# Examining the Development of Internet Finance Based on a Comprehensive Index Analysis

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## Abstract

*This study aims to analyze the development status of Internet finance in China from four aspects: P2P lending, crowdfunding, third-party payment, and big data. The Internet finance industry development index is a comprehensive indicator used to quantitatively analyze the overall development of the Internet finance industry. The data was sourced from representatives of Internet finance companies and third-party organizations. A model based on data from 2010 to 2019 was constructed to obtain the development index of Internet finance and its sub-sectors. The weight determination process was carried out through pairwise comparisons among the factors and expert scoring. The results show that Internet finance in China has experienced significant growth since 2014, particularly in the P2P lending sector. Third-party payment has become increasingly important in China's payment system, while crowdfunding and big data have also expanded and developed rapidly, although their overall impact on the financial industry remains relatively small. Overall, the development of Internet finance offers numerous benefits but also presents risks that warrant regulatory attention.*

**Keywords:** *Internet Finance；Index；P2P Lending；Crowdfunding；Third-Party Payment；Big Data.*

## Introduction

In recent years, the rapid development of technology has reshaped the global financial landscape, with China emerging as a key player in this dynamic field. Over the past decade, China's Internet finance sector has experienced significant growth. Internet finance represents a systemic integration of the internet, technology, and finance (Xie et al., 2013). The Chinese government has implemented various measures to promote this development, including establishing regulatory frameworks, developing financial technology infrastructure, and launching innovative financial products. It views Internet finance as a powerful tool for economic growth and has implemented regulatory measures to ensure its safety and stability. Consequently, Internet finance has become an integral part of the Chinese economy. By the end of 2022, the number of online payment users in China reached 904 million yuan, with total online payment transactions amounting to 52.55 trillion yuan. In 2018, approximately 2,457 P2P lending platforms defaulted, adversely affecting investor welfare and the healthy development of the financial services market. By 2021, the P2P business was phased out, and diversified businesses such as online small loans, internet deposits, and loans were incorporated into the standardized regulatory system. This raises the question: Is internet finance a catalyst for technological development or a disruptive force in the financial services market? Answering this question holds significance for the Chinese government.

Existing research offers various perspectives on Internet finance, highlighting the need to recognize developmental trends for clearer insights. In recent years, Internet finance has made significant strides and has exerted considerable influence worldwide (Hua & Huang 2021). However, it has consistently lacked an indicator system to measure its overall development level. Current research primarily focuses on functional aspects of Internet finance (Guo et al., 2016; Yang & Lim, 2015; Liu, 2018; Xu et al., 2020). Therefore, this study adopts a comprehensive index approach to analyze the development of Internet finance. Building on the research foundation of constructing an indicator system and calculating indexes for Internet finance, a set of indexes is compiled to accurately depict the current situation of Internet finance development in China.

The innovation of this study lies in selecting four types of Internet finance for constructing the Internet finance index: P2P lending, crowdfunding, third-party payment, and big data. These types are crucial as

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they collectively enhance the accessibility, efficiency, and inclusiveness of the financial ecosystem, driving innovation and economic growth. Indicators such as the number of online payment transactions, the total amount of online loans issued, the number of users on online wealth management platforms, and the adoption rate of digital currencies were utilized. By analyzing the trends of these indicators over time, the growth of China's internet finance from 2010 to 2019 was examined. The structure of this study is outlined as follows: Section two reviews relevant literature, section three introduces the Internet finance indicator system and index synthesis method, followed by an analysis of the development status of Internet finance. Finally, the last part provides a summarizes the study's findings.

## Literature Review

In recent years, the development of Internet finance in China garnered significant attention. Internet finance, characterized by the integration of the Internet and finance, experienced rapid growth in China (Guo et al., 2016; Yang & Lim, 2015). This growth was propelled by a variety of business models, including Internet payment, online lending, equity crowdfunding, Internet fund sales, Internet insurance, Internet trust, and Internet consumer finance (Liu, 2018). Yang and Lim (2015) emphasized the revolutionary nature of the industry in terms of online payment services, P2P lending platforms, and online sales of financial products. However, the lack of relevant legislation and associated risks, particularly regarding risk control and consumer information security, posed major challenges.

