M&A Analyze on Stock Price Shocks from the Perspective of Industrial Chain: A Case Study of CATL

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Abstract: After the hitting of the world economy and energy markets, China accelerates energy structural adjustment to reduce fossil energy dependence, which needs new energy industry grows rapidly. This paper based on industrial chain perspective, uses CATL as samples to study the short-term performance of Mergers and acquisitions(M&A) of upstream and downstream on stock price shocks with case study method and studies the impact of M&A on the short-term performance of a business by analyzing corporate financial performance. It designed to analyse the different impact on stock price performance caused by M&A of upstream and downstream and whether M&A can bring continuous benefits for companies. It detects that stock price fluctuations can be positive and negative and the different factors of M&A target have influence on the short-term performance of M&A companies.

1 Introduction

M&A is a powerful tool for company to complete strategic expansion.Compared to organic growth, it can make company growing fast in the short term [1]. The influence of M&A about achieving synergies for enterprises and improving the competitive position in the market is more significant [2]. It is a important pathway to push the development of new energy industry, which can bring financial support and talent supply to enterprises.

However, current research focuses on Market Mispricing Timing and Post - acquisition Performance [3], systematic reviews of M&A and so on [4]. There is currently insufficient research on the performance of M&A on stock price shocks in specific markets. Chinese capital market policy driven, heterogeneity in investor behavior and improving energy efficiency for the promotion of China goes green makes research on M&A analyze on stock price shocks in the context of China necessary [3].

The marginal contribution of this paper is as follows：First, it adds the effect of M&A on the Chinese background. Second, it further analysis the short-term business performance impact of industrial chain M&A. Third, it analyze business performance after M&A and stock price shocks in combination on the basis of the existing research, providing new ideas for further M&A of new energy industry.

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2 Case Overview

2.1 The Status Quo of the Industry

2.1.1 Industry background

As the second largest economy in the world, China has high consumption of traditional energy sources. Adjustment of energy structure is indispensable to reduce carbon emissions. China efforts to increase the use scales of clean energy to replace the use of traditional fossil fuels like coal gradually [5]. As a result, the demand for power battery has increased significantly. The development of the power battery industry has received strong support from the national and local governments [6].

2.1.2 Introduction to the Power Battery Industry and Porter's Five Forces Model Analysis

As shown in Table 1, competition in power battery industry is relatively fierce. The industrial chain is wide, including civil sector, industrial sector and military field. Like development of raw materials in the upstream of the industrial chain for mineral, research and development (R&D) of battery, cells, module and management system in the midstream and new energy vehicles, electronic equipment, energy storage systems and other applications in the downstream. It also involve environmental protection industry like battery recycling and material reproduction [6].

Table 1 . Porter's Five Forces Model Analysis

Industry competition--high	There are many competitors:CATL, BYD and others occupy preferred share of the market. EVE Energy, China Innovation Airlines and others followed.
Threat of entry--lower	The barriers to entry in the industry are high. Competition in the industry is fierce and the remaining share of the market is small.Technological innovation and funding investment is demanding in this industry.
Threat of substitution--low	Compared to power battery, R&D technology of sodium battery is immature. Hydrogen batteries require cold chain transportation and preservation so that it has a high cost and there are security concerns.
Bargaining power of suppliers--higher	Parts of the battery material need high R&D cost. Mineral resources are becoming increasingly scarce.
Bargaining power of buyers--high	The brand of new energy vehicles have huge influence. There are high requirements for battery performance. Most of the power generation industry are controlled by the state so that the application standards are demanding.

2.1.3 The Impact of M&A on competitive landscape

M&A is one of the most important way to help businesses grow and achieve strategic objectives through corporate restructuring 错误!未找到引用源。. First, businesses can shift resources from low-productivity companies to high-productivity ones to increase overall productivity and implement resource reconfiguration through M&A [7]. Second, it can

influence the entry and exit decisions of a business which indirectly change the market structure and competitive environment.

