Journal of Economic Statistics

Homepage: https://anser.press/index.php/JES

Performance evaluation of user value in digital economy industry: Based on the improvement EVA model

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ABSTRACT

With the advancement of science and technology and the advent of the digital economy, the digital economy has become a new driving force for economic development, and the digital economy industry at home and abroad is facing new opportunities for survival and development. However, due to the special development model and profit mode of the digital economy industry, the traditional performance evaluation method is no longer applicable, so it is particularly important to improve the previous performance evaluation method. This paper first adjusts the customer value assessment (CLV) model according to the characteristics of the digital economy industry, and then analyzes the traditional EVA based on the adjusted user value assessment (ULV) model of the digital economy industry. The performance evaluation system is improved, and the representative enterprises of Alibaba, JD and Pinduoduo in the digital economy industry are selected for performance evaluation and analysis, and the user value performance evaluation model of the digital economy industry is integrated, innovated and standardized, in order to provide reference and reference for the follow-up research and practice of performance evaluation in the digital economy industry.

KEYWORDS

EVA; Performance evaluation; User value; ULV model

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ISSN 2972-3728
doi: 10.58567/jes01010005

Received 23 December 2022; Accepted 29 January 2023; Available online 16 February 2023

I. Introduction

In recent years, big data, cloud computing, Internet of Things and other rapid development, Internet penetration rate has risen sharply. The "Statistical Report on China's Internet Development" released by China's Internet Information Network Center pointed out that "as of June 2019, the size of China's Internet users reached 854 million, and the Internet penetration rate reached 61.2%" (Ma, 2019). Under the background of the widespread popularity of the Internet, Internet enterprises have achieved unprecedented development, promoting economic development and leading a new round of consumption transformation. In September 2019, the Internet Society of China released the "2019 Top 100 Internet Enterprises Development Report" mentioned that 2019 The annual Internet business revenue of the top 100 Internet enterprises is as high as 2.75 trillion yuan (Entrepreneur Information, 2019). This considerable figure symbolizes that Internet enterprises have achieved leapfrog development in the overall scale and become a new engine of the digital economy.

The trend of digital economy development is becoming more and more obvious, but there is no established performance evaluation system to study the value of digital economy companies, especially the potential value in the context of digital economy. For companies such as Alibaba, JD and Pinduoduo that integrate with the digital economy, the value is driven by the growth driven by the digital economy. Under the traditional performance evaluation method, enterprises often stabilize the enterprise in a way that seems to "burn money", which is reflected in the financial statements of the current period, that is, the profit index of the current period is negative. There will be the illusion that the performance of enterprises that have made large investments in the early stage is lower than that of enterprises with less investment and less losses, which shows that it is unreasonable to evaluate the performance of enterprises based only on the profit indicators of the current period. Users are the source of profit for Internet enterprises, and "the process of investing in users in the digital economy industry is also a process of value creation, and users who do not create income are also valuable" (Duan and Xuan, 2018). At the same time, the on-balance sheet assets of traditional companies are no longer enough to reflect their true intrinsic value, and hidden assets such as digital resources that are free from off-balance sheet are the foundation of value creation.

Therefore, this paper is no longer limited by the traditional EVA performance evaluation system, and based on the particularity of the digital economy industry, it is improved on the basis of the original EVA performance evaluation model. The key indicator of "user value" is introduced into the performance evaluation in order to accurately evaluate the performance value of the digital economy industry.

2. Literature review

Performance evaluation is a kind of process management, effective performance evaluation can monitor the implementation of corporate strategies and goals, to ensure the realization of organizational strategies and goals. The research scope of performance evaluation at home and abroad is very extensive, the knowledge system is huge, and the research level is also uneven. In order to cope with the research on the performance evaluation of the digital economy industry, this paper focuses on the importance of performance evaluation to enterprises, the method and scope of performance evaluation.

At present, most of the theoretical research on performance evaluation comes from abroad. Lebas & Miehel (1995) pointed out the importance of performance evaluation, arguing that performance evaluation is a crucial part of business management, and the results of performance evaluation show the results of the strategy and actions chosen by the enterprise. In the way business performance is evaluated, Robert Kaplan & David Norton (1992) proposed the Balanced Scorecard, from finance, customer, Evaluate enterprise performance in four aspects: internal processes and learning; British scholar Andy Neely (2002) proposed a performance prism, which takes into account the interests of other stakeholders and is somewhat an improvement on the balanced scorecard; Stewart proposed

the Economic Value Added (EVA) indicator in 1991 and Jeffrey (1997) A revised Economic Value Added (EVA) indicator was proposed. For Internet enterprises, foreign scholars generally attach importance to the evaluation of the performance of Internet enterprises. Barney Jay (1991), Raphael Amit et al. (1993) argued that unique resources that are not easily imitated or replaced can provide companies with a sustained competitive advantage.