Several studies investigated the development of Internet finance in China, examining overall trends and regional differences. Guo et al. (2016) was one of the first studies to attempt to assess and analyze the overall trends and patterns of China's Internet finance industry, highlighting significant differences in development levels and growth rates across different business categories and regions. Jiang (2020) emphasized the role of Internet popularization in accelerating financial development. Miao and Chang (2018) delved more deeply into regional differences, arguing that the differences were most pronounced in North China and emphasizing the importance of narrowing these gaps. Shen and Huang (2016) provided a broader perspective, discussing the rapid expansion of Internet finance in China and the associated risks and prerequisites for its sustainable growth. However, the industry faced challenges such as the need for effective regulation to balance stability and market liberalization (Yang & Lim, 2015). Despite these challenges, Internet finance still had the potential to improve the quality and efficiency of financial services, deepen financial reform, and promote innovative development (Xuefeng et al., 2016). Collectively, these studies highlighted the complex and evolving landscape of Internet finance in China and called for further research to grasp its impact and potential.

Therefore, to further study the development of Internet finance in China, this study examined the progress of Internet finance using comprehensive indexes. The comprehensive index method is a technique for evaluating and measuring the combined impact of multiple variables or indicators (Castelnuovo et al., 2010). It involves integrating multiple indicators and deriving a comprehensive index value through weighting, aggregation, or other mathematical processing methods. This value is then used to represent the overall status or comprehensive level of the object under study. This method is commonly employed to assess complex systems, industry development, socioeconomic conditions, and so forth. As discussed by Medina-León (2014), the composite index approach involves the utilization of composite indices in management control systems. Chun-Jie (2008) further improved this method and proposed a new approach for constructing an index system. Ren (2010) suggested an optimization method for combining weights in a multi-index comprehensive evaluation. These studies collectively underscored the importance of a well-structured and appropriately weighted index system in a comprehensive evaluation. A series of investigations explored the application of composite index methods in the financial industry. Mourhij (2020) developed a composite index to assess the performance of commercial banks, taking into account financial ratios related to profitability, liquidity, and safety. Similarly, Liu (2017) introduced an automatic identification method for core financial indicators of enterprises based on similarity calculation. Wu (2006) employed financial indices to gauge retail performance, utilized data envelopment analysis to determine efficiency, and employed multiple regression analysis to examine the impact on sales and gross margins. Mysková (2017) further refined the assessment of corporate financial performance by integrating financial ratio

analysis with annual report language analysis, showcasing the potential of this approach in evaluating the informational content of reports.

Boitan (2021) developed the EU FinTech Index to rank countries according to their FinTech environment and highlight development opportunities. These studies collectively demonstrated the potential of composite indices in understanding and evaluating fintech. Concurrently, there was also a more authoritative Internet Finance Index Report (2016) from China. To accurately and promptly record the development of China's Internet finance, the Internet Finance Research Center of Peking University, Shanghai New Finance Research Institute, and Ant Financial Group compiled The Peking University Internet Financial Development Index based on the attributes of Internet financial services. Kong, and Wang (2017) and Guo et al. (2020) conducted further analysis and research based on this development index.

Through the previous literature review, it was observed that most of the research was based on the attributes of Internet finance. There was a lack of research on Internet finance types. This study focused on the types of Internet finance. Xie (2012) defined the attributes of Internet finance and conducted an in-depth analysis of the Internet finance model. Liao (2015) examined P2P platforms, Yu'e Bao, and third-party payment platforms based on Internet finance. Xiang and Zhang (2016) investigated the development of equity crowdfunding in China within the context of Internet finance. Subsequently, Wang (2018) explored the application and innovation of big data in Internet finance. It was noted that big data was also a part of Internet finance.

However, in the research on the development of Internet finance, most studies considered three types (Zhang & Zhao, 2017; Shen & Liu, 2017). Therefore, this study aimed to provide a more comprehensive understanding of the development of Internet finance through four types of Internet finance, namely P2P lending, crowdfunding, third-party payment, and big data. This study utilized a comprehensive index to examine Internet finance, which could comprehensively consider various factors, reduce the one-sidedness of single indicator evaluation, and more objectively reflect the overall situation of the research object. Thus, it could more comprehensively assess the development level and trends of the Internet finance industry.

## Research Method

Constructing an Internet finance industry development index is an effective method for quantitatively analyzing the overall development of the industry (Svirydzenka, 2016; Arner et al., 2015; Dong et al., 2020). By selecting multiple indicators related to different dimensions of the industry and employing a comprehensive index method, it is possible to obtain a more comprehensive understanding of the development status of Internet finance (Camara &Tuesta, 2017; Gu et al., 2017; Yao & Song, 2021; Kehera et al., 2022;). Utilizing the P2P online lending development index, crowdfunding development index, third-party payment development index, and big data development index to construct the overall Internet finance development index is a reasonable approach (as shown in Figure 1). By calculating the arithmetic average of these indices, the resulting Internet finance development index can provide a more comprehensive picture of the overall development of the industry. However, it is crucial to ensure that the indicators are appropriate and relevant to the dimensions being measured. Additionally, the weight assigned to each indicator should be carefully considered to accurately reflect the relative importance of each dimension in the overall index. Constructing an Internet finance industry development index can yield valuable insights into the current status of the industry and inform predictions of future trends.
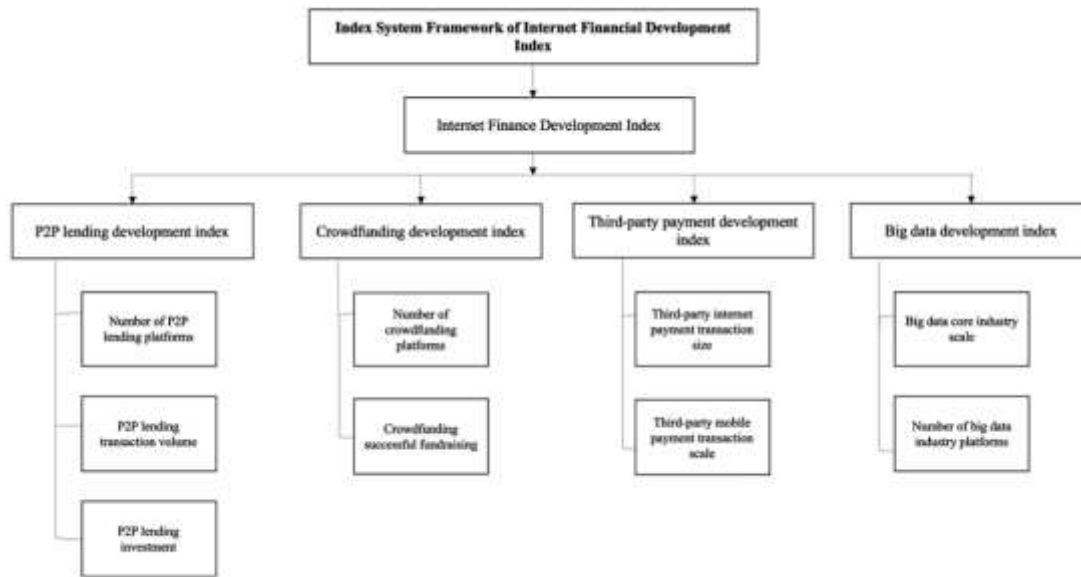
**Figure 1  Internet Finance Development Index**

The comprehensive index method is a technique for evaluating economic benefits by calculating a composite value derived from individual indices, weighted according to a well-defined economic benefit index system. The fundamental idea behind this method is to use weights calculated through the analytic hierarchy process, combined with values obtained via fuzzy evaluation methods. These weights and values are multiplied, summed, and ultimately used to derive a comprehensive evaluation index for the economic benefit index.

Employing the comprehensive index method, along with data from representative sources, can provide valuable insights into the development status of the Internet finance industry. However, it is crucial to carefully consider the limitations of the data used. The data required for the Internet Finance Development Index compiled in this study comes from various reputable sources, including *First Online Loan, Net Credit Eye, Analysys International, iResearch, the China Institute of Information and Communication, and Baiten*, among other representative Internet finance companies and third-party organizations (as shown in Table 1). The data spans the years 2010 to 2019. Notably, data for crowdfunding and big data have only been available since 2014, reflecting their emergence in China during that period.

**Table 1**: Source of Each Indicator Data

| Index | Data Sources |
|---|---|
| **Number of P2P leading platforms** | First online loan https://www.p2p001.com/ |
| **P2P leading transaction volume** | First online loan https://www.p2p001.com/ |
| **P2P leading investment** | Net credit eye https://www.p2peye.com/ |
| **Number of crowdfunding platforms** | Analysys International https://www.analysys.cn/ |
| **Crowdfunding successful fundraising** | Analysys International https://www.analysys.cn/ |
| **Third-party Internet payment transaction size** | Iresearch https://www.iresearch.com.cn/ |
| **Third-party mobile payment transaction scale** | Prospective Industry Research Institute https://bg.qianzhan.com/ |
| **Big data core industry scale** | China Institute of Information and Communications http://www.caict.ac.cn/ |

| Number of big data industry platforms | Baiten https://www.baiten.cn/ |
|---|---|

*Weight Determination*

The determination of weights in a comprehensive index method is a crucial step that can significantly impact the accuracy and reliability of the resulting index. There are several methods for determining weights, including the analytic hierarchy process (AHP), the entropy weight method, and the principal component analysis (PCA). This study will employ the AHP method (Thomas,1980), which is widely used for weight determination in comprehensive indices. The AHP involves breaking down a complex decision into smaller, more manageable components and comparing them in pairs to assess their relative importance. A numerical weight is then assigned to each component based on its relative importance, and the weights are normalized to ensure they sum to one (Abdel et al.,2020; Bouraima et al.,2020; Ban et al.,2020; Solangyi et al., 2021)

Pairwise comparisons and scoring are key steps in the Analytic Hierarchy Process (AHP) for determining the weight of each factor in the hierarchy. This process involves comparing each factor with every other factor at the same level and assigning a score based on their relative importance. In this study, there are four factors, and each factor is compared to the other three factors using a scale of 0.5, 1, 1.5, or 2. A score of 2 indicates that a factor is extremely more important than the other, 1.5 means that it is very much more important, 1 means that it is somewhat more important, and 0.5 signifies that it is equally or less important.

After scoring all pairwise comparisons, a judgment matrix table is created, which is then used to calculate the weight of each factor using the Eigenvector method. The weight represents the relative importance of each factor in the overall decision-making process. These final weights are subsequently used to calculate the comprehensive index. The symbols for each indicator are shown in the Table 2.

**Table 2:** Indicator Symbol

| First-level | Second-Level | Third-level |
|---|---|---|
| **Internet Finance Development Index (IFI$_1$)** | P2P online lending development index (IFI$_1$) | IFI$_{11}$ Number of P2P leading platforms |
| | | IFI$_{12}$ P2P leading transaction volume |
| | | IFI$_{13}$ P2P leading investment |
| | Crowdfunding development index (IFI$_2$) | IFI$_{21}$ Number of crowdfunding platforms |
| | | IFI$_{22}$ Crowdfunding successful fundraising |
| | Third-party payment development index (IFI$_3$) | IFI$_{31}$ Third-party Internet payment transaction size |
| | | IFI$_{32}$ Third-party mobile payment transaction scale |
| | Big data development index (IFI4) | IFI$_{41}$ Big data core industry scale |
| | | IFI$_{42}$ Number of patent applications in the field of big data |

This study will use SPSSAU analysis software to calculate its weight. By entering the judgment matrix. The following results are obtained（as shown in Table 3）

**Table 3:** AHP Analytical Results Summary

| Item | Feature vector | Weights | Maximum eigenvalue | CI value |
|---|---|---|---|---|
| **IF$_{11}$** | 1.041 | 34.701% | 3.018 | 0.009 |
| **IF$_{12}$** | 0.597 | 19.915% | | |
| **IF$_{13}$** | 1.362 | 45.385% | | |

| | | | | |
|---|---|---|---|---|
| **IIF$_{21}$** | 0.667 | 33.333% | 2 | 0 |
| **IF$_{22}$** | 1.333 | 66.667% | | |
| **IF$_{31}$** | 0.667 | 33.333% | 2 | 0 |
| **IF$_{32}$** | 1.333 | 66.667% | | |
| **IF$_{41}$** | 1 | 50.000% | 2 | 0 |
| **IF$_{42}$** | 1 | 50.000% | | |

When constructing the judgment matrix, logical errors may arise, for example, if IF$_{11}$ is deemed more important than IF$_{12}$, IF$_{12}$ is more important than IF$_{13}$, yet IF$_{13}$ is found to be more important than IF$_{11}$. To address this, a consistency test is necessary to identify any issues. The consistency test utilizes the consistency ratio (CR) value for analysis. If the CR value is less than 0.1, it means that the consistency test has passed, otherwise, it means that the consistency test has not been passed. For the calculation of CR, it is the ratio of consistency index (CI) and random index (RI), that is, CR=CI/RI. SPSSAU will directly output this result (as shown in Table 4) and the consistency test results (as shown in Table 5).

**Table 4**: Random Consistency RI Form

| n order | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|
| **RI value** | 0.52 | 0.89 | 1.12 | 1.26 | 1.36 | 1.41 | 1.46 |
| **n order** | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| **RI value** | 1.49 | 1.52 | 1.54 | 1.56 | 1.58 | 1.59 | 1.5943 |
| **n order** | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| **RI value** | 1.6064 | 1.6133 | 1.6207 | 1.6292 | 1.6358 | 1.6403 | 1.6462 |
| **n order** | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| **RI value** | 1.6497 | 1.6556 | 1.6587 | 1.6631 | 1.667 | 1.6693 | 1.6724 |

**Table 5:** Summary of Consistency Test Result

| Indictor | Maximum eigenvalue | CI value | RI value | CR value | Consistency test results |
|---|---|---|---|---|---|
| **IF11-IF13** | 3.018 | 0.009 | 0.52 | 0.018 | Pass |
| **IF21-IF22** | 2 | 0 | 0 | null | Pass |
| **IF31-IF32** | 2 | 0 | 0 | null | Pass |
| **IF41-IF42** | 2 | 0 | 0 | null | Pass |

It can be seen from the above Table 3, 4, and 5 that the required weights have been calculated, and the consistency test of the judgment matrix. For the weight setting of secondary indicators: according to the weight determination method of the research group of Internet Finance Center of Peking University. The weights among the major Internet finance categories (P2P, crowdfunding, third-party payment, and big data) are determined subjectively based on the development maturity of each category. Maturity was assessed by considering the market development and stability of each sector. Consequently, the weights of the four categories are set as P2P lending at 25 percent, Crowdfunding at 20 percent, Third-party Payment at 35 percent, and Big-data at 20 percent.

*Index Calculation*

Based on the three-level indicators from 2010 to 2019, the raw data compiled is presented in Table 6. Since the sample data in this study is multi-dimensional, that is, a sample is represented by multiple features. The P2P lending development index is constructed through three dimensions: The number of P2P lending platforms, P2P lending transaction volume, and P2P lending investment. The crowdfunding development index is through two dimensions: