

# Research on the Valuation of Internet Companies Based on Metcalfe's Law

Anqi Zhang\*, Yi Yang

Guangxi University of Science and Technology, Liuzhou, 545000, China

\* Corresponding author: Anqi Zhang (Email: 1798762372@qq.com)

**Abstract:** This paper employs Metcalfe's Law to study the valuation issues of social network platform companies, using Kuaishou as a case study to validate the model, thereby providing new insights for the valuation of such companies. First, the paper outlines the background and significance of researching these companies, summarizing the content and approach of the study. It then discusses the challenges in valuing internet companies and determines the use of a modified Metcalfe model for research. Finally, Kuaishou is selected for valuation analysis, leading to the following conclusions: (1) User scale is a source of value for social network platform companies but not the sole determining factor. (2) The Metcalfe model can approximately reflect the value trends of social network platform companies, but it is not perfectly suited for the valuation of all such companies.

**Keywords:** Metcalfe's Law, Enterprise valuation, Social networking.

## 1. Introduction

Social networks have grown from their infancy to widespread popularity over the past decade, with the market size of social networks significantly increasing. In 2022, the number of social network platform users in China reached 1.03 billion, an increase of 8.0% year-on-year, and is expected to reach 1.08 billion in 2023. Chinese social network platforms can generally be divided into relationship-based (e.g., WeChat, QQ, accounting for 62.2%) and content-based (e.g., Weibo). Social platforms are important information collection points for internet companies, with vast user bases and significant marketing value. Activating the value of user chains is key to profitability. With frequent asset restructuring, mergers, acquisitions, and capital operations among major mobile social platform companies, effective valuation of social platforms can provide a solid basis for fair and reasonable transaction prices in the public market. However, the rapid and ever-changing development of the social network industry, combined with the unique asset attributes and business characteristics of social network platforms, makes traditional valuation theories and methods limited in assessing their value. It is essential to "adapt to local conditions" and choose emerging or modified methods based on the characteristics of the company to help potential investors better identify risks and grasp the value sources of mobile social network platforms. Constructing a valuation method suitable for existing social network platform companies is particularly important.

## 2. Characteristics and Valuation Challenges of Social Network Platform Companies

### 2.1. Poor Profitability

In the early stages of development, social network platform companies need to invest heavily in user growth, subsidies, research and development, and maintenance, resulting in long-term negative net profits and net operating cash flows. To sustain operations, companies rely on unique business

models for financing or achieve high market valuations through overseas or Hong Kong listings. Negative profits render the price-to-earnings (P/E) ratio valuation method ineffective, and negative cash flows increase the difficulty of using income-based valuation methods.

### 2.2. High Future Risks

Social platforms require continuous technological updates to maintain users and find new profit growth points, and the industry is highly competitive. Leading platforms such as Douyin and Kuaishou each have their own focus areas and rapid expansion, but they face the risk of being overtaken, as seen with Didi, which lost market share to competitors like Cao Cao Mobility after a security crisis. Internet companies face diverse risks that are difficult to quantify.

### 2.3. Lack of Comparable Companies

Different social platforms have varying business models. For example, Kuaishou focuses on advertising and live streaming, Xigua Video relies on advertising revenue sharing, Meipai depends on advertising income, and Miaopai leverages Sina Weibo's hierarchical user structure. Companies differ in development stages, profit models, and user scales, and most are not yet listed, making it difficult to find comparable data and historical financial information.

### 2.4. Significant Impact of Non-Financial Indicators

Platform profit models (advertising, live streaming gifts, e-commerce, gaming) rely on user scale, requiring analysis of active user numbers, user contribution value, monetization rate, and user stickiness. However, these data are often not publicly disclosed, making quantification difficult and increasing valuation challenges.

### 2.5. Difficulty in Determining Lifecycle

Valuing internet companies requires considering their lifecycle stages, but most social platforms are in the startup or growth phases, with highly volatile valuations and limited historical data. Traditional market-based methods and financial data are insufficient for accurate valuation.