The academic research on enterprise performance started late, and most of it is about the sorting, analysis and application of performance rating methods. Lengnick-Hall (1996) believes that users as value co-creation roles can achieve downstream output through value co-creation activities, and the final result of value conversion is affected by the participation of leading users. Von Hippe (1988) found that users play an important role in the process of enterprise innovation, which has gradually been recognized and concerned by academia. In the dynamic market environment, the business model innovation of enterprises should take the discovery of new opportunities and the satisfaction of user needs as the strategic requirements. Alam et al. (2002) through research, it is found that the idea of the enterprise's creative process mainly comes from users, and users' participation in the innovation process can reduce the obstacles to innovation and optimize the innovation process of products or services. Stevens et al. (2003) believed that although the success rate of new product development is only 40%-70%, attracting users to participate in the innovation process can improve the innovation efficiency, commercial value and market attractiveness of products or services. Some scholars in Antoncic (2003) believed that although the internal entrepreneurship of employees is not a pure enterprise innovation practice, it has certain internal relations with the internal organizational activities and innovation output of enterprises. Modern enterprises increasingly rely on employees' entrepreneurial activities (internal entrepreneurship) to maintain and maximize the organization's initiative, innovation efficiency and competitiveness. Carbonell (2010) found through research that the product design process with user participation can improve the technical quality and innovation speed of enterprises. Anderson et al. (2015)pointed out that the blurring of organizational boundaries makes the information exchange between employees and users more direct and convenient, and that enterprises, employees and users can greatly increase the knowledge flow and stock of enterprises through cross-border exchange of knowledge and information, and ultimately promote the success of enterprise strategy and performance improvement .Blanka (2018) clearly pointed out that the current research on employees' internal entrepreneurship is relatively fragmented and needs further exploration and research. Gawke et al. (2019) provided and tested the measurement method of entrepreneurial behavior at the individual level of employees, but pointed out that the reliability of the scale should be tested in the Chinese context (platform enterprises with entrepreneurial derivative mechanism). Schweisfurth (2019) believes that the innovation model guided by user needs and user participation can promote the sustainable development of enterprises.

3. Improve the EVA model based on user value

3.1. Traditional EVA model

3.1.1. Introduction the traditional EVA model

Economic Value Added (EVA) was first proposed by Joel Stern in 1991. The economic value-added theory holds that both debt capital and equity capital of enterprises have costs, and when the profits of enterprises exceed all costs, it indicates that enterprises create value, and the EVA emphasizes "economic profits". At present, this performance evaluation method has been accepted and applied by more and more domestic and foreign enterprises, such as Siemens, Coca-Cola, Haier and so on.

There are many ways to calculate EVA, and this article adopts the most widely used EVA calculation formula listed in the "SASAC Economic Added Value Assessment Rules":

$$Economic\ Value\ Added\ =\ Net\ operating\ profit\ after\ tax\ -\ Cost\ of\ capital$$
$$=\ Net\ operating\ profit\ after\ tax\ -\ adjusted\ capital\ \times\ average\ cost\ of\ capital\ ratio \quad (1)$$

3.1.2. Advantages and defect analysis of traditional EVA model

The biggest feature of the EVA performance evaluation model is that it considers the cost of equity. This means that enterprises will enter a new stage of value management from strategic management, and the current profit on financial statements is no longer the only criterion for enterprise assessment. Enterprises pay more attention to their own capital cost ratio, which helps enterprises to make more scientific and reasonable decisions.

But, the EVA performance evaluation model is also unreasonable. It can be seen from the calculation formula given by the State-owned Assets Supervision and Administration Commission EVA calculated on the basis of after-tax net operating profit. When the current net profit of an enterprise is negative, the current performance of an Internet enterprise is likely to be negative. However, for the digital economy industry in the development and growth stages, the necessary R&D expenditure and the publicity expenditure incurred to build the user base Exit is crucial to the long-term development of a business. From this, yes EVA performance evaluation model is based on the digital economy industry to improve has its theoretical and practical significance.

3.2. User Value Assessment (ULV) model for digital economy industry

3.2.1. Traditional enterprise customer valuation (CLV) model

At present, there are many studies on customer value assessment methods. Among them, the customer life cycle (CLV) valuation model uses future cash flows to estimate the asset value at the present point, which is a relatively objective customer value evaluation model. This model contains effective predictions of the customer's future profits and is used to assess the amount of value a customer can bring to the business in the coming period. It considers the complete customer life-cycle, not only the historical value that the customer has generated, but also the future value that the customer will bring. The specific formula is:

$$\mathrm{CLV} = \sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{C_i}(1+\mathrm{d})^{-1} \quad (2)$$

The CLV model proposed by Qi Jiayin taken into account the total number of customers, the per capital profit margin of customers, customer acquisition costs, and customer churn rate, and combines the profit expected by all customers in the future stages with the discounted principle of cash flow to calculate the customer value at the time of evaluation. The formula is as follows:

$$CLV = \sum_{i=1}^{n}\sum_{t=0}^{Ti}\prod(t_i) \times Pr(t_i) \times d^{'t} \quad (3)$$

In Formula (3): $\prod(t_i)$ indicates the profit brought by the customer to the enterprise in the first period; $Pr(t_i)$ the first t period of customer purchase rate, i.e. the likelihood that customers will purchase or use products and services; $d' = 1/(1+d)$ where d is the discount rate; T the time span of the customer life-cycle, n the number of customers the enterprise has.

3.2.2. The user value assessment (ULV) model of the digital economy industry --- improve the CLV model

The customer value evaluation model of traditional enterprises cannot accurately evaluate the user value of the digital economy industry, so this paper optimizes the traditional CLV model from three aspects: customer retention rate, profit margin and discount rate.

