude of its business risk is difficult to predict. In addition, changes in the internal and external environment such as changes in the management team, the impact of intangible asset value, the appraiser's subjective forecast, core technology, innovation capability, and policy support may have a significant impact on the appraisal results and reduce the accuracy of the appraisal [8]. Therefore, if the DCF model is used to assess the value of power battery enterprises, its appraisal accuracy will be greatly affected [9].

3.2.2. Market method analysis

This method determines the enterprise value by comparing the P/E ratio (Price to Earning Ratio), P/N ratio (Price Earnings Ratio) and other indicators with other enterprises' stocks. Therefore, the market approach requires a comparison with the same industry to determine the value. Although this method is relatively simple to operate and also takes into account the value of the same industry, there are fewer comparable enterprises of the same scale and main business in the power battery industry. In the enterprise value assessment, some small factors are likely to affect the overall

assessment results, resulting in inaccurate enterprise value assessment. Moreover, there are limited data available for comparable companies in the same industry, which increases the difficulty of valuation. In addition, for power battery enterprises at the early stage of development, the company needs a large amount of investment in R&D capital at the beginning of the period, and the profitability of the company at the beginning of the period is weak and less competitive, so it is also not applicable to the market price to net asset ratio and P/E valuation methods.

3.2.3. Analysis of real options model

While options are mostly used in financial markets, the real options model is introduced into the company and valued by analyzing the fundamentals to predict the value of future commodities. Compared with the DCF model, this model is able to value intangible assets, natural resources, etc., and can assess numerous aspects of enterprise value. However, in the actual process, the selection of parameters is complicated, the calculation process is tedious, the workload is high, and manual adjustment of enterprise value is prone to occur. At present, in order to truly, reasonably and accurately assess the enterprise value, most scholars in China combine EVA model with such model for the value assessment of power battery enterprises to achieve the effect of complementary advantages. Only the real options method is used to predict the value of power battery enterprises less.

3.2.4. EVA model analysis

EVA method uses the enterprise's net operating profit after tax minus all invested capital to express its economic value added. Valuation using EVA model may underestimate the value of the enterprise. Because the method focuses on the calculation of enterprise value by selecting specific financial indicators. Therefore, the valuation is more accurate for financial aspects. However, the authenticity of the financial disclosure can also affect the accuracy of its valuation. Similar to the DCF model, this method fails to consider non-financial factors. The fact that the type and size of business varies from one company to another makes it necessary to consider the key factors of the company when applying the EVA model to assess the enterprise value [10].

3.3. Introduction to Metcalfe's theorem and Guotai Junan model

3.3.1. Metcalfe's theorem

Metcalfe's theorem means that the value of an enterprise increases as the square of the number of users increases. Since this model is simple to calculate and focuses on the impact of the number of users on the value of an enterprise, which is in line with the characteristics of Internet enterprises, it is widely used in the value evaluation of Internet enterprises. However, the theorem considers fewer dimensions. Based on this, the author will further consider the factors affecting the value of power cell enterprises.

3.3.2. Guotai Junan model

Guotai Junan model is an evaluation model based on Metcalfe's theorem. As Metcalfe's theorem has fewer dimensions for measuring enterprise value, the model adds several factors on its basis, such as the enterprise's realizability and the cost required to obtain a unit user, which broadens the enterprise value assessment dimensions and enhances the accuracy of the assessment. According to the model, the higher the realizability and market share of an enterprise, the higher its value, the smaller the distance between network nodes, the higher the value of the enterprise. When evaluating

power battery enterprises, the number of users has less influence on the enterprise value. Therefore, this paper will find the main factors suitable for power battery industry assessment.

3.3.3. Applicability of applying Metcalfe's theory in the power battery industry

The power battery industry and the Internet industry have some similarities. First of all, both industries need a large amount of capital investment at the beginning of the period. Internet companies need to invest a lot of money and talent to maintain website operations, and need to attract customers and develop their consumption habits to increase customer stickiness. Power battery companies need to continuously research and develop to build core competitiveness, enhance battery storage capacity and quality, and gain consumer recognition. Under the background of "double carbon", both domestic and foreign markets need stable and clean energy, and the market demand is vast. Therefore, both industries are facing huge risks. Second, both industries have scale effects. Once a company exceeds the break-even point, it can produce exponential growth. Power battery enterprises can rely on new energy vehicles to seize the market and stabilize sales. Internet companies need extensive user participation to scale driven business development. Finally, these two industries also have a certain Matthew effect, striving to first entrants to occupy the market, so that potential competitors and latecomers to share a smaller "cake".