### 3. Existing Models Based on Metcalfe's Law and Their Pros and Cons

Mary Meeker proposed the DEVA model for internet company valuation based on Metcalfe's Law. Chinese securities firm Guotai Junan, based on Metcalfe's Law and Zeng Liqing's node distance perspective, introduced a monetization factor K and a premium rate coefficient to establish the Guotai Junan model, widely used by scholars for company valuation. This chapter mainly introduces the formulas and pros and cons of the two existing derivative models of Metcalfe's Law.

#### 3.1. DEVA Model

The model formula is as follows:

$$V = M \times C^2 \quad (3-1)$$

Where:

V---Value of the company being evaluated

M---Unit initial cost of investment

C---Value created by a single user per economic cycle

##### 3.1.1. Advantages

First, this model emphasizes the importance of single-user value for internet company valuation. It allocates the company's production and operation costs and revenues to each user, fully considering the interaction between users and its impact on network value. Second, the model quantifies the coefficient in Metcalfe's Law as the unit initial cost per user, incorporating cost factors into the valuation from an investment perspective. Third, the model avoids the difficulties of discounted cash flow (DCF) valuation methods due to negative or unstable cash flows and unpredictable risks.

##### 3.1.2. Disadvantages

First, the model assumes that all users bring the same value to the company, which can severely overestimate the value of internet companies. Active and paying users of social network platforms can bring value to the company, while users who only register but do not use the platform cannot bring value and should be excluded. Second, the model only considers the initial cost of acquiring users and does not account for subsequent annual maintenance costs, retention costs, and new customer acquisition costs, making it unreasonable.

#### 3.2. Guotai Junan Model

The model formula is as follows:

$$V = K \times P \times \frac{N^2}{R^2} \quad (3-2)$$

Where:

V---Value of the company

K---Monetization factor

P---Premium rate coefficient

N---User scale

R---Distance between network nodes

##### 3.2.1. Advantages

The coefficient is transformed into the product of the monetization factor and the premium rate coefficient. The introduction of the monetization factor makes the valuation process more focused on the company's actual monetization ability. The premium rate coefficient measures the contribution of the Matthew effect in the internet industry to the company's value, assessing the company's value based on

its position in the external market environment.

##### 3.2.2. Disadvantages

First, the model does not clearly define user scale. Second, the distance between network nodes R is difficult to quantify. Finally, the formula does not consider user costs.

### 4. Valuation Model Construction Based on Metcalfe's Law

From the above, we can see that the valuation models based on Metcalfe's law mainly include DEVA model and Guotai Junan model. DEVA model takes the promotion cost per user and the value of user-user interaction into consideration, which has a breakthrough significance in the valuation theory, but because it does not clearly define the effective users of the Internet enterprise and does not take into account the follow-up cost of the users, the indexes are not mature enough to be taken into consideration, whereas in Guotai Junan model, the realizing factor and the section cost are taken into consideration, which is the same as in the other valuation models. In the model, the realization factor and the section

In the Guotai Junan model, the realization factor and the distance of the nodes are difficult to characterize, which causes great difficulties in the valuation process. Therefore, it is necessary to use the research of other scholars to modify and quantify the indexes in order to make the valuation model more perfect. This chapter mainly introduces the modification of the parameters and the re-quantification of the valuation model based on the Guotai Junan model. This chapter introduces the process of modifying the parameters and rebuilding the model based on the Guotai Junan model.

#### 4.1. Corrections to the Parameters

First, correct the user size N. Social network platforms require many users, but not all of them create value. Inactive users (no longer use after registration) should be eliminated, and active users (continue to use and consume) can bring resources and traffic. In this paper, we use the number of monthly active users to denote N.

Second, correct the node distance R. The shorter the node distance, the greater the network value, but the concept is abstract. In this paper, we define R as the acquisition and maintenance cost per unit of active users, i.e.,  $R = \text{total cost} / \text{number of active users}$ , the higher the cost, the lower the enterprise value.

Once again, correct the realization factor K. The stronger the realization ability, the greater the enterprise value. In this paper, K is defined as the ratio of cash flow from operating activities to operating income, which reflects the actual realization ability of the enterprise.

