

Improvement of DEVA Model in Valuation Research of Internet Financial Information Service Companies

Jiangbin Zhu^{1,a,†}, Zuer Yang^{1,b,*,†}, Peifan Li^{1,c}

¹*School of Management, Wuhan University of Technology, No. 34 Wenzhi Street, Hongshan District, Wuhan City, Hubei Province, 430070, China*

a. 913194228@qq.com, b. 1363170847@qq.com, c. lipeifan626@163.com

[†]*Both of the two authors have made equally significant contributions to the work and share equal responsibility and accountability for it.*

Abstract: With the development of the digital economy and the internet, the internet financial information service industry has shown strong momentum. Different from traditional enterprises, internet financial information service companies possess characteristics of low assets, high risks, and difficulties in measuring non-financial indicators. As a result, traditional valuation methods exhibit inaccuracies in application and require the introduction of non-financial valuation models for validation. Therefore, considering the industry's characteristics from a user perspective, we introduce the Metcalfe valuation model—the DEVA valuation model. Simultaneously, we improve this model and, using Hithink Royalflush Information Network Co., Ltd. as a case study, estimate the value at the evaluation point using both the original DEVA model and the revised new model. Finally, we analyze and compare the differences between the various valuations and Royalflush's total market value at the evaluation point, concluding that the improved DEVA model yields more fair and accurate valuation results.

Keywords: Financial Information Service Companies, DEVA Model, Valuation

1. Introduction

Under the scenario of high-quality economic development, disposable income per capita is increasing, and the awareness of investment and financial management is growing daily. It has become increasingly common for people to invest idle funds in financial products. Due to individual investors' habit of obtaining financial information and investment advice from the internet, their reliance on platforms that integrate financial information resources and enhance information utilization rates has deepened. The valuation of internet financial information service companies, which primarily sell financial data and consider user quantity as a core resource, has surged in recent years, garnering significant attention from the capital market.

The internet financial information service industry is a subdivision that has emerged alongside the development of internet finance [1]. It primarily relies on core internet data and information technology to provide financial information services to users through terminals. For companies providing digital information resources, the presence of significant research and development expenses, customer resources, and off-balance-sheet intangible assets [2] complicates traditional valuation methods [3]. This paper aims to explore, from a user value perspective, how to enhance the

accuracy of enterprise valuation by constructing a Metcalfe valuation model that aligns with the actual situation of internet financial information service companies.

2. Construction of Valuation Models for Internet Financial Information Service Companies

2.1. Deficiencies in the Traditional DEVA Valuation Model

The DEVA (discounted equity valuation analysis) model [4] is proposed based on Metcalfe's law and Moore's law. Its formula is as follows:

$$V = E \times C^2 \quad (1)$$

Among which V represents the value of internet enterprises, E denotes the initial cost per unit, and C stands for the value created by a user within a unit economic period.

The model exhibits the following deficiencies: Firstly, not all users contribute value to the enterprise. In the original DEVA valuation model, users refer to "registered users." In practice, some users, after registration, barely use the company's products and services. Therefore, directly considering the quantity of "registered users" as the value of users is inaccurate. Secondly, measuring the relationship between user value and enterprise value as a square relationship, as per Metcalfe's law, may result in an infinite enterprise value, which clearly does not align with reality. Lastly, the original DEVA valuation model does not consider the initial input costs of subsequent user acquisition and maintenance for the enterprise.

2.2. Construction and Optimization of the DEVA Valuation Model

2.2.1. Defining User Value

It is crucial to define the attributes of users. For internet financial information service enterprises, some online users remain inactive after registration, not contributing any value to the enterprise. Using the quantity of "registered users" alone to gauge user value is not realistic. [5] Therefore, this paper defines the user attribute in the DEVA valuation model as active users.

Moreover, determining the user's contribution value, based on numerous studies by scholars and experts and considering the current industry's operational status, this paper will utilize the Average Revenue Per User (ARPU) index to denote the value a unit active user brings to the enterprise, calculated as the business revenue within a certain period divided by the number of active users.

2.2.2. Modifying User Contribution Relationships

This paper introduces Zipf's law to optimize the relationship between platform value and user contribution. [6] According to Zipf's law, for internet financial information service enterprises, if there are N users, the value of the first user is 1, the second user's value is $1/2$, and the N th user's value is $1/N$. The value received by one user, added by other user values, equals $1 + 1/2 + 1/3 + \dots + 1/(N-1)$, resulting in an approximation to $\ln(N)$. The other $N-1$ users can obtain the same value from this. Hence, the total value of the internet is $N\ln(N)$, not N^2 .