In addition, Metcalfe's theory emphasizes that enterprise value increases exponentially with the increase in the number of users. For the power battery industry, the enterprise value will also grow exponentially with the increase in the number of installed units. Therefore, the power battery industry meets the conditions for applying Metcalfe's theory and can use it for parameter correction and value assessment.

3.3.4. Model modification of the application of Metcalfe's theory for power battery enterprises

After considering the limitations of the existing valuation models and the similarities between Internet enterprises and power battery enterprises, this paper chooses to use Metcalfe's theory as the basis to modify the Guotai Junan model for the value assessment of power battery enterprises. The specific ideas are as follows:

(1) Correction and analysis of relevant parameters

The enterprise value of power battery enterprises depends largely on their installed capacity. Therefore, the first parameter to be corrected is the installed capacity. Metcalfe theory believes that the value of Internet enterprises is proportional to the square of the number of users, and the Guotai Junan model also retains this core point when it is amended. Therefore, the revised model in this paper is also based on this point.

The second parameter to be considered is the cost required per unit of installed capacity. Also considering that the value of Internet enterprises is proportional to the square of the number of users and cost, compared to Internet enterprises, the cost of power battery enterprises does not increase with the increase of installed capacity. In this paper, the acquisition cost per unit of installed capacity of the enterprise is used to calculate the cost.

The third parameter is the realization factor, i.e., the realization ability of the enterprise. The larger the realization factor is, the higher the realizability of the enterprise and the higher the value. In this paper, the quick ratio is used to reflect the size of the realization factor.

The last parameter is the premium rate coefficient, which reflects the enterprise's position or market share. Like Internet companies, power battery companies also have the horse-trade effect in the market, i.e., the companies that enter the market first occupy the market resources, gain a certain number of users and have a certain degree of user stickiness, which makes the chances of the companies that enter the market later to gain the market resources and the number of users greatly

reduced.

(2) Determination of valuation model

Through the correction of the above-mentioned parameters, the valuation model of power battery enterprises is modified as follows.

$$V = \frac{K * P * N^2}{R} \quad (1)$$

Where V denotes the enterprise value. K denotes the realization factor (quick ratio).P denotes the premium rate factor (market share).N denotes the installed capacity. R denotes the cost required per unit of installed capacity.

(3) Applicability of the valuation model

This model fully takes into account the installed capacity of the power battery industry and has industry characteristics, so this model is only suitable for power battery enterprises, otherwise it will lead to undervaluation of the enterprise. Evaluating power battery enterprises with this model is simpler to operate and not easily affected by the accuracy of financial data. However, due to the differences between enterprises, even in the same industry, it is necessary to consider different enterprise characteristics in enterprise value assessment.

4. Case Study

4.1. Introduction of CATL Company

In 2011, CATL was initially established in Ningde, Fujian Province. The company is committed to the research and development, production and sales of battery systems for new energy vehicles power batteries. The company is actively building a full industrial chain of batteries. In response to international, CATL has increased R&D and developed green energy technology. Under the condition of high market share, CATL has a strong voice for suppliers and downstream enterprises. It was listed on the A-share GEM on June 11, 2018. Now it has become the domestic power battery cell industry leader. 2022 Hurun China Top 500 was released, and the company was ranked 6th On January 13, 2023.

In terms of marketing capability, after the implementation of technology-driven product differentiation strategy, many car companies cooperate with CATL. The expansion of overseas cooperation will not only further open foreign markets, but also accelerate the development and commercialization of power batteries and new energy vehicles in China.In 2022, operating revenue domestically accounted for 76.59%, a rise of 145.57% year-on-year, and abroad accounted for 23.41%, a rise of 175.99% year-on-year. In overseas, the company deepens global cooperation with Tesla, BMW, Daimler, VW, Ford, Hyundai, Tesla and other car companies. Domestically, the company has strengthened partnerships with car companies such as SAIC, Geely, Azera and Yutong, and reached strategic agreements with China Energy Investment Corporation Limited, China Power Investment Corporation(CPI), China Huaneng, China Huadian Corporation, China General Nuclear Power Group(CGN) and China Three Gorges Corporation in the new energy sector. In addition, the company promotes integrated innovation in several market application scenarios, such as smart mines, power exchange services, light storage and charging inspection, smart ports, and electric ships. The global order volume is second only to LG Chem.

4.2. Analysis of Financial Indicators of CATL

4.2.1. Debt-servicing capacity analysis

CATL needs large amount of capital to implement expansion strategy and product differentiation strategy, which has high requirements on debt servicing ability. In this paper, current ratio, quick ratio, gearing ratio and cash ratio are selected to further analyze the solvency ability of CATL. From 2018 to 2022, CATL current ratio is higher than the industry reference value1 and quick ratio is higher than the industry reference value of 0.85, which indicates that the enterprise has better short-term solvency ability. As shown in Table 1, the cash ratio is 65.26% in 2022, which is higher than the same period last year, indicating that the ability to pay cash is strengthened. Due to the impact of national policy in 2020, supported by stronger solvency, CATL vigorously researches and develops new energy technologies, which makes current ratio decrease from 2020 to 2022. From 2018 to 2022, asset-liability ratio increases year by year to 55.82%, 69.9% and 70.56%, which further increases the business risk of the enterprise.

Table 1: Statistics of financial capacity indicators of CATL in 2018-2022

Item	2022	2021	2020	2019	2018
Current ratio	1.31	1.19	2.05	1.57	1.73
Quick Ratio	0.96	0.84	1.78	1.27	1.44
Gearing ratio	70.56%	69.90%	55.82%	58.37%	52.36%
Cash ratio	65.26%	60.56%	130.44%	73.80%	89.21%

4.2.2. Profitability Analysis

Profitability is the guarantee to determine CATL high R&D investment, and is also an important indicator to test whether the product differentiation strategy is effective. This paper mainly selects the main business profit margin and total assets net profit margin indicators to analyze the profitability of CATL. This paper selects the profitability of EVE Energy Co., Ltd., Hefei Gotion High-tech Power Energy CO., Ltd (GOTION) and CATL, which are ranked second and third in the battery industry in terms of assets, for comparison.

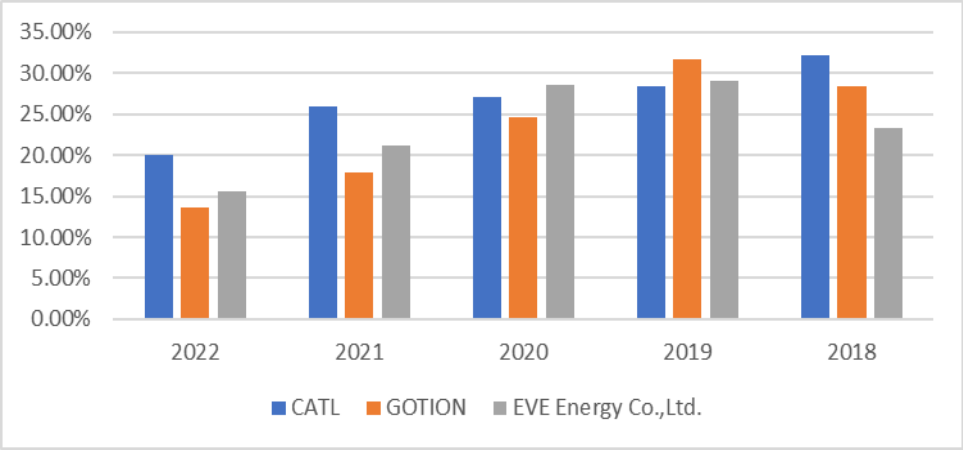
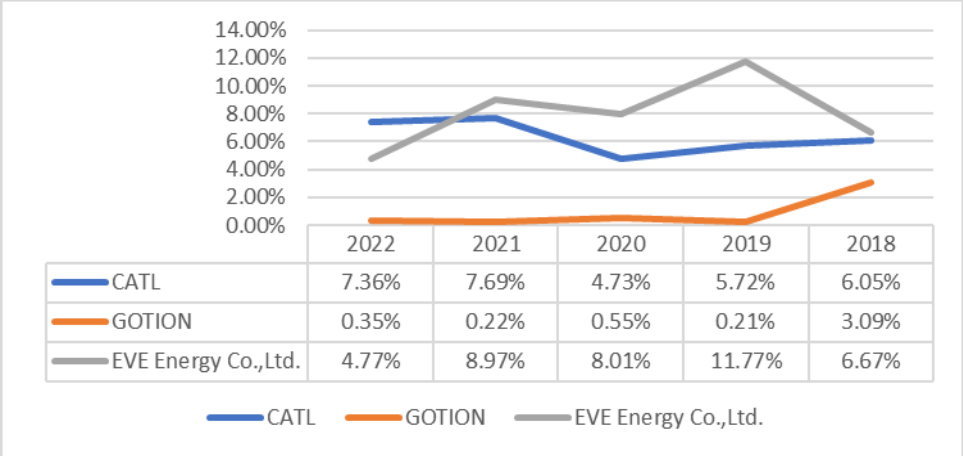


Figure 1: Comparison of main operating margins between CATL and peer companies

As shown in Figure 1, the increase in raw material costs in 2021 and 2022 leads to a general decrease in profit margins in the industry. In 2021 and 2022, CATL main operating margins decreases compared to previous years, but both are higher than EVE Energy Co., Ltd. and GOTION. With the growth of sales scale, the increase of sales expense and R&D expense leads to the

significant increase of operating cost, but the revenue of CATL is much higher than that of GOTION and EVE Energy in the same industry, so the profitability of CATL is better compared with the same industry. The high revenue is attributed to CATL strategy of technology-driven products to open both international and domestic markets with high-quality low-carbon products. High revenue is the guarantee of R&D.

As shown in Figure 2, total assets net profit margin of CATL keeps decreasing in 2018-2020, indicating that CATL keeps expanding its corporate assets and capacity expansion. The net profit margin of total assets tends to be stable in the past two years, indicating that the ability to invest assets in the previous period has increased. GOTION costs due to poor liquidity and increased bank borrowings keep total net asset margin at a low level. In2019, total net asset margin of EVE Energy Co., Ltd. reached a peak, thanks to its focus on the international new energy market and cooperation with Daimler and other companies, which enhanced profitability. However, with CATL strategic shift to join the new energy segment and drive product development with technological innovation, CATL total asset net profit margin gradually exceeds that of EVE Energy.



	2022	2021	2020	2019	2018
CATL	7.36%	7.69%	4.73%	5.72%	6.05%
GOTION	0.35%	0.22%	0.55%	0.21%	3.09%
EVE Energy Co.,Ltd.	4.77%	8.97%	8.01%	11.77%	6.67%

Figure 2: Comparison of total assets net profit margin between CATL and peer companies

Under the influence of technology-driven product differentiation strategy, CATL has been expanding rapidly. However, the increase in operating costs, management expenses and selling expenses has weakened the profit margin. The increase in non-operating profit and loss has weakened the sustainability of earnings. As shown in Table 2, the R&D expenses and the number of R&D personnel of CATL increase year by year from 2018 to 2022, and the R&D expenses in 2022 increase by 101.66% year on year. Under the high R&D expenses, the sales volume in 2022 then grows 116.6% year-on-year. From 2020 to 2022, R&D investment to operating revenue ratio shows a decreasing trend, reflecting the huge growth of CATL operating revenue under the rapid R&D investment situation, and the company is expanding rapidly.

Table 2: CATL R&D breakdown

Item	2022	2021	2020	2019	2018
R&D expenses (billion yuan)	155.10	76.91	35.69	29.92	19.91
Number of R&D personnel (persons)	16322	10079	5592	5364	4217
Ratio of R&D investment to operating revenue	4.72%	5.90%	7.09%	6.53%	6.72%
Number of R&D personnel as a percentage	13.73%	12.06%	18.16%	20.03%	16.95%

The company focuses on innovation and its technology is in the leading position in the battery industry. Secondly, the company has strong production capacity and a wide customer base, covering

not only large domestic car companies, but also trading with Europe, Japan and other countries. Moreover, CATL focuses on industry chain synergy and cooperation, with a deep layout of upstream enterprises dominating raw material pricing and stable downstream partners. As the industry leader, CATL follows the policy, actively takes social responsibility, green production, reduces carbon emission, and focuses on recycling of used batteries.