2.2 Brief Introduction of the Case Company and SWOT Model Analysis

As shown in Table 2, CATL is the world's leading manufacturer of lithium-ion batteries, which dominates the market advantage. It notices green development industrial chain. Its enterprise policy focus on environment protection, renewable energy use, energy conservation and emission reduction and resource recycling. Under the leadership of the development of a green economy, its main business is renewable energy, energy storage, power batteries, electrification and intelligence. CATL has innovation makes customers as its mission, committed to providing best-in-class solutions and services for global new energy applications. By 2024, its power battery usage has ranked first in the world for eight consecutive years. In 2025, it becomes the first enterprise to pass the new national standard for power batteries in China.

Table 2 . SWOT Model Analysis

Strengths	It occupy a leading position in the market and its brand is influential. It is competitiveness and masters self-developed technology. The range of its business id wide.
Opportunities	The market demand in China and abroad is growing. China's policy support. Adapt to the trend of sustainable development.
Weaknesses	Market regulation is becoming more and more stringent. The cost of environmental protection investment for enterprises is increasing. It has a large demand for talents.
Threats	Opponents are constantly emerging, such as Tesla and BYD. The gradual scarcity of upstream supply resources leads to its strong bargaining power.

2.3 Part of CATL's M&A process

As shown in Table 3, in recent years, CATL constantly strengthening cooperation of industrial chain and M&A to solidify its leading position. It reduces the cost of procurement and optimizes supply chain through the M&A of Luokuang Group and Slovey. It also conducts M&A of Liyang Leye Photovoltaic Energy Co. Ltd to expand high-tech industry like power generation, biomass energy, photovoltaic and so on to push technological innovation and improve anti-risk capability. Based on this, this paper will be analyzed from the following events.

Table 3 . Part of CATL's M&A Events

Announcement Day	Industrial Chain	M&A Events
September 3, 2022	Upstream	Luoyang Mining Company Limited
March 6, 2023	Upstream	Yajiang Snowway Mining Development Co., Ltd
June 7, 2024	Downstream	LERRI Solar Technology Co., Ltd.

Data source: choice

3 Analysis of the Impact of CATL's Serial M&A on Stock Price Shocks

3.1 Quantitative analysis of the impact of M&A on Stock Price Shocks

Event Research Method can measure the influence of specific events to asset price 错误!未找到引用源。. Applying event research method to analyze the impact of the three M&A on stock price shocks can observe these impact of events on stock price shocks effectively which avoiding the influence of situation policy and other factors. This dovetails with the study purpose. Therefore, this paper takes this method to calculations cumulative abnormal return (CAR) value for judging and evaluating short-term market reaction. The above three announcements are selected separately to get the impact of M&A on Stock Price Shocks. The specific steps are as follows,Step 1, three event days were selected as T(0). September 30, 2022, March 6, 2023 and June 7, 2024, respectively.

Step 2, determine the window period for the study events. Taking into account the influence of other events, here uses three days before and after the announcement date as the window period for the stu dy, which is recorded as T(-3,3).

Step 3, determine the estimation window. Estimate the normal rate of return after determining event days and the window period. This paper uses 200 trading days to 15 trading days before the announcement date as the estimate window as the period for calculating the normal rate of return , recorded as T(-22,-15).

Step 4, the following market model is used for calculation,

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \tag{1}$$

Among the model, R_{it} is the normal rate of return, R_{mt} is the market yield of the SZSE Component Index, α_i is excess returns, β_i is market risk, ϵ_{it} is random error. After performing a regression analysis by substituting the relevant data of T(-200,-15), the formula corresponding to the normal rate of return of CATL and the order of the above event days is as follow,

$$R_{it} = 1.5534x + 0.0004 \tag{2}$$

$$R_{it} = 1.5166x - 0.0002 \tag{3}$$

$$R_{it} = 1.061x + 0.0002 \tag{4}$$

As shown in Figure 1 and Figure 2, the horizontal axis represents the market return, and the vertical axis represents the individual stock return. R^2 are both nearly reach at 0.5, showed that it is good for the fitting effect of the model.

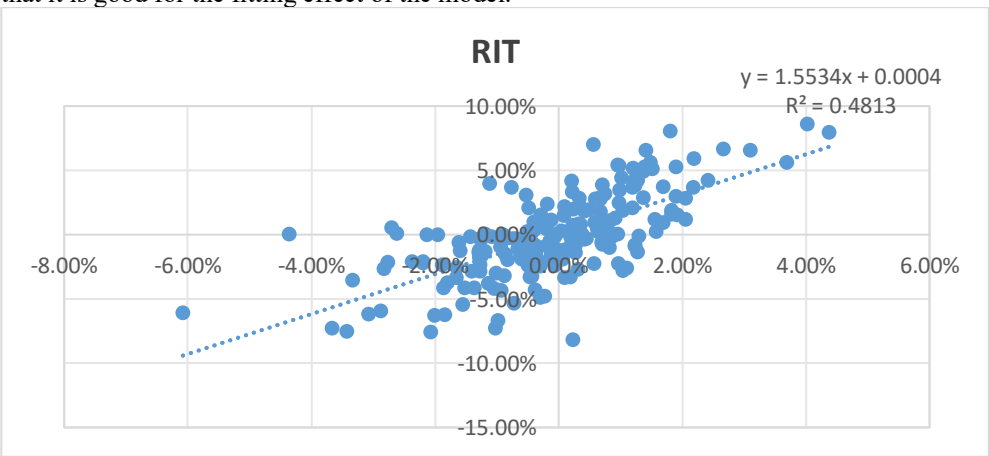

Fig. 1. T(-217,-17) Scatter plot of the M&A of Luoyang Mining Company Limited

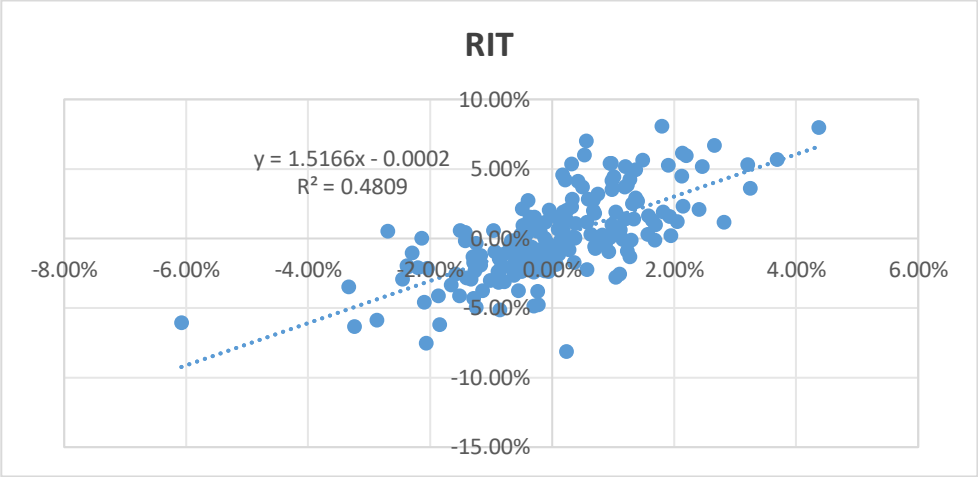

Fig. 2. T(-217,-17) Scatter plot of the M&A of Yajiang Snowway Mining Development Co., Ltd

As shown in Figure 3, R^2 is 0.3453 smaller than another two. It scatters are still distributed along a straight line roughly and are concentrated, which shows that it is still related to the market strongly.