2.2.3. Adjusting Initial Investment Costs

Adjusting the initial investment costs to accurately reflect the costs incurred by internet financial information service enterprises to obtain and maintain user resources allows for a better estimation of the enterprise's value. This industry heavily relies on data information technology support, and the

expenses in this technical research and development can represent the costs incurred to obtain and maintain users. According to Metcalfe's law, user resources are crucial for Internet financial information services. The industry utilizes social media to increase publicity and attract new users, representing the costs incurred to attract new users.

2.2.4. Introducing Market Share

Introducing market share P into the evaluation model, this paper employs MAU market share ratio to represent the measure of market share. The MAU market share ratio equals the enterprise's monthly active users divided by the industry's monthly active users. Generally, market share refers to the ratio of an enterprise's total business revenue to the industry's total revenue. However, internet financial information service enterprises differ from traditional enterprises, exhibiting the Matthew effect. A larger number of active users reflects higher user loyalty and preference within the industry for the platform, bringing more potential value to the platform and indicating a higher share of the enterprise in the user market.

2.2.5. Constructing the Optimized DEVA Model

Based on the above analysis, the formula for constructing the optimized model is as follows:

$$V = M \times P \times (MAU \times ARPU) \times \ln(MAU \times ARPU) \quad (2)$$

Among them:

V - The value of internet financial information service enterprises.

M - Unit input cost.

P - Market share.

MAU - Monthly average active users.

ARPU - Average revenue per unit user.

3. Valuation Model Case Application

3.1. Company Overview

Zhejiang Hithink Royalflush Information Network Co., Ltd. (referred to as Royalflush) is a leading provider of internet financial information services, established in 2001. The company's main revenue sources include value-added telecom services, software sales and maintenance services, advertising, internet business promotion services, fund sales, and other transaction services, achieving revenues of 1.538 billion, 285 million, 1.527 billion, and 210 million yuan respectively in 2022. In terms of user scale, Royalflush's traffic base surpasses its peers, with significantly higher monthly active users on the app, reaching an average of 14.63 million users daily on the Royalflush online free client in 2022.

3.2. Application of the Metcalfe Valuation Model

3.2.1. Applicability of Metcalfe's Law

This paper conducts a correlation analysis between the square of Royalflush's monthly average active users from 2016 to 2022 and its operating income, as depicted in Figure 1.

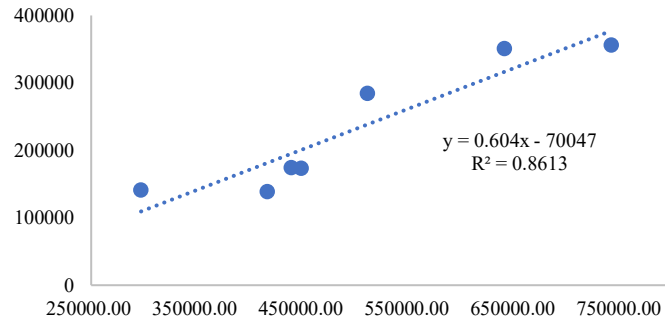


Figure 1: Fitting result of operating income and MAU²

In Figure 1, R^2 is 0.8613, indicating a good fit between operating income and the square of monthly average active users, validating Metcalfe's law and establishing some reasonableness in using monthly average active users as a user quantity.

3.2.2. Application of the Traditional DEVA Model before Improvement

As the 2023 annual report of the enterprise has not been disclosed yet, for obtaining relevant indicators and calculations, this paper considers the evaluation reference date as December 30, 2022.

The traditional DEVA valuation reflects the impact of two factors, unit initial cost (M) and user value (C), on the value of internet enterprises. The unit initial cost (M) is calculated based on the company's initial registered capital divided by the registered number of users, while user value (C) is measured based on the overall size of registered users. According to the 2022 annual report of Royalflush, its 2022 operating income was 3.559 billion yuan, with an initial registered capital of 537.6 million yuan, and Royalflush's cumulative registered users on its financial service platform reached 614 million. Substituting these values into the traditional DEVA valuation model formula,

$$V(2022) = \frac{5.376}{6.14} \times \left(\frac{35.59}{6.14} \right)^2 = 3.447(\text{billion yuan}) \quad (3)$$

The valuation of Royalflush is calculated to be 3.447 billion yuan. At the evaluation point in 2022, the market value of Royalflush was 53.013 billion yuan, with a disparity rate of -93.50%.