(1) Improvement of customer retention rate

In the CLV model proposed by Qi Jiayin, the customer retention rate is taken as an important parameter, which is directly and significantly related to the final evaluation results, and also directly determines the accuracy of the final results. However, customer retention rate is difficult to reasonably evaluate in practice, so this paper introduces two special indicators for the digital economy industry based on the operating conditions and characteristics of the digital economy industry: "Monthly Active Users (MAU)" and "Daily Active Users (DAU)". When counting DAU, the average number of daily users in a month is usually taken, that is, the sum of the number of active users per day is used to remove the total number of days in the month. When calculating the MAU, the number of days of repeated login usage of the same active user in the current month shall be deducted. For example, if 100 people are active every day for 30 days in a month, then the MAU for this month is not 3000, but 100.

Suppose two extremes: First, if the number of active users per day is the same for 30 days in a month, and it is the same set of people, then our DAU/MAU = 100/100 = 100%. This can be understood as the upper limit of DAU/MAU. Conversely, suppose the number of active users per day is 100 for 30 days in a month, but the 100 people per day are not the same as the 100 people in the other 29 days, then D AU/MAU=100/3000=3.33% at this time. Through the above two indicators, the value range of DAU/MAU can be found as (3.33%, 100%). This fraction reflects customer stickiness to a certain extent. Based on customer stickiness, the improved user value evaluation model of Internet enterprises is as follows:

$$ULV = \sum_{i=1}^{n}\sum_{t=0}^{Ti}\prod(t_i)\cdot\frac{DAU}{MAU}\cdot\alpha\cdot d'^{t} \tag{4}$$

Among them, DAU/MAU together constitute the impact factor of enterprise customer retention, and the value of the Internet industry is generally 0.8. Moreover, taking the number of active users in the most recent period as the base period data, using the common equation (5), the average number of active users in the forecast period in the next few years can be obtained n:

$$n = \frac{DAU}{MAU}\cdot\alpha\cdot\text{Number of active users in the base period} \tag{5}$$

The rationality of the introduction of the active user indicator is reflected in the following three aspects: First, the set of indicators M AU and DAU is easily available, which makes up for the traditional CLV The disadvantage of high statistical cost and difficult statistical difficulty of customer retention rate in the model. Second, active users remove the influence of invalid users on review results. The digital economy industry is a gathering place for user traffic, but not all users are active users. Active users are customers who frequently browse the company's website and perform effective operations during the browsing process, bringing profits to the enterprise. The concept of effective operation can be defined according to the different nature of the digital economy industry. For example, effective users of video websites are those who have watched videos, effective users of forum websites are posts or comments, effective users of e-commerce platforms are those who have purchased records, and effective users of social software are those who have had information exchanges. Finally, the set of indicators M AU and DAU is unique to the digital economy industry, and it is more suitable to use this indicator to calculate the user value of the digital economy industry.

(2) Improvement of profit margins

Once the number of active users is determined, the next step is to determine the ability of active users to bring value to the business in the future, i.e. profit margin. Here, the "Average Revenue per User (ARPU)" metric is introduced. This indicator measures how many yuan of economic profit a user can bring to the enterprise in a month, reflecting the contribution made by unit customers to the enterprise and the relationship between the enterprise and the consumer. The average revenue per unit user (ARPU) is calculated in Equation (6), and Equation (6) is used

to improve the profit margin in the CLV model The ULV model is Equation (7):

$$ARPU(\text{Yuan/month}) = \text{Monthly profit contribution/Number of active users} \quad (6)$$

$$ULV = \sum_{i=1}^{n} \sum_{t=0}^{Ti} ARPU\,, t \cdot \frac{DAU}{MAU} \cdot \alpha \cdot d'^{t} \quad (7)$$

In equation (7), n is the life cycle time of the customer; ARPU represents the average revenue of a unit user in the t period; DAU/MAU customer retention rate; d represents the discount rate.

(3) Improvement of discount rate

The discount rate is very important for the calculation of user value, and even a small change in the discount rate can cause a large change in the customer value assessment results, and the change direction is reversed, which can be verified by sensitivity analysis. The choice of discount rate determines the authenticity and reliability of the user value evaluation results, but the traditional CLV model does not clearly indicate the calculation method of discount rate. This paper uses the capital asset pricing model to calculate the risk discount rate of Internet enterprises, namely:

$$d = Rf + \beta(Rm - Rf) \quad (8)$$

Among them, Rf take the average interest rate of the ten-year government bonds of the country where the enterprise is listed; Rm The average market expected rate of return for the Internet industry: the β value is the risk factor of the enterprise.

3.3. Improve the EVA model

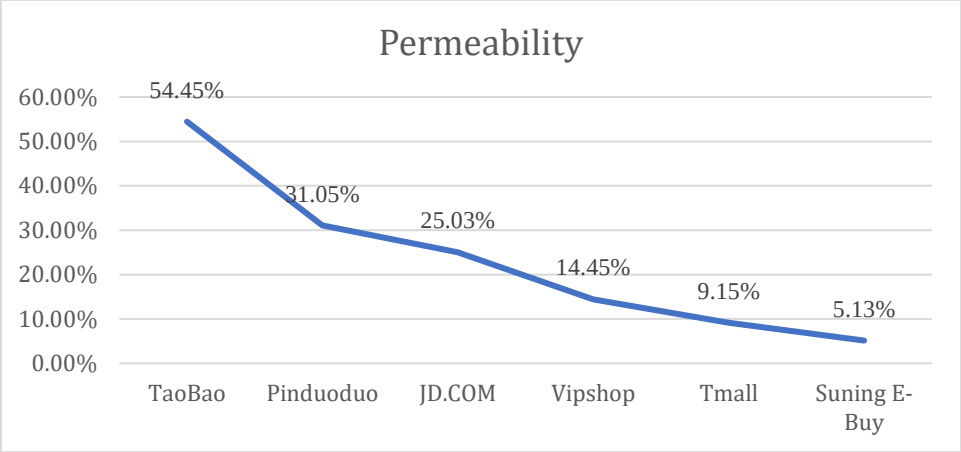
The process of enterprise performance evaluation is the process of comparing the performance goals achieved by employees with the performance goals required by the enterprise. However, unlike traditional enterprises, the increase of the user base in the digital economy industry requires a process, and a buffer period to achieve profitability, and the current financial statement data cannot fully represent the degree of achievement of the company's performance goals. The performance appraisal of the digital economy industry shall also include the current efforts made to cultivate the future profit potential of the enterprise. Therefore, the comprehensive profitability of the digital economy industry is measured by using the user value indicator that includes both the current profitability and the future development potential of the enterprise to replace the adjusted net profit that only represents the profitability of the current period, that is, Equation (9):

$$Economic\ Value\ Added = User\ Value - Cost\ of\ Capital$$
$$= User\ Value - Adjusted\ Capital \times Average\ Cost\ of\ Capital\ Ratio \quad (9)$$

4.The case study of improved EVA performance evaluation based on user value

4.1. Selection of research objects

In 2019, China's Academy of Information and Communications Technology rated the list of the world's top 30 listed Internet companies, and China's listed Internet companies have reached 10. The development of Baidu, Alibaba, and Tencent (BAT) is particularly prominent, these enterprises not only promote China's economic development, but also drive the transformation and upgrading of people's consumption patterns. Internet enterprises are divided into social networking, news information, comprehensive shopping malls, short videos, installment loans and other types. Therefore, this paper selects the average penetration rate of A PP in the past four quarters (the third quarter of 2018 to the second quarter of 2019). Top 3" for case analysis, namely: Alibaba, JD, Pinduoduo.



Source: Aurora Big Data

Figure 1. Average penetration rate of APP in comprehensive shopping malls in the past four quarters.

4.2. Analysis of financial indicators of Alibaba, JD and Pinduoduo

Before evaluating the performance of the enterprise, it is necessary to have a corresponding understanding of the operation of the enterprise in recent years, so the main financial indicators of the enterprise in recent years should be selected for analysis. In order to ensure the accuracy of the data and take into account the availability of data, the financial indicators of Alibaba and JD here are taken from the average of five years (2014-2018), and the financial indicators of Pinduoduo are taken from the average of the past three years (2016-2018).

Table 1. Comparison of financial indicators of Alibaba, JD and Pinduoduo.

Financial indicators		Alibaba	JD	Pinduoduo
Profitability	Sales gross margin	59.90%	13.16%	40.65%
	Net profit margin on sales	34.85%	-2.26%	-55.27%
Operational capabilities	Total asset turnover	0.39	2.29	0.35
	Total asset turnover days	928.82	158.15	1166
Solvency	liquidity ratio	2.26	1.15	1.32
	Gearing ratio	36.10%	63.32%	75.74%
	Equity ratio	56.83%	193.34	510.39

From the perspective of profitability, the average gross profit margin of Alibaba's sales in the past five years is about 59.90%, and the average net profit margin of sales is about 34.85%, and Alibaba's profitability is considerable; JD's profitability is quite different from Alibaba's, and the net profit margin of sales is negative; Although the gross profit margin of Pinduoduo's sales is considerable, the net profit margin of sales is as low as -55.27%, which shows that Pinduoduo's profitability is poor, and the comprehensive profit level is lower than that of Alibaba and JD.

From the perspective of operating capacity, Alibaba's asset turnover is slow, its operating efficiency is poor, and its operating capacity is low. In contrast, JD's asset turnover is faster, its operating efficiency is higher, and its operating capacity is far better than that of Alibaba; The average value of Pinduoduo's total asset turnover rate and total asset turnover days in the past three years was 0.35 and 1166 days, respectively It can be seen that Pinduoduo's asset turnover speed is slow, the operating efficiency is low, and the operating capacity is slightly lower than that of Alibaba and far lower than that of JD.

From the perspective of solvency, Alibaba's current ratio in the past five years has averaged about 2.26, and its short-term solvency is better, while its asset-liability ratio and equity ratio show that its long-term solvency is good and its financial risk is low. JD's short- and long-term solvency is poor, and its financial risks are higher; Pinduoduo's short-term solvency is poor, lower than Alibaba's but slightly better than JD. Among the three companies, Pinduoduo

has the worst long-term debt repayment ability, and its financial risk is higher than that of Alibaba and Pinduoduo.

4.3. Calculation of user value (ULV) in the digital economy industry

4.3.1. User retention rate of Alibaba, JD and Pinduoduo

When calculating active user stickiness, this paper selects the daily active users and monthly active users of the three enterprise clients in the WIND database and public data for calculation, because the indicator table of user stickiness is relatively stable and considering the availability of data, the statistical data of the past four consecutive quarters are selected, as follows:

Table 2. Statistics of the number of active users in the four quarters of Alibaba, JD and Pinduoduo.