Finally, correct the premium rate factor P. This variable reflects the industry position of the enterprise, the higher the market share, the higher the valuation. In this paper, we use the proportion of monthly active users to the total number of monthly active users of industry head enterprises to denote P, i.e.,  $P = \text{the number of monthly active users} / \text{the total number of monthly active users of industry head enterprises}$ .

#### 4.2. Determination of Valuation Model

The new model is obtained by correcting the Cathay Pacific model as:

$$V = K \times P \times \frac{N^2}{R^2} \quad (4-1)$$

Among them:

V-Value of the business

K-Cash generated from operating cash activities/operating income

P-Average monthly active users/monthly average active users of short video platform-based companies with top industry position in the current year

P-Average monthly active users/the sum of the monthly average active users of the top short video platform companies in the industry in the current year

N-Number of monthly active users

R-Total cost for a few active users for a period

## 5. Application of the Modified Metcalfe Model - The Case of Racer

### 5.1. Introduction to the Case of Racer

#### 5.1.1. Background of Racer

Founded in 2011, Snapdragon (Beijing Snapdragon Technology Co., Ltd.) was initially a motion picture production and sharing APP, and then transformed into a short video social platform, with the main business of online marketing, live broadcasting and other businesses. In March 2021, Snapdragon was listed on the Hong Kong Stock Exchange, with an opening price of RMB 280.54, which is a surge of 1.94 times compared with the issue price of RMB 95.45, and attracted a large amount of capital. Racer increased its user scale and activity through short videos and live interactions to realize cash. By the end of 2022, Shutterstock had more than 300 million daily active users and more than 400 million monthly active users, with revenue of RMB 58.776 billion, of which RMB 33.2 billion was from live broadcasting, RMB 21.86 billion from online marketing, and RMB 3.71 billion from other businesses. With its social features, high-quality content and user growth, Shutterstock has become the world's second largest short video platform.

#### 5.1.2. Analysis of Kuaishou's Annual Report

##### (1) User Number Analysis

The majority of Kuaishou's users come from its main app, which includes the standard version, a lite version, and a concept version. The Kuaishou app is a trusted and beloved platform for recording and sharing content. The user trend analysis of the Kuaishou app from 2019 to 2022. During this period, the average daily active users (DAU), monthly active users (MAU), and daily usage time per DAU of the Kuaishou app continued to grow. The growth rates of DAU from 2019 to 2022 were 75.56%, 49.96%, and 50.68%, respectively. The growth rates of MAU were 76.60%, 37.27%, and 45.61%, respectively. The growth rates of daily usage time per DAU were 23.15%, 14.95%, and 17.02%, respectively. These metrics of active user numbers, user engagement, and experience quality significantly impact the income from virtual gifts, advertising client expenditures, and other monetization channels such as e-commerce.

**Table 5-1. Racer Operating Income, 2019-2022**

Operating income (100 million yuan)	83.4	203	391.2	587.76
Revenue from live streaming business (billion yuan)	79.5	186.1	314.4	332.1
Online marketing services (billion yuan)	3.9	16.7	74.2	218.6
Other revenues (billion yuan)	0	0.2	2.6	37.1

From 2019 to 2022, the total revenue of Crypto will be RMB 8.34 billion, RMB 20.30 billion, RMB 39.12 billion, and RMB 58.78 billion, respectively, with a CAGR of 91.7%. The company's operating revenue mainly comes from live broadcasting, advertising, and other businesses the revenue share of live broadcasting business declined from 95.3% in 2019 to 56.5% in 2022, and 39% in the first three quarters of 2021, and the advertisement business is becoming the core force of the revenue of Shutterstock, with the share increasing from 4.68% in 2019 to 37.2% in 2020 and 52% in the first three quarters of 2021, and other services, including the e-commerce business, have grown to 6.3% in 2022 and 9% in the first three quarters of 2023 since its inception in 2018.