Table 3: Analysis of profit change of CATL

Item	2021	2022
Cost of sales(RMB)	4367869400	11099401200
Administrative expenses(RMB)	3368937100	6978669400
Financial expense(RMB)	-641200000	-2799985800
Operating cost(RMB)	96093722300	262049609200
Operating profit(RMB)	19823729200	36821983100
Operating income(RMB)	130355796400	328593987500
Net profit(RMB)	17860730100	3345713500

As shown in table 3, CATL insisted on the strategy of promoting product differentiation by technology in 2022. This led to a huge increase in sales, driving the rapid increase in revenue and net profit growth. The net profit in 2022 was 33.457 billion, and increased by 87.32% compared with the same period last year. Operating revenue of CATL increased by 152.07% in 2022. Financial expenses decreased by 336.68%, expenses were effectively controlled and certain profit margin was released. Investment income increased by 103.99%, and the contribution of investment to net profit increased.

4.2.3. Operating Capacity Analysis

Operating capacity can reflect the enterprise's capital turnover. As shown in Table 4, the total asset turnover ratio of CATL in 2022 is 0.72, compared with 0.56 in the same period last year, and the comprehensive utilization efficiency of assets has improved. From 2020 to 2022, under the influence of product differentiation strategy, the competitiveness of CATL battery products has increased, and the inventory turnover ratio has also increased from 2.93% to 4.48%, reflecting that its cost of sales has been transferred out faster and the sales situation has gradually become better. Net operating cash flow increased by 42.65% compared with last year, reflecting the enhanced liquidity of the operating segment.

Table 4: Analysis of operating capacity indicators of CATL

Item	2022	2021	2020	2019	2018
Inventory turnover rate (%)	4.48	3.6	2.94	3.5	3.79
Accounts receivable turnover rate (%)	8.04	7.44	5.13	6.29	4.51
Growth rate of net cash flow from operations (%)	42.65	132.82	36.8	19.05	362.04

As shown in Figure 3, the accounts receivable turnover ratio of EVE Energy Co., Ltd., GOTION and CATL are all increasing, reflecting the fast collection speed of the three companies, short average collection period, less bad debt loss and increasing debt servicing ability. However, CATL accounts receivable turnover ratio is higher than that of its industry peers EVE Energy Co., Ltd. and GOTION, indicating that CATL has better operational capability compared with them.

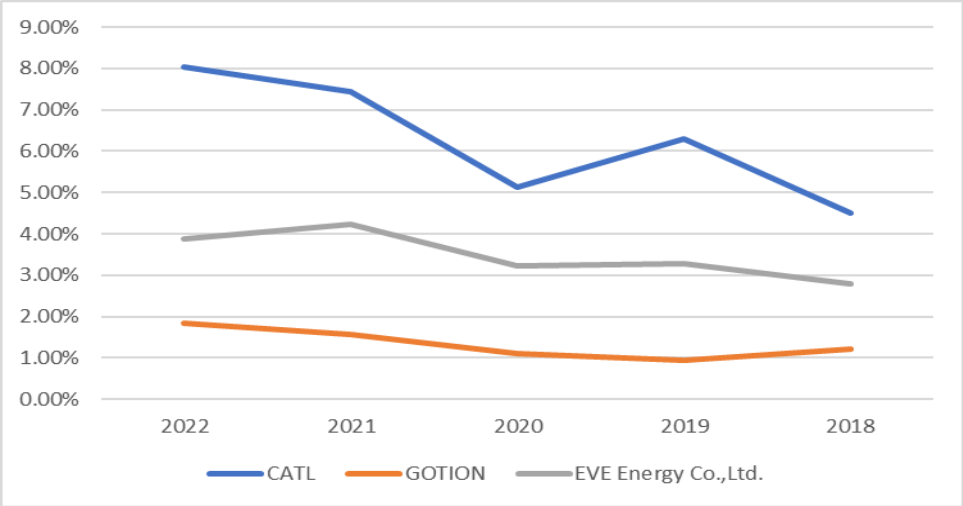


Figure 3: Comparison of accounts receivable turnover ratio between CATL and peer companies

4.2.4. Growth capacity analysis

As shown in Table 5, the growth rate of main business revenue, net profit growth rate and total assets growth rate of CATL from 2020 to 2022 are all positive, and the growth ability of this enterprise is good. Net profit growth rate of CATL slows down in 2022, which is mainly because the total operating revenue increases 152.07% year-on-year in 2022, while the total operating cost increases 162.5% year-on-year. Selling expenses increased from 4.368 billion yuan to 11.099 billion yuan and administrative expenses increased from 3.369 billion yuan to 6.979 billion yuan due to the expansion of the company's scale and the increase of upstream raw material prices. In 2022, CATL implements the strategy of profit taking market share, its main business revenue growth rate and total assets growth rate are relatively stable, while net profit growth rate slows down.

Table 5: Analysis of CATL growth capacity indicator

Item	2022	2021	2020	2019	2018
Growth rate of main business revenue (%)	152.0747	159.0563	9.8966	54.6304	48.0796
Net profit growth rate (%)	87.3224	192.6109	21.7697	34.1759	-10.924
Total assets growth rate (%)	95.3257	96.4436	54.5292	37.1777	48.7705

4.3. Reasons for Case Selection

First of all, as a leading company in the power battery cell industry, CATL is highly representative. According to SNE Research, CATL has a global market share of 37.0% in 2022 in terms of power battery cell system usage, ranking first in the world for 6 consecutive years. As shown in Figure 4, the production and sales volume of CATL increases year by year.

Second, CATL power battery cell industry features are obvious. For example, there are more total assets, insufficient cash flow, and more investment in R&D. However, compared with the same industry, CATL has a high turnover rate of accounts receivable and high production and sales volume, so it is meaningful for analysis.

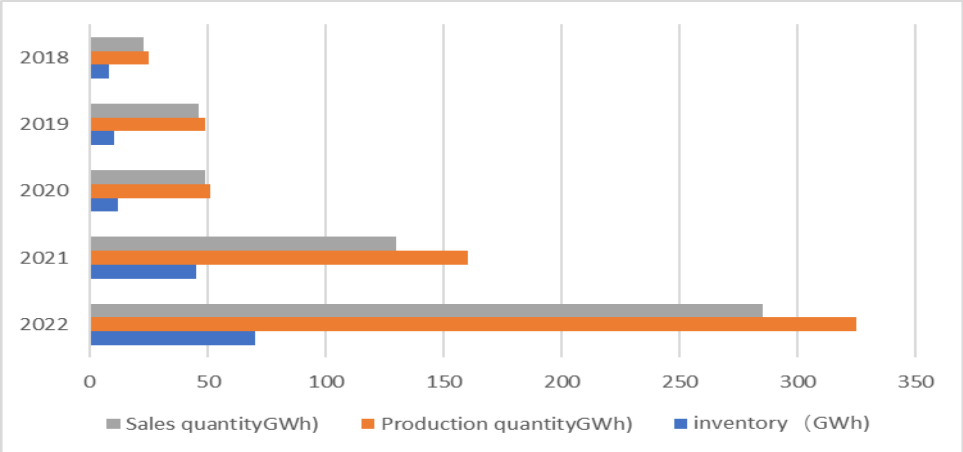


Figure 4: CATL Times 2018-2022 production, sales and inventory comparison chart

4.4. Case Value Assessment

4.4.1. Value assessment of the revised model

Step 1: Find the N value.
The installed capacity of CATL power battery cells in 2022 is 191.6 GWh. n=191600000kWh.
Step 2: Find the value of K.