	Time	DAU (10,000 people)	MAU (10,000 people)	DAU/MAU
Alibaba	2018-06	17250.00	47564.20	36.27%
	2018-09	17710.00	51063.80	34.68%
	2018-12	20060.00	53643.10	37.40%
	2019-03	20900.00	51943.50	40.24%
JD	2018-06	3720.00	18805.30	19.78%
	2018-09	3360.00	20421.50	16.45%
	2018-12	3670.00	21758.70	16.87%
	2019-03	3730.00	19957.10	18.69%
Pinduoduo	2018-06	5390.00	12460.60	43.26%
	2018-09	6260.00	13800.20	45.36%
	2018-12	7140.00	14360.50	49.72%
	2019-03	7750.00	14571.90	53.18%

Data source: WIND database, Aurora Big Data

DAU/MAU is user stickiness, out of the principle of prudence, the product of user stickiness and impact factor is regarded as the user retention rate of enterprises, and the value of Internet enterprises is generally 0.8. The more satisfied the user is with the products or services provided by the enterprise, the higher the user stickiness and the higher the user retention rate. Firstly, the arithmetic mean of the three enterprises can be calculated from Table 4-2, and the average user viscosity of the three enterprises can be calculated as 37.15%, 18.69% and 47.88% respectively. Secondly, taking into account the impact factors of user retention rate, the user retention rates of Alibaba, JD and Pinduoduo are about 29.72%, 17.95% and 38.30 respectively.

Finally, based on the number of active users in the latest period, the average number of customers in the next five years is predicted, and the data of the latest issue of Alibaba, JD, and Pinduoduo in the WIND database is November 2019. The number of monthly active users was 726,544,000, 279,396,000 and 460,651,000 respectively. Based on this, calculate the average number of customers of the three companies in the next five years n1, n2, n3, as follows:

Alibaba: $n_1 = \alpha \times \frac{DAU}{MAU} \times 72654.40 = 18454.22$(ten thousand people)

JD: $n_2 = \alpha \times \frac{DAU}{MAU} \times 27939.60 = 4012.13$(ten thousand people)

Pinduoduo: $n_3 = \alpha \times \frac{DAU}{MAU} \times 46065.10 = 17644.18$(ten thousand people)

4.3.2. Alibaba, JD, Pinduoduo profit margin parameters

In this paper, the profit margin parameter is calculated using average user revenue per unit (ARPU). Assuming that the user life cycle of the digital economy industry is five years, the profitability of Alibaba and JD in the next five

years is determined based on the profitability of Alibaba and JD in recent years. The operating income and operating costs of Alibaba, JD and Pinduoduo in recent years are shown in the following table.

Table 3. Operating income and operating costs of Alibaba, JD and Pinduoduo in the past six years.

	Reporting period	Operating income (100 million yuan)	Operating cost (billion yuan)	Operating profit	Operating margin	Operating profit growth rate
Alibaba	2014-03-31	525.00	133.70	391.3	74.53%	
	2015-03-31	762.00	238.30	523.7	68.73%	25.28%
	2016-03-31	1011.00	343.60	667.4	66.01%	21.53%
	2017-03-31	1583.00	594.80	988.2	62.43%	32.46%
	2018-03-31	2503.00	1070.00	1433.0	57.25%	31.04%
	2019-03-31	3768.00	2069.00	1699.0	45.09%	15.66%
JD	2013-12-31	693.40	625.00	9.86%	68.4	
	2014-12-31	1150.00	1016.00	11.65%	134.0	48.96%
	2015-12-31	1810.00	1590.00	12.15%	220.0	39.09%
	2016-12-31	2583.00	2229.00	13.70%	354.0	37.85%
	2017-12-31	3623.00	3115.00	14.02%	508.0	30.31%
	2018-12-31	4620.00	3961.00	14.26%	659.0	22.91%
Pinduoduo	2016-12-31	5.05	5.78	-14.46%	-0.7	
	2017-12-31	17.44	7.23	58.56%	10.2	107.15%
	2018-12-31	131.20	29.05	77.86%	102.2	90.00%

Source: Oriental Fortune Network

From Table 4-3, it can be seen that Alibaba's operating profit margin is optimistic, basically at 50% and above. Moreover, the growth rate of operating profit is relatively stable, and by calculating the arithmetic average, the average growth rate of Alibaba's operating profit = 25.19%; JD's operating profit growth rate shows a downward trend year by year, but JD's operating profit margin is relatively stable, and the profit margin in the past six years is basically between 10% and 15%. By calculating the arithmetic average, the average growth rate of JD's operating profit in the past six years is 35.83%; From 2016 to 2018, Pinduoduo's operating profit growth rate is very fast, from negative operating net profit to 77.86% operating profit margin, with an average operating profit of 98.58%. Based on the operating profit growth rate of Alibaba, JD and Pinduoduo, the operating profit data of the three companies in the next five years is forecasted, as shown in the following table.

Table 4. Alibaba's operating revenue and cost forecast for the next five years.

	year	Operating income (100 million yuan)	Operating cost (billion yuan)	Operating profit (100 million yuan)	Operating margin
Alibaba	In 2019	4717.16	2590.18	2126.98	45.09%
	In 2020	5905.41	3242.65	2662.76	45.09%
	In 2021	7392.98	4059.47	3333.51	45.09%
	In 2022	9255.28	5082.05	4173.23	45.09%
	In 2023	11586.68	6362.22	5224.46	45.09%
JD	In 2019	6275.35	5380.23	895.12	14.26%
	In 2020	8523.80	7307.96	1215.84	14.26%
	In 2021	11577.88	9926.40	1651.48	14.26%
	In 2022	15726.24	13483.03	2243.20	14.26%
	In 2023	21360.95	18314.01	3046.94	14.26%

Pinduoduo	In 2019	260.54	57.69	202.85	77.86%
	In 2020	517.37	114.56	402.82	77.86%
	In 2021	1027.40	227.48	799.92	77.86%
	In 2022	2040.21	451.74	1588.48	77.86%
	In 2023	4051.46	897.06	3154.39	77.86%

According to the operating profit of Alibaba, JD and Pinduoduo predicted in the above table, the average monthly total profit contribution is calculated in the next five years, and then the average revenue value per unit user is calculated by using the calculation formula of ARPU, as shown in the table below:

Table 5. Calculation table of average revenue per user during the forecast period ARPU.