Most of the Racer's revenue comes from its live streaming business, which generates revenues of \$7.95 billion, \$18.61 billion, \$31.44 billion, and \$33.21 billion from 2019 to 2022, respectively. As shown in Table 5-2 below for Crypto's live streaming revenues, the average monthly paid subscribers for live streaming increased from 12.6 million to 57.6 million from 2019 to 2022, and the average monthly paid subscriber revenue decreased from \$52.5 to \$48.0.

**Table 5-2. Racer Live Streaming Revenue, 2019-2022**

	2019	2020	2021	2022
Average monthly paying users (million)	12.6	28.3	48.9	57.6
Average Monthly Paid User Revenue (RMB)	52.5	54.9	53.6	48.0

Source: annual report of Crypto

Advertising revenue as a percentage of total revenue continues to increase. Advertising revenue is \$390 million, \$1.67 billion, \$7.42 billion, and \$21.86 billion, or 4.7%, 8.2%, 19.0%, and 37.2% of revenue, from 2019 to 2022, respectively. The average advertising revenue from daily active users of the Racer app from 2019 to 2022 is \$5.9, \$14.2, \$42.3, and \$82.6. Racer also derives revenue from other services, which include e-commerce, games, and other value-added services. Revenue from other services is \$0.0 billion, \$0.2 billion, \$2.6 billion, and \$3.71 billion from 2019 to 2022, respectively, as a percentage of revenue of 0, 0.1%, 0.6%, and 6.3%, respectively. Crypto launched its e-commerce business in August 2018. E-commerce merchandise transactions totaled \$0.097 billion, \$59.6 billion, and \$381.17 billion from 2019 to 2022, respectively, and Crypto e-commerce revenues are also growing rapidly.

As can be seen in Figure 5-3, the sales expense ratio of Racer increases at a faster rate, especially in 2022 in order to expand the audience of the newly launched Racer Extreme Edition and increase the number of users. Especially in 2022, in order to expand the audience and increase the number of users of the newly launched Maktivo Extreme Edition, the sales expense ratio increased from 25.22% to 45.28%. Maktivo's research and development expenses showed a rising trend year by year, except for the decrease in 2021. Racer's administrative expenses basically did not fluctuate. The gross profit margin of Racer basically remained stable from 2019 to 2021, at 31.4%, 28.7%. From 2019 to 2021, the gross profit margin of Racer will remain stable at 31.4%, 28.7% and 36.2% respectively, and will increase to 40.5% in 2022. The increase in gross profit margin was mainly attributable to the increase in revenue contribution from advertising and e-commerce business.

### (3) Analysis of earnings

**Table 5-3.** Racer Per Share Metrics, 2019-2022

Per Share Indicators	2019	2020	2021	2022
Basic earnings per share (yuan)	-21.46	-13.31	-21.04	-125.25
Net assets per share (yuan)	-25.6104	-43.2916	-68.6839	-184.4946
Operating cash flow per share (yuan)	2.3727	2.2058	9.8845	2.6382
Operating income per share (yuan)	9.627	24.6145	48.2143	67.7531

Source: annual report of Racer

As can be seen in Table 5-3, Racer's earnings per share have been in a loss position since 2019 and reaches a loss value of \$125.25 per share at the end of 2022, and its net worth per share is also in a loss position. On the books, Crypto is not a good company in the traditional sense of being able to generate profits for shareholders. As shown in Figure 5-4, Crypto's net profit attributable to the parent company from 2019 to 2022 will be RMB -20,045 million, -12,429 million, -19,652 million, and -11,663.5 million, respectively, mainly due to the fact that Crypto has adjusted the portion of its net current liabilities that was originally classified as net current liabilities to net non-current liabilities, causing changes in the fair value of - in 2019 and - in 2020, respectively. 19.87 billion and -106.81 billion in 2019 and 2020, respectively, which caused Crypto to sustain losses. The net profit margins of Racer from 2017 to 2020 are -240.36%, -61.23%, -50.23%, and -198.44%, respectively, which shows that the profitability of Racer's books continues to be negative.

#### 5.1.3. Analysis of the value characteristics of fast hands

(1) User scale affects the three major profit models: the main business of Deft hand includes live broadcasting, advertising and other businesses (such as e-commerce, games, etc.), all of which rely on user scale. Attracting users through red packets and subsidies, the live broadcasting business is profitable through user reward draws, the advertising business provides advertisers with accurate marketing through data analysis, and the e-commerce and other value-added services gain revenue through user transactions and activity. User scale is the basis of Racer's value.

(2) User cost affects enterprise value: the total cost of Racer includes operating cost and three major expenses (sales, R&D, and management). Operating costs and sales costs are directly used to acquire users, such as anchor share and user acquisition costs; sales costs are mainly used for user retention and brand marketing; R&D and management costs indirectly support user maintenance and system optimization. These costs directly affect the value assessment of Racer.

#### 5.1.4. Applicability analysis of Fast Hand valuation

(1) Profitability analysis: the net profit, earnings per share and net assets of Racer are negative and fluctuating, with limited historical data after listing in 2021, making financial forecasting difficult and unable to use the DCF method. The market method requires comparable companies and complete historical data, which is difficult to realize, and the price-earnings ratio, price-net ratio and price-sales ratio are not applicable. Snapdragon is a light-asset enterprise, intangible assets and financial assets account for a large proportion, and the cost method is difficult to assess and should not be used.

(2) Analysis of the relationship between users and revenue: from 2019 to 2022, the growth rate of daily active users of Quick Hands will be 75.56%, 49.96% and 50.68% respectively, the growth rate of monthly active users will be 76.60%, 37.27% and 45.61%, and the growth rate of operating revenue will be 143.41%, 92.71% and 50.25%

respectively. The user growth rate fell first and then rose, revenue continued to fall, the relationship between the three is not obvious.

## 5.2. Application of Metcalfe's Valuation Model

In order to reduce the uncertainty of the valuation results as well as to analyze the trend of changes in the value of Racer, this paper selects December 31, 2022 as the valuation base date for the enterprise value assessment of Racer, and utilizes the same methodology to assess the value of Racer from the end of 2019 to the end of 2021, based on the foregoing characteristics of the industry and the value of the enterprise, the financial analysis, and based on the current business model and profitability of Racer, the application of the Modified Guotai Junan model for the valuation, and the selected data and valuation results are described below.

### 5.2.1. Selection of data

(1) Determination of user size N.

The user scale N is the number of monthly active users of Racer. It can be obtained directly from the annual report, and the number of monthly active users of Crypto from 2019 to 2022 is 136.3 million, 240.7 million, 330.4 million, and 481.1 million, respectively.

(2) Determination of node distance R

**Table 5-4.** Node Distance R Calculation Process Diagram

	2019	2020	2021	2022
Cost of sales (billion)	57.29	144.98	250.17	349.61
Cost of sales (billion)	13.6	42.62	98.65	351.09
Administrative expenses (billion)	2.28	5.42	8.65	16.77
R&D expenses (billion)	4.77	17.55	29.44	65.48
Total cost (billion)	77.94	210.57	386.91	782.95
Average monthly active users (billion)	1.363	2.407	3.304	4.811
Unit user acquisition cost R	57.18	87.48	117.10	162.74

Data source: annual report of Racer

R is the cost paid by the enterprise for acquiring and maintaining unit active users, i.e.,  $R = \text{total cost for a certain period} / \text{number of active users for a certain period}$ . The numerator is the total cost per year, and the denominator is the number of monthly active users per year to get the annual R. As shown in Table 5-4, we can get the data of cost of sales, selling expenses, management expenses and R&D expenses from Racer's annual report, the cost of sales and selling expenses are the direct costs paid for acquiring the number of users, and the management expenses and R&D expenses are the indirect costs paid for acquiring the number of users, which should be included in the user costs. The cost of sales and selling expenses are the direct costs of acquiring users, while administrative expenses and R&D expenses are the indirect costs of acquiring users, which should be included in the cost of users, and then divided by the average number of

monthly active users per year to obtain the cost of acquiring users.