3.2.3. Application of the Improved DEVA Model

Firstly, it involves quantifying user value. The number of users will be represented by Monthly Average Active Users (MAU). With the upgrade of Royalflush's software features, the mobile app on smartphones can now meet the needs of a large number of users, such as investors, browsing financial information and economic news. Users are increasingly accustomed to accessing data and information conveniently through mobile apps. Hence, to determine the Monthly Average Active Users and reduce the impact of overlapping users between PC and mobile ends, this paper uses data from a third-party app statistics platform called Aurora Month Fox. In 2022, Royalflush's Monthly Average Active Users (MAU) were approximately 27.2165 million people, around 27 million people. This paper will use the Average Revenue Per Unit User (ARPU) indicator to represent the value brought to the enterprise by each active user. According to Royalflush's business structure, except for software sales and maintenance services primarily provided to B-end securities companies, the other three services are aimed at C-end users. Therefore, to determine the ARPU value, it mainly relies on the three services: value-added telecom services, advertising, and internet business promotion services, fund sales, and other transaction services. As per the formula:

$$ARPU = \frac{15.38+15.27+2.10}{0.27} = 121.25 \quad (4)$$

The Average Revenue Per Unit User (ARPU) is 121.25 yuan. Therefore, the value contributed by Royalflush's 2022 active users (MAU * ARPU) amounts to 3,300,001,000 yuan, approximately 3.3 billion yuan.

Next is the quantification of the unit investment cost. In 2022, Royalflush incurred R&D expenses of 1.067 billion yuan and sales expenses of 0.368 billion yuan, totaling 1.435 billion yuan. Based on data compiled from the third-party app Aurora Month Fox, Royalflush's Monthly Average Active Users in 2022 were 27 million, with an additional user count of 26 million. This calculation results in a unit investment cost of 27.08 yuan per person.

$$M = \frac{14.35}{0.27+0.26} = 27.08 \quad (5)$$

Lastly, quantifying the market share (P). The Market Share is represented using the MAU market share rate of Royalflush at the assessment point. According to statistics from the third-party app monitoring platform, Yiguan Qianfan, the industry's Monthly Average Active Users for securities service applications in 2022 amounted to 139.3676 million people, while Royalflush had 27.2165 million Monthly Average Active Users in 2022, indicating an MAU market share of 19.53%.

Based on the aforementioned data results and substituting them into the improved DEVA valuation formula:

$$V = 27.08 \times 19.53\% \times 33 \times \ln(33) = 610.24 \quad (6)$$

The valuation of Royalflush at the assessment point is 61.024 billion yuan. Royalflush's market value at the end of 2022 stands at 53.013 billion yuan, resulting in a difference rate of 15.11%.

3.3. Comparison and Analysis of Valuation Results

The traditional DEVA valuation model yielded a valuation of 34.47 billion yuan for Royalflush before adjustments, whereas the revised DEVA valuation determined Royalflush's value as 610.24 billion yuan. Comparing these valuation results before and after adjustments with the total market value of Royalflush on the assessment date, which was 530.13 billion yuan, the difference rate for the traditional DEVA valuation model was -93.0%, while the improved new model showed a difference rate of 15.1%, falling below 20%. Hence, it is evident that using the adjusted DEVA valuation model to assess Royalflush's enterprise value aligns closely with the market value, exhibiting higher accuracy in the evaluation results.

4. Conclusion

As China's financial industry matures, the rapid growth of the internet finance information service industry in recent years underscores the crucial importance of correctly assessing the value of internet finance information service enterprises for corporate managers and numerous investors. This study delves into the valuation methods for emerging enterprises, proposing an improved Metcalfe valuation model from the user's perspective. Building upon the traditional DEVA valuation model and aligning it with industry characteristics, this research rectifies the relevant indicators of the traditional DEVA valuation model and optimizes the model by introducing market share. Finally, by applying a case study, the feasibility of the adjusted DEVA valuation model is validated. The aim is to enrich and refine the theoretical and methodological system for evaluating the value of internet

finance information enterprises while providing investors with a more realistic understanding of enterprise value.

References

- [1] Hu, Y., Chen, W., & Hao, Y. (2023). *The Formation, Evolution, and Social Welfare Loss of Monopoly in Internet Finance Platforms*. *China Soft Science*, 2023(01), 73-83.
- [2] Liu, Y., Liang, R., & Huang, L. (2022). *Research on Valuation of Internet Finance Companies—Taking Ant Group as an Example*. *Financial and Accounting Newsletter*, 2022(16), 3-15.
- [3] Lumpkin, G. T., & Dess, G. G. (2004). *E-Business Strategies and Internet Business Models: How the Internet Adds Value*. *Organizational Dynamics*, 2004(2), 161-173.
- [4] Meeker, M.x (1995). *Internet Trends 1995*. Mary Meeker, 1995.
- [5] Zeng, L. (2019). *Valuation of Internet Startups Based on the Metcalfe Model*. *Financial and Accounting Newsletter*, 2019(23), 58-62.
- [6] Zhang, X., & Ma, X. (2021). *Application of the DEVA Model in Valuation of Internet Enterprises*. *Financial and Accounting Newsletter*, 2021(04), 129-133.