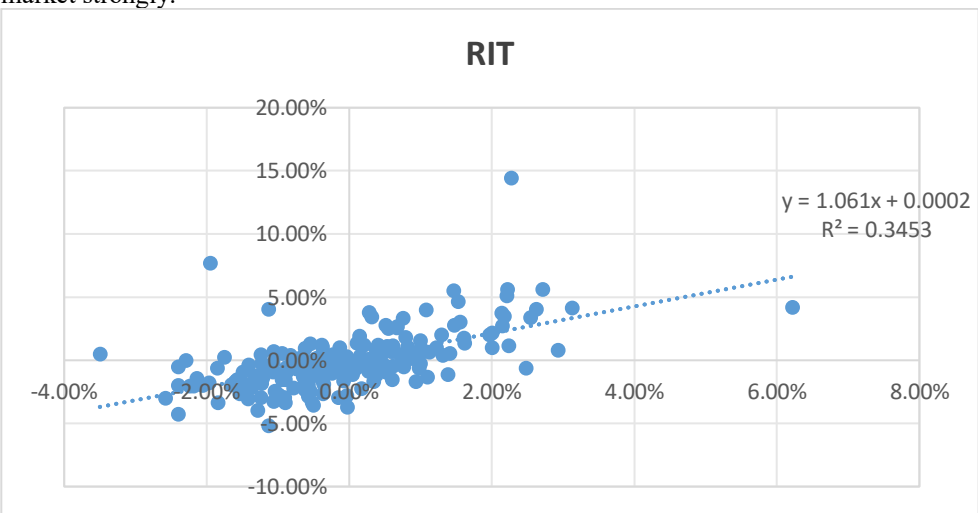

Fig. 3. T(-217,-17) Scatter plot of the M&A of LERRI Solar Technology Co., Ltd.

Step 5, the excess return of individual stocks is calculated by the following formula,

$$AR = R_{it} - (\alpha_i + \beta_i R_{mt}) \tag{5}$$

Among the model, $(\alpha_i + \beta_i R_{mt})$ indicates the expected rate of return. Then add up AR to get CAR and the result of the study were analyzed:

As shown in Table 4, three days before and after the M&A of Luoyang Mining Company Limited date, the lowest CAR value of CATL is -0.0224 and the highest one is 0.0361. The CAR of T(-3,1) are all negative but The CAR of T(2,3) are all positive. The CAR at T=3 is bigger than the one at T=2. The overall CAR value show a positive growth trend but stock price uptrend is delayed. It shows that this event has positive effect to the company's share price and there is a lag in market's response to information. The market process of adapting new information is slow and cautious[8-9].

Table 4. CAR value calculation table of the M&A of Luoyang Mining Company Limited

T	R_{mt}	R_{it}	AR_{it}	CAR
-3	1.94%	0.20%	-0.0174	-0.0174
-2	-2.46%	-2.96%	-0.005	-0.0224
-1	0.18%	0.53%	0.0035	-0.0189
0	-1.29%	-4.32%	-0.0303	-0.0492
1	-2.38%	-2.00%	0.0038	-0.0454
2	0.53%	5.97%	0.0544	0.009
3	2.46%	5.17%	0.0271	0.0361

As shown in Table 5, three days before and after the M&A of Yajiang Snowway Mining Development Co., Ltd date, the lowest CAR value of CATL is -0.0129 at T=-2 and the highest one is 0.0113 at T=1. Among them, The CAR values of T(-3,-1) drop from positive to negative, which have a trend of falling first and then rising. The CAR of T(0,3) are all positive, which show a trend of rising first and then dropping. The overall CAR value are volatile. It shows that this event also has positive effect to the company's share price but reveals market's adjustment of information is uncertain and rigorous.

Table 5. CAR value calculation table of the M&A of Yajiang Snowway Mining Development Co., Ltd

T	R_{mt}	R_{it}	AR_{it}	CAR
-3	1.11%	1.95%	0.0084	0.0084
-2	-0.54%	-2.67%	-0.0213	-0.0129
-1	0.02%	0.38%	0.0036	-0.0093
0	-0.08%	1.52%	0.016	0.0067
1	-1.98%	-1.52%	0.0046	0.0113
2	-0.09%	-1.11%	-0.0102	0.0011
3	-0.16%	-0.18%	-0.0002	0.0009

As shown in Table 6, three days before and after the M&A of LERRI Solar Technology Co., Ltd.date, the lowest CAR value of CATL is -0.0742 at T=2 and the highest one is 0.0146 at T=-1. The CAR of T(-3,-1) are all positive, which show a trend of dropping first and then rising. The CAR of T(-3,-1) are all negative, which show a trend of dropping dramatically first and then rising slowly. It shows that this event don't have positive effect to CATL in short-term probably and market's judge of the expected benefits of M&A is negative.

Table 6 . CAR value calculation table of the M&A of LERRI Solar Technology Co., Ltd.