(3) Determination of realization factor K

In this paper, K is defined as the ratio of cash generated from operating cash activities and total assets, which represents the real liquidity of the enterprise in the process of profitability, i.e. as shown in Table 5-5:

**Table 5-5.** Calculation procedure for the liquidity factor k

	2019	2020	2021	2022
<b>Cash generated from operating activities</b>	20.76	18.98	88.82	31.19
<b>Total assets</b>	76.94	164.79	324.14	521.47
<b>K</b>	26.98%	11.52%	27.40%	5.98%

Data source: Racer's annual report

(4) Determination of premium rate coefficient

The premium rate coefficient analyzed above = average

**Table 5-6.** Calculation process of the valuation of Racer in 2017-2020

<b>Total value of Racer</b>	<b>2019.12.31</b>	<b>2020.12.31</b>	<b>2021.12.31</b>	<b>2022.12.31</b>
<b>K</b>	26.98%	11.52%	27.40%	5.98%
<b>P</b>	35.31%	33.34%	26.96%	34.40%
<b>N</b>	1.363	2.407	3.304	4.811
<b>Square of N</b>	1.857769	5.793649	10.916416	23.145721
<b>R</b>	5.71827×10 <sup>-7</sup>	8.74823×10 <sup>-7</sup>	1.1710×10 <sup>-6</sup>	1.62742×10 <sup>-6</sup>
<b>Square of R</b>	3.2698×10 <sup>-13</sup>	7.6531×10 <sup>-13</sup>	1.371×10 <sup>-12</sup>	2.64848×10 <sup>-12</sup>
<b>V (billion)</b>	5421.53	2906.61	5880.07	1798.20
<b>Number of shares (billion)</b>	9.34	9.34	9.34	9.31
<b>Value per share</b>	579.46	311.26	629.54	193.10

Source: Calculation obtained

### 5.3. Analysis of Business Valuation Results

(1) Analysis of valuation changes: taking December 31, 2022 as the benchmark, the valuation of Crypto per share is 193.10 yuan. 2019-2022 valuation fluctuates a lot, and the value per share is higher in 2019 (579.46 yuan), mainly due to the inflated realization factor K (small asset size, low marketing investment, low user acquisition cost, resulting in a small model denominator and large results). 2020 Valuation decline is mainly due to the decrease in cash inflow from operating activities and lower realization factor K. Reasons include the increase in operating costs and expenses leading to higher cash expenses, profitability has not been improved in parallel, and the speed of asset expansion is faster than the speed of cash generation. In 2021, the growth of pre-tax profit and the increase in accounts payable led to the large increase in cash inflow from operating activities and a significant increase in the realization factor K. In 2022, the pre-tax profit increased significantly, but due to the change in financial liabilities and the adjustment of accounting methods. Losses due to changes in financial liabilities and adjustments in accounting methods, and a significant decrease in the realization factor K. The number of monthly active users and cost per user grows from 2019-2022, but the valuation is mainly affected by fluctuations in the realization factor.

The realization factor reflects the ability of the company's assets to generate cash, defined as the ratio of cash flow from operating activities to total assets. In 2019-2020, the revenue of Crypto continues to grow, but the growth of cash flow from

monthly active users/the sum of average monthly active users of social network platform-type enterprises with top industry status, according to the public information showing that the average monthly active users of Shutterstock accounted for the proportion of the sum of average monthly active users of top-ranked short-video companies to determine its premium rate coefficient each year, and it is known from the review of the information that Shutterstock's market share from 2019 to 2022 will be 35.31%, 33.34%, 26.96%, 34.40%.

#### 5.2.2. Determine the results

Bringing the above data into the modified Guotai Junan model shows that the year-end value of Racer in 2019, 2020, 2021 and 2022 is 541.253 billion yuan, 290.661 billion yuan, 588.007 billion yuan and 179.820 billion yuan, respectively, and the total number of shares is 934 million, 934 million, 934 million and 931 million, and the value per share is 579.46, 311.26, 629.54, and 193.10, and the calculation process is shown in Table 5-6.

operating activities is unstable, which indicates that its cash-generating ability does not match the expansion of its assets, affecting the valuation.

**Table 5-7.** Selected financial data of Racer in 2019-2022

	2019	2020	2021	2022
<b>Cash generated from operating activities</b>	20.76	18.98	88.82	31.19
<b>Operating income</b>	83.4	203	391.2	587.76
<b>Total assets</b>	76.94	164.79	324.14	521.47
<b>Current assets</b>	56.42	107.83	173.11	315.28
<b>Non-current assets</b>	20.52	56.96	151.03	206.19
<b>Growth rate of cash generated from operating activities</b>		-0.09	3.68	-0.65
<b>Growth rate of operating income</b>		1.43	0.93	0.50
<b>Total Assets Growth Rate</b>		1.14	0.97	0.61
<b>Growth rate of current assets</b>		0.91	0.61	0.82
<b>Growth rate of non-current assets</b>		1.78	1.65	0.37

Data source: Racer's annual report

(2) Comparison and analysis with market price: the revised Metcalfe model shows that the valuation of Quick Hands is in a high start-low trend, falling from 579.46 yuan in 2019 to 193.10 yuan in 2022. In February 2021, Quick Hands was listed on the Hong Kong Stock Exchange, with an opening price of 280.5 yuan, a surge of 1.95 times compared with the

issue price, and the market capitalization reached 1.15 trillion yuan. A year after the listing, the share price gradually stabilized at about 65 yuan. The initial valuation of Racer has a bubble, the commercialization ability is inflated, and the stock market frenzy returns to the real profit level. The industry environment is severe, technology companies are affected by the policy, 2023 Hang Seng Technology Index and China Internet Index fell 24.79% and 36.50% respectively, Tencent, Ali, Meituan shares also fell sharply. However, with the improvement of content quality and business expansion in the short video industry, the number of users and retention rate is expected to grow, and the share price of Quick Hand will return to the fundamentals.

(3) Comparative analysis with Zipf's law: the valuation of multiple rounds of financing before the listing of fast hand compared with the model in this paper shows that the valuation in 2019-2021 is high, and the valuation in 2022 is close to the valuation of institutional investors (147.305 billion yuan), indicating that the model's valuation of the fast-developing short video platform as a whole is on the high side, and gradually returns to the market value. After the introduction of Zipf's law correction, the valuation of Racer per share at the end of 2022 is \$63.05, which is far below the market price of \$240-300, indicating that Zipf's law valuation is too low. Metcalfe's law is more applicable in the early stage of development of short video platforms.

**Table 5-8.** Calculation process of the valuation of Racer in 2017-2020

Total value of Racer	2019.12.31	2020.12.31	2021.12.31	2022.12.31
<b>K</b>	26.98%	11.52%	27.40%	5.98%
<b>P</b>	35.31%	33.34%	26.96%	34.40%
<b>N</b>	1.363	2.407	3.304	4.811
<b>Nln(n)</b>	0.42	2.11	3.95	7.56
<b>R</b>	5.72×10 <sup>-7</sup>	8.75×10 <sup>-7</sup>	1.17×10 <sup>-6</sup>	1.63×10 <sup>-6</sup>
<b>Square of R</b>	3.27×10 <sup>-13</sup>	7.66×10 <sup>-13</sup>	1.37×10 <sup>-12</sup>	2.65×10 <sup>-12</sup>
<b>V (billion)</b>	1229.78	1060.70	2126.96	587.15
<b>Number of shares (billion)</b>	9.34	9.34	9.34	9.31
<b>Value per share</b>	131.66	113.59	227.72	63.05

Data source: calculation process

In the third quarter of 2023, monthly active users of Shutter reached 580 million (+19.6% year-on-year) and daily active users reached 310 million (+18.0% year-on-year). User activity and cash flow will continue to improve in the future, thanks to the optimization of operational efficiency, content supply and recommendation technology. E-commerce and advertising business has significant room for growth, with online marketing revenue of 10.92 billion yuan (+76.6% year-on-year) in the third quarter of 2023, and expected to reach 42.322 billion yuan (+95% year-on-year) for the full year; e-commerce revenue of 1.87 billion yuan (+54% year-on-year), and expected to reach 2.4 billion yuan (+42% year-on-year) in the fourth quarter. E-commerce turnover of RMB 175.9 billion (+87% y-o-y) will continue to grow in the future. Selling expenses remain high, with marketing expenses of 11.02 billion yuan (+80% year-on-year) in Q3, mainly due to industry competition and overseas market promotion. Overall, Crypto needs to realize future value growth by increasing active users, improving cash generation, lowering cost of sales and improving operational efficiency.

## 6. Summary

In recent years, the social network platform industry has been developing rapidly, especially the short video platforms represented by Jitterbug and Shutterbug are highly favored by capital, and their valuation issues are becoming increasingly important. However, short video social platforms have valuation difficulties such as poor profitability, few comparable companies, and high future risks, and traditional valuation methods have limitations in assessing the value of Internet enterprises. Short video platforms combine the Matthew effect, network effect and unique business model of Internet enterprises, attracting a large number of users through pre-promotional and preferential activities, building social ecosystems, and creating traffic through diversified

operations, realizing the value of realizing, and forming a sustainable business model. User scale is the core of the value of short video platforms, and the basis of realizing value depends on users and traffic.

Based on the unique business model of social network platforms, this paper adopts the modified Metcalfe's law model for valuation, defining the realization factor as the ratio of cash flow from operating activities to total assets, reflecting the enterprise's ability to obtain cash through its assets; the node distance is replaced by the cost of active users per unit; the premium rate coefficient is measured in terms of the market position, and the user scale is based on the number of monthly active users. Combining the business model and valuation results of Racer, the following conclusions are drawn:

User scale is a source of value, but not the only determinant. Fast hand through subsidies to obtain users, user scale is the basis for cash, but the user retention rate and cash ability is equally important, blind expansion of user scale is not desirable.

(2) The Metcalfe model can approximate the value trend. The 2019-2022 valuation of Shutterstock is high and low, gradually returning to market value, indicating that the model is informative in assessing such enterprises, helping investors identify value drivers and avoiding blind investment.

(3) The Metcalfe model is not perfectly applicable. Due to the diversity of short video platforms and the specificity of valuation, the model cannot accurately measure the value of all enterprises. The model needs to be revised according to the enterprise's industry status, development mode and value characteristics to reduce the error.

## References

- [1] Metcalfe B. Metcalfe's law after 40 years of Ethernet. IEEE Computer, 2013, 46(12):26-31

- [2] D.P. Reed. "That Sneaky Exponential-Beyond Metcalfe's Law to the Power of Community Building," 1999: [www. reed. com/dpr/locus/gfn/reedslaw. html](http://www.reed.com/dpr/locus/gfn/reedslaw.html)
- [3] B.Briscoe, A. Odlyzko, and B. Tilly, "Metcalfe's Law Is Wrong," IEEE Spectrum, 2006, 1
- [4] Xingzhou. Zhang. and Jing, J. L. and Wei, X. Tencent and Facebook Data Validate Metcalfe's Law [J]. Journal of Computer Science and Technology, 2015, V30(2): 246-251
- [5] Deny Rahardjo, Mr. Sugiarto. Valuation model using a mixed real options method: a review on Singapore and Indonesia digital startups [P]. Proceedings of the 16th International Symposium on Management (INSYMA 2019), 2019.
- [6] Chiang Hsiu-Sen; Hsiao Kuo-Lun. You Tube stickiness: the needs, personal, and environmental perspective [J]. Internet Research, 2019(3): 85-106.
- [7] Xingzhou. Zhang. and Jing, J. L. and Wei, X. Tencent and Facebook Data Validate Metcalfe's Law [J]. Journal of Computer Science and Technology, 2015, V30(2): 246-251.
- [8] B. Briscoe, A. Odlyzko, and B. Tilly, "Metcalfe's Law Is Wrong," IEEE Spectrum, 2006, 1.