		In 2019	In 2020	In 2021	In 2022	In 2023
Alibaba	Operating profit (million yuan)	21269781	26627638.83	33335141.06	41732263.09	52244620.16
	Average Total Monthly Cash Contribution ($10,000)	1772481.75	2218969.90	2777928	3477688.59	4353718.35
	Average active users (10,000)			18454.22		
	ARPU(Yuan/month)	96.05	120.24	150.53	188.45	235.92
	ARPU(Yuan/year)	1152.60	1442.88	1806.36	2261.40	2831.04
JD	Operating profit (million yuan)	8951197	12158410.89	16514769.51	22432011.42	30469401.11
	Average Total Monthly Cash Contribution ($10,000)	745933.08	1013200.91	1376230.79	1869334.28	2539116.76
	Average number of active users (tens of thousands).			4012.13		
	ARPU(Yuan/month)	185.92	252.53	343.02	465.92	632.86
	ARPU(Yuan/year)	231.04	3030.36	4116.24	5591.04	7594.32
Pinduoduo	Operating profit (million yuan)	2028494.7	4028184.775	7999169.327	15884750.45	31543937.44
	Average Total Monthly Cash Contribution ($10,000)	169041.23	335682.06	666597.44	1323729.20	2628661.45
	Average active users (10,000)			17644.78		
	ARPU(Yuan/month)	9.58024	19.02444	37.77873	75.02101	148.9767
	ARPU(Yuan/year)	114.9629	228.2933	453.3448	900.2521	1787.7204

4.3.3. Alibaba, JD, Pinduoduo discount rate

(1) Market risk premium

First, the risk-free return rate of the three Internet companies is measured. Since Alibaba, JD and Pinduoduo are listed in the United States, the arithmetic average of the medium-term government bond interest rates in the United States in the past five years is taken. Through the WIND database search, a total of 1250 data were counted, of which 251 data were included in 2015, with an average value of about 2.1383%; 250 data were included in 2016, with an average of about 1.8374%; 2017 contains 250 data, with an average value of about 2.3295%; 2018 contains 249 data, with an average value of about 2.9112%; 250 data were included in 2019, with an average of about 2.1414%; Based on the average government bond interest rate in the past five years, the arithmetic average is about 2.2716%, that is, the risk-free return rate of Alibaba, JD and Pinduoduo is 2.2716%.

Secondly, the market expected rate of return of the three Internet companies is measured. Alibaba is listed on the New York Stock Exchange, so the expected rate of return can be considered as the long-term average yield of the Internet industry on the New York Stock Exchange. By calculating the arithmetic mean of the expected return of the New York Stock Exchange TMT industry market over the past 20 years in the WIND database, the expected return is 27.1348%. Unlike Alibaba, JD and Pinduoduo are both listed on the NASDAQ stock exchange in the United States, so the market expects the return rate to be the long-term average yield of the Internet industry on the NASDAQ market. By calculating the arithmetic average of the expected market rate of return of the NASDAQ stock exchange Internet industry market for the past 5 years in the NasdaqI ND database, the expected rate of return in the NASDAQ stock exchange Internet industry is obtained 19.7696%.

Finally, by differentiating the expected market rate of return with the risk-free rate of return, Alibaba's market risk premium (the return that investors hope to obtain through this investment behavior above the social average return) is 24.8623%, and the market risk premium of JD and Pinduoduo is 17.4980%.

(2) Enterprise risk coefficient

The enterprise risk factor is based on the average of recent years in the flush database. Considering the availability of data, Alibaba's risk factor is taken from the average value of the past six years, and JD's risk coefficient is taken from the average value of the past five years. After calculation, the average value of Alibaba is about 1.0324, the average of JD is about 1.4694, and the average value of Pinduoduo is about 0.5582.

(3) Discount rate

The risk-free return rate, market risk premium and enterprise risk coefficient of Alibaba, JD and Pinduoduo have been determined, and the next step is to calculate the discount rate of user value according to the capital asset pricing model, respectivelyd_1,d_2 as d_3 follows:

Alibaba: $d_1 = 2.27\% + 1.0324 \times 24.8623\% \approx 27.93\%$

JD: $d_2 = 2.27\% + 1.4694 \times 17.4980\% \approx 27.98\%$

Pinduoduo: $d_3 = 2.27\% + 0.5582 \times 17.4980\% \approx 12.04\%$

(4) Alibaba, JD, Pinduoduo user value

The user retention rate, user profit margin and discount rate of the three Internet companies have been determined above, and the cash flow brought by users in the next five years will be discounted to obtain the user value ULV_1, ULV_2 and ULV_3 of Alibaba, JD and Pinduoduo.

Alibaba: $ULV_1 = \sum_{i=1}^{n}\sum_{t=0}^{Ti} ARPU\,, t \cdot \frac{DAU}{MAU} \cdot \alpha \cdot d'^t = 7951.6476$(RMB100mn)

JD: $ULV_2 = \sum_{i=1}^{n}\sum_{t=0}^{Ti} ARPU\,, t \cdot \frac{DAU}{MAU} \cdot \alpha \cdot d'^t = 3951.3156$(RMB100mn)

Pinduoduo: $ULV_3 = \sum_{i=1}^{n}\sum_{t=0}^{Ti} ARPU\,, t \cdot \frac{DAU}{MAU} \cdot \alpha \cdot d'^t = 3870.9624$(RMB100mn)

4.4. Improve EVA computing in the digital economy industry

The basic idea of improving the EVA is to replace the after-tax net operating profit in the traditional EVA performance evaluation model with customer value. The user value of Alibaba, JD and Pinduoduo is evaluated above, and the evaluation results are substituted into the improved EVA model to obtain the final performance evaluation results. Before the performance evaluation, the total invested capital (TC) and average cost of capital ratio (WACC) of the three companies need to be measured separately.

4.4.1. Total invested capital (TC) calculation

This paper uses the formula listed in the SASAC Economic Added Value Assessment Rules to determine the total invested capital of the three Internet enterprises, as follows:

$$Adjusted\ capital = average\ owner's\ equity + total\ average\ liabilities - average\ interest - free\ current\ liabilities - average\ construction\ in\ progress \quad (10)$$

Table 4-6 shows the capital adjustments extracted from the latest financial statements of Alibaba, JD and Pinduoduo, and according to Table 4-6 and the calculation formula (10) of the total invested capital, the adjusted capital (TC) of Alibaba, JD and Pinduoduo can be obtained They are: 821.460 billion yuan, 101.470 billion yuan and 40.763 billion yuan.

Table 6. Summary of capital adjustments of Alibaba, JD and Pinduoduo in 2018 (Unit: 100 million yuan).

		Alibaba	JD	Pinduoduo
Average owner's equity		6154	768.3	188.2
Total average liabilities		3497	1323	243.6
Average interest-free current liabilities	Notes payable	0	0	0
	Accounts payable	0	799.9	0
	Advance receivables	1177	202.9	24.17
	Taxes payable	176.9	8.257	0
	Interest payable	\	\	\
	Other payables	82.5	0	0
	Other current liabilities	0	0	0
Average construction in progress		0	65.54	0

Source: Oriental Fortune Network

4.4.2. Weighted average cost of capital (WACC) calculation

The weighted average cost of capital in this article is calculated using the formula listed in the SASAC Economic Value Assessment Rules:

$$\begin{aligned} &Weighted\ average\ cost\ of\ capital\ ratio\ (WACC) \\ &= debt\ capital\ cost\ ratio \times [debt\frac{capital}{(equity\ capital\ +\ debt\ capital)}] \\ &+ Cost\ of\ equity\ capital\ ratio\ \times\ equity\frac{capital}{(equity\ capital\ +\ debt\ capital)}] \end{aligned} \tag{11}$$

To determine the weighted cost of capital (WACC) of Alibaba, JD and Pinduoduo, it is necessary to determine the debt capital cost ratio, equity capital cost ratio, debt ratio and equity ratio of the three enterprises in turn. First, the debt-to-capital ratio is the long-term loan interest rate of the enterprise after deducting income tax. In May 2018, People's Bank of China updated China's long-term loan interest rate to 4.90%. This latest standard deducts 25% corporate income tax, resulting in a debt-to-capital ratio of 3.68%. Secondly, the cost of equity capital in the digital economy industry is calculated using the capital asset pricing model, and the equity capital cost ratios of Alibaba, JD and Pinduoduo are 27.93%, 27.98% and 12.04% respectively. Based on the above indicators, the weighted cost of capital (WACC) of Alibaba, JD and Pinduoduo is obtained: 19.1431%, 12.6073%, 7.3237%. Here, because Alibaba has the highest proportion of equity, reaching 63.77%, and compared with the cost of debt capital, the cost of equity capital is much higher, resulting in the situation of Alibaba's highest weighted capital cost. The calculation process of the weighted average cost of capital of the three enterprises is shown in the table below:

Table 7. Weighted average cost of capital (WACC) for Alibaba, JD and Pinduoduo in 2018.

	Alibaba	JD	Pinduoduo
Total liabilities (billion yuan)	3497	1323	243.6
Shareholders' equity (billion yuan)	6154	768.3	188.
Total capital (100 million yuan	9651	2091.3	431.8
Debt ratio	36.23%	63.26%	56.42%
Equity ratio	63.77%	26.74%	43.58%
Weighted average cost of capital (WACC)	19.1431%	12.6073%	7.3237%

4.4.3. Improve EVA calculation

The user value, adjusted total capital and weighted average cost of capital ratio of the three enterprises were determined, and the economic added value (EVA) of Alibaba, JD and Pinduoduo in 2018 could be calculated as 636,540.48 million yuan 382,338.93 million yuan, 384,110.88 million yuan. The specific calculation is as follows:

Alibaba: EVA = ULV - TC*WACC = 636.54048 (billion yuan).

JD: EVA =ULV - TC*WACC =3823.3893(billion yuan)

Pinduoduo: EVA = ULV - TC*WACC = 3841.1088 (billion yuan).

4.5. Analysis and discussion of calculation results

The following table shows the operating results of Alibaba, JD and Pinduoduo. This paper analyzes this result from two perspectives: the difference between the net profit of the same enterprise and the improvement of the E VA result, and the difference between the improvement of the EVA result of different enterprises.

Table 8. Performance comparison table of three Internet companies in 2018.