T	R_{mt}	R_{it}	AR_{it}	CAR
-3	1.05%	1.71%	0.0066	0.0066
-2	-0.80%	-0.90%	-0.001	0.0056
-1	-0.57%	0.33%	0.009	0.0146
0	-0.90%	-5.66%	-0.0476	-0.033
1	0.07%	-2.29%	-0.0236	-0.0566
2	0.08%	-1.68%	-0.0176	-0.0742
3	-0.69%	-0.23%	0.0046	-0.0696

In short, the highest CAR value of CATL among these three M&A events is 0.0361, which during the M&A of Luoyang Mining Company Limited. The lower one is -0.0742, which

during the M&A of LERRI Solar Technology Co., Ltd. After analyzing, it is obvious that CATL become the second largest shareholder of CMOC Group Limited (CMOC) (60399.SH，03993.HK) with 24.68% shares through the M&A of Luoyang Mining Company Limited. CMOC has business located on five continents and it not only is the world's leading producer of mineral resources, but also is the world's second-largest producer of cobalt. The M&A greatly stabilized the upstream supply chain of CATL, reduced procurement costs and expanded development prospects for CATL. The asset-heavy business like photovoltaic power stations and systems are the main of LERRI Solar Technology Co., Ltd. Its design and development needs huge and long-term investment, might cause the problem of capital operation and talent demand faced by CATL, so that the M&A made market sentiment volatile. These are the reasons why the impact of two M&A on the stock price has a large performance gap. However, the entry of CATL into the photovoltaic industry can increase its market share, improve the layout of the industrial chain and strengthen its market position. This M&A event will also has a positive effect on the future stock price.

3.2 Analysis of the Financial Performance of the Company

Using various financial ratios to assess financial performance of companies is the process of financial health analysis[10]. In order to obverse the impact of R&A on business performance. The following will analyze the financial performance of CATL by ratios: Return on Net Assets (ROE), Net Profit Margin on Sales (NPM), Growth Rate of Total Assets (TAGR), Growth Rate of Net Profit (NPGR), Turnover of Total Assets (TAT), Quick Ratio (QR) and Debt to Asset Ratio (DAR).

3.2.1 Profitability

ROE and NPM measure the profitability of a company from the aspects of shareholder's equity and profit of sells. As shown in Figure 4, ROE of CATL is overall growth from 2020 to 2024. After the M&A of Luoyang Mining Company Limited in 2022, its ROE reached the highest value of 24.67%. As the same, its ROE was kept above 24% after the M&A of Yajiang Snowway Mining Development Co., Ltd in 2023 and LERRI Solar Technology Co., Ltd in 2024. It shows that M&A events strengthened and solidified the profitability of CATL.

As shown in Figure 5, NPM of CATL slipped from 13.7% to 10.18% in 2022 after the M&A of Luoyang Mining Company Limited. From 2023 to 2024, it steadily grew to14.92%, which widen the gap with BYD and EVE Energy. It shows that companies need sufficient integration to generate benefits after completing the M&A of upstream industry chain. Confirming the M&A of LERRI Solar Technology Co., Ltd. has broaden the scope of downstream business and improve profit. CATL uses the strategy of M&A to stay ahead of the competition with BYD, which has advantage of technological innovation.