38,773,485.70-7,666,889.88=31106595.82 (million yuan) (2)

31,106,595.82 divided by 29,576,141.93 is approximately equal to 1.05, i.e. K=1.05.
Step 3: Find the P-value.
The proportion of installed CATL power battery cells in 2022 is 48.2%, and P=48.2%.
Step 4: Find the value of R.
R=1
Step 5:

Ninted Value=1.05*0.482*1916000002/1022.782=1816537093.535 (million yuan) (3)

4.4.2. EVA value assessment

Step 1: CATL net profit after tax is 334.57 billion.
Step 2: Calculate EVA capital

Debt capital=short-term borrowing + long-term borrowing due within one year + long-term debt=144.15 + 72.32 + 82.82=299.29 billion (yuan) (4)

Equity capital=total shareholders' equity + minority interest + provision for bad debts + provision for inventory decline + non-operating expenses-non-operating income1644.81 + 25.3285 + 124.28 + 17 + 3.086-1.59=1812.9175 (billion yuan) (5)

EVA capital=debt capital + equity capital-construction in progress-cash and bank deposits

EVA capital=2 99.29 + 1812.9175-353.98-1583.836=17,339.12 million (yuan) (6)

Step 3: Calculate the cost of equity capital ratio

Weighted average cost of capital ratio=Cost of debt capital ratio * (debt capital / total capital) * (1-tax rate) + Cost of equity capital ratio * (equity capital / total capital)= 4.35% * (299.29/2112.2075) * (1-15%) + 11.67% * 85.83%=10.54% (7)

Cost of equity capital ratio=risk-free rate of return + BETA factor * market risk premium=2.1% + 1.27*9%=11.67% (8)

Step 4: Calculate EVA

EVA=334.57 + 173.3912*10.54%=3528454.325 (million yuan) (9)

The relevant data is shown in Table 6.

Table 6: Selected Financial Indicators of CATL in 2022

Indicator	Amount (billion yuan)	Indicator	Amount (billion yuan)
Short-term borrowings	144.15	Provision for decline in value of inventories	17
Long-term liabilities	82.82	Non-operating expenses	3.086
Non-operating expenses	1644.81	Non-operating income	1.59
Minority interests	124.28	Payments for construction in progress	353.98
Provision for bad debts	11.49	Cash and bank deposits	1583.836
Long-term loans due within one year	72.32		

4.4.3. Evaluation Analysis

This paper evaluates the enterprise value of CATL in 2022 based on EVA model and modified model. The enterprise value of CATL based on EVA model is valued at 3528454.325 million Yuan, and the evaluation result of the revised model is 181, 653, 7093.535 million Yuan. The difference between the EVA model and modified model is huge because the EVA model can only estimate the impact of financial factors on enterprise value assessment, while non-financial impacts are not considered. The Metcalfe revised model takes installed capacity as the core and fully considers the characteristics of the power battery cell industry.

5. Recommendations

5.1. Application of the Model

With the development of power battery industry in China, the impact factors on enterprise valuation vary at each stage, so the parameters in the model must be adjusted accordingly to more comprehensively consider the accuracy of enterprise valuation. In addition, the power battery industry is still in the development stage, the financial data of listed companies is not complete, and there is a lack of horizontal comparison among enterprises, which still needs to further improve the accuracy of valuation. In addition, the current valuation model is not perfect, and the impact of non-financial factors on the valuation of power battery enterprises especially needs to be quantified and proven, and paid attention to and resolved.

5.2. Power Battery Enterprises

Power battery enterprises have problems of high risk, insufficient cash flow and low return on investment, and need to strengthen the management of capital recovery and capital turnover to improve the capital turnover rate. In terms of market, enterprises should get rid of the problem of product homogeneity, develop their own unique competitive advantages, develop the industrial

chain in the process of product promotion. At the same time, enterprises should actively expand overseas markets, promote cooperation with foreign governments and enterprises, and absorb foreign cash talents in the power battery industry. In terms of customer selection, it is necessary to assess the customers' ability to develop the market and solvency to prevent them from being affected when they have business difficulties. In terms of managing suppliers, it is necessary to reduce customer concentration and avoid the situation where a single customer has too much influence on the enterprise. Under the policy environment, power battery enterprises should achieve strategic goals from the perspective of company development to become high-tech new energy enterprises. They also should make important contributions to the strategic development of the power battery industry.

5.3. Investors

Power battery enterprises are potential investment objects, but the risk is also high. Investors should understand the power battery industry, conduct a comprehensive background investigation of the selected enterprise, and determine whether the investment time and expected rate of return, etc. match the enterprise. Any value assessment model has limitations, so one should not only focus on the valuation result of the enterprise, but consider the investment value of the enterprise from multiple aspects.

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