Business name	Gross profit (100 million yuan)	Operating profit (100 million yuan)	Net profit (100 million yuan)	Improved EVA model (billion yuan).
Alibaba	1699	570.8	802.3	6365.4048
JD	659.5	-26.19	-28.01	3823.3893
Pinduoduo	102.1	-108.0	-102.2	3841.1088

4.5.1. Comparative analysis of net profit and improved EVA

From the perspective of net profit, only Alibaba's operating profit and net profit value are positive, and the net profit of JD and Pinduoduo are both negative, indicating that Alibaba has strong strength in the digital economy industry of the comprehensive mall; From the perspective of gross profit, the gross profit of the three enterprises is positive, and much higher than the operating profit and net profit of the enterprise, from the company's current annual report can be seen that this phenomenon is due to the three Internet companies have a large number of research and development expenses, marketing expenses, and operating expenses, these expenses are crucial to the development of the digital economy industry in the development and growth period. Only by paying enough expenses in the early stage to accumulate a user base for the enterprise can the company get rid of the passive position and make profits in the later stage, but in the short term, the most direct performance is that the profit indicator in the current annual report of the enterprise may be negative. It can be seen that the performance evaluation method based only on the current profit index is unreasonable for Internet enterprises.

From the E VA value in the above table, the EVA of the three companies is positive, and the EVA value is much higher than the profit indicator of the enterprise, because the user value is introduced to measure the performance of the enterprise. It is the user who really brings profit to the digital economy industry, so the value that can be brought to the enterprise in the user life cycle must be included. This paper assumes that the user life cycle of the digital economy industry is five years, and the discounted user value minus the cost of capital is the EVA value listed in the table. This treatment makes up for the shortcomings of performance evaluation based only on current profit indicators, and the efforts made by enterprises to acquire users in the current period are reflected in this year's results, making the performance evaluation of the digital economy industry more reasonable.

4.5.2. Alibaba, JD, and Pinduoduo improved EVA comparative analysis

By comparing the EVA values of the above three companies, it can be seen that Alibaba is still a leading enterprise in the e-commerce digital economy industry. Alibaba's operating performance is about twice that of JD and Pinduoduo, which is undoubtedly related to its strong user value. Alibaba compares with JD in the number of

users, although the profit contribution per unit user is only half of JD, but the number of Alibaba users is more than 4 times that of JD, which is the embodiment of Alibaba's strong user base. Alibaba and Pinduoduo are better than the profit contribution per unit user, and it can be seen from the previous article that the number of users of Pinduoduo is not much different from Alibaba, and the real gap is that Pinduoduo's unit user profit contribution is small, which is similar to Pinduoduo's implementation of group low price The way sales are profitable is related. As a result, Alibaba has dominated the performance evaluation of the EVA.

Secondly, the difference between the valuation of Pinduoduo and JD's EVA is small. Pinduoduo went public in 2018 and surpassed JD in a relatively short period of time, indicating that its marketing strategy of group-group low-price sales is feasible. It can be seen from the data that although Pinduoduo is lower than JD in terms of profit contribution indicators per unit user, Pinduoduo has an absolute advantage in the number of users. This has caused the phenomenon that Pinduoduo and JD are evenly matched.

It can be seen that the performance comparison of different companies confirms that the results of the EVA performance evaluation are consistent with the business strategy of the enterprise. Therefore, based on the improved EVA model of Internet enterprises, the performance evaluation of Internet enterprises can be accurately carried out.

5. Conclusion

Due to the particularity of the digital economy industry, the traditional performance evaluation system cannot accurately evaluate the performance of the digital economy industry, so this paper introduces “user value” to improve the traditional EVA performance evaluation system and form an improved EVA performance evaluation model that is more applicable to the digital economy industry. Finally, taking Alibaba, JD and Pinduoduo as examples, a case study is made to improve the performance evaluation model of EVA, and the performance evaluation results of the three digital economy enterprises are compared from multiple angles, and it is found that the evaluation results of EVA are consistent with the profit model and operation characteristics of enterprises, which further verifies the improvement The reasonableness of the EVA performance evaluation model. This paper confirms that the traditional performance evaluation model has certain limitations, and user value must be introduced to make a scientific and reasonable evaluation of the performance of Internet enterprises.

The main contribution of this paper: First, it enriches and improves the performance evaluation methods of digital economy enterprises, links user value with the performance evaluation of enterprises, and opens up a new concept for the performance evaluation of digital economy enterprises. Secondly, the evaluation of user value adopts the improved ULV model, and introduces Internet enterprise special words such as active users (MAU) and profit contribution per unit user (ARPU), which are more in line with the characteristics of digital economy enterprises. This not only solves the problem that the traditional CLV model has many assumptions and data is difficult to obtain, but also makes the user value assessment of the digital economy industry more accurate. This paper assumes a five-year life cycle for digital economy enterprise users. In practice, different policies and different business methods of enterprises will lead to the extension or shortening of the actual life cycle of users. Therefore, the performance evaluation of the digital economy industry needs to be further improved in subsequent research.

Funding Statement

This research is supported by the National Social Science Foundation Youth Program “Research on the theory and method of China's sharing economy accounting” (17CTJ003); Statistical research project of the National Bureau of Statistics “China's sharing economy statistical survey and research” (CJ-2017-02); Key project of financial application research in Shandong Province “Research on the mitigating effect of inclusive finance on financing

constraints of small and medium-sized enterprises in Shandong Province" (2019-JRZZ-01).

Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

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