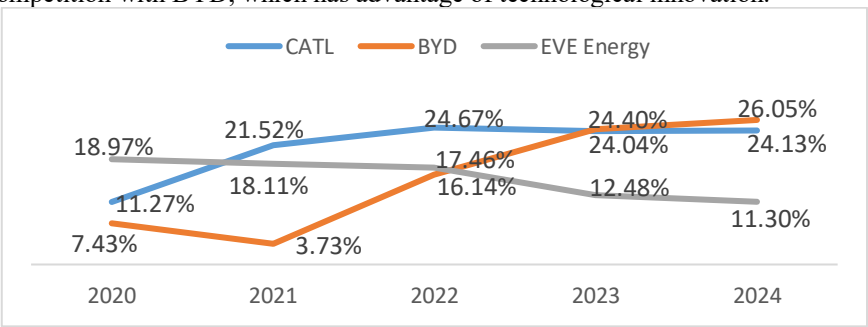

Fig. 4. Changes in ROE from 2020 to 2024

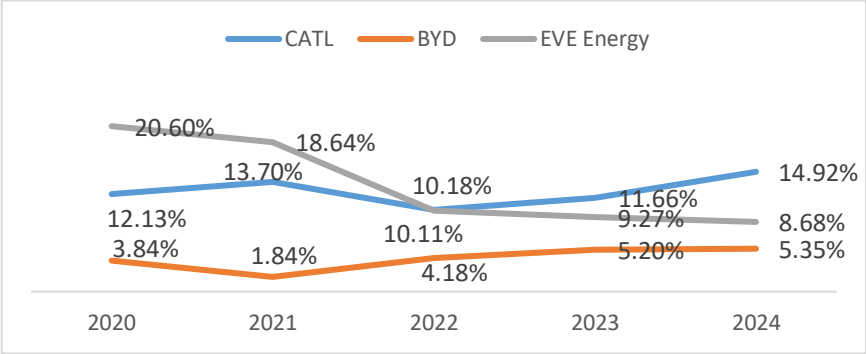

Fig. 5. Changes in NPM from 2020 to 2024

3.2.2 Ability to Grow

TAGR reflects the expansion of corporate assets. NPGR reflects the profitability compared to the previous period. As shown in Figure 6, the TAGR of these three companies declined significantly from 2022 to 2023, but only the TAGR of CATL started to return from19.34% to 19.93% in 2024. As shown in Figure 7, NPGR of CATL was stable overall and it even grow to 69.76% in 2024, which is nearly twice as fast as BYD. They both shows the M&A of LERRI Solar Technology Co., Ltd in 2024 pushed CATL achieved effective asset consolidation and growth and improve the ability to grow and anti-risk.

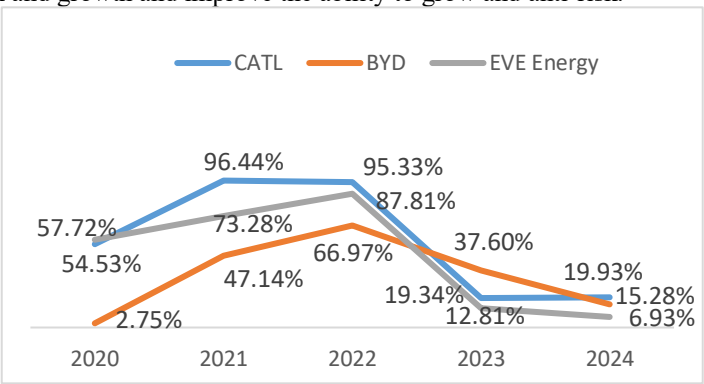

Fig. 6. Changes in TAGR from 2020 to 2024

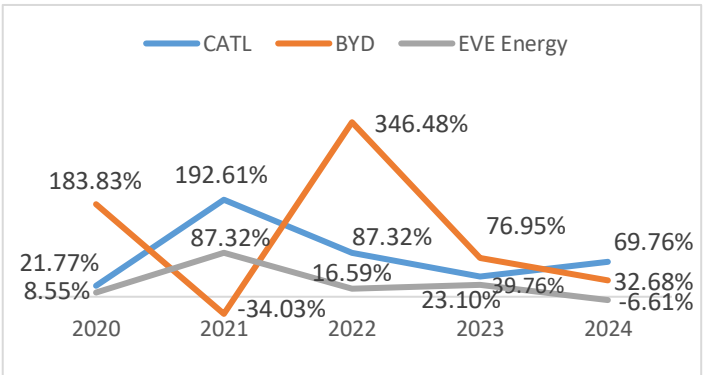

Fig. 7. Changes in NPGR from 2020 to 2024

3.2.3 Operational Ability

TAT reflects asset operational efficiency and velocity turnover. As shown in Figure 8, from 2020 to 2024, TAT of CATL reached the highest of 0.72 in 2022 and contained at 0.61 in 2023, which is growing compared to TAT in 2020 and TAT in 2021. It emphasizes that M&A events of upstream industry chain are positive to the improve of operational ability. In 2024, TAT of CATL decrease to 0.5 reflects that the M&A of LERRI Solar Technology Co., Ltd. made some influence on operational ability and caused reverse shock on Price Shocks.

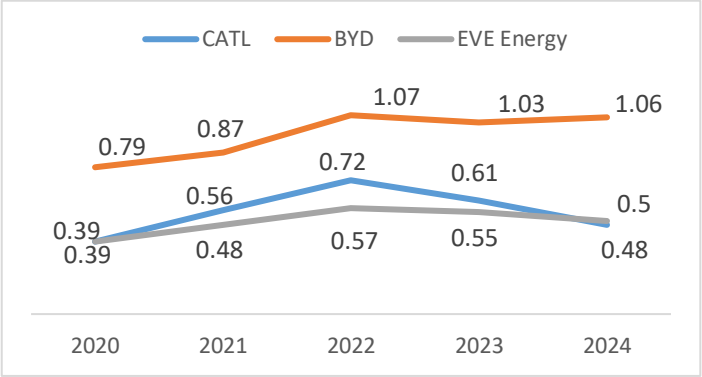

Fig. 8. Changes in TAT from 2020 to 2024

3.2.4 Debt Paying Ability

QR is an index to measure the speed of debt repayment. As shown in Figure 9, the highest QR of CATL is 1.81 from 2020 to 2024. In 2021, QR of CATL started to decrease. From 2020 to 2024, it increased constantly and get the advantage compared to BYD and EVE Energy, which shows that these three M&A events all push debt paying ability of CATL and the effect of the M&A of Yajiang Snowway Mining Development Co., Ltd was most significant.

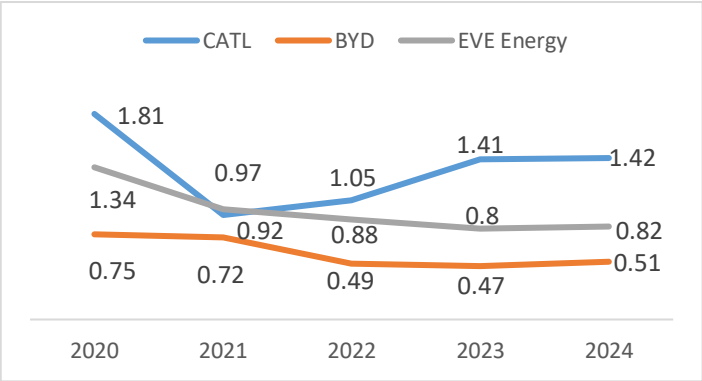

Fig. 9. Changes in QR from 2020 to 2024

DAR shows asset ratio by debt raising. As shown in Figure 10, DAR of CATL was unstable from 2020 to 2024. Among of them, DAR of CATL showed a downward trend year by year after these three M&A events, which reflects that companies need amounts of capital investment and construction in the early stages of M&A to pave the way for the growth of debt paying ability in the later stage.

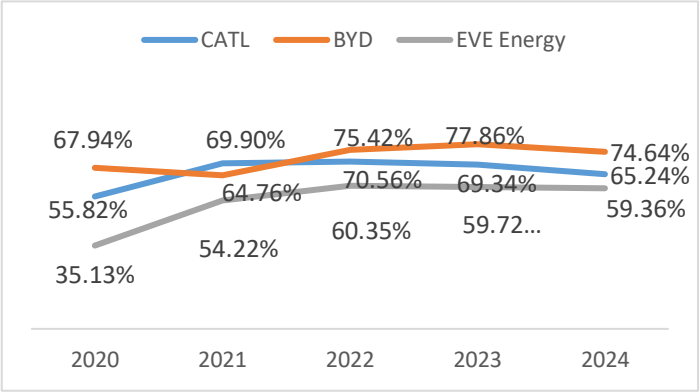

Fig. 10. Changes in DAR from 2020 to 2024

In short, M&A of upstream industry chain has significant positive impact on profitability and operational ability. M&A of downstream industry chain is benefit to development of the ability to grow but also has negative impact on operational ability in the short-term. M&A of industry chain both promote uplifting of debt paying ability.

4 Conclusions

This paper detected that M&A of upstream and downstream industry chain will produce different affects and made positive effect on business performance. For new energy industry, the impact of M&A of upstream industry chain to strengthen control over the supply of raw materials on share price is more significant. Different factors of a business which merged and acquired are affected Stock Price Shocks and business performance. Such as the size of business, market competitiveness, type of business and so on. The impact process also show the caution and uncertainty of the market in the short-term processing of information.

M&A made positive influence for the development of new energy insudtry. Before M&A, business should take most of factors that would affect the effect of M&A into consideration combing own strategy. Then committed to resource and cultural integration. Analyzing the different impact of merged and acquired business factors can become future research directions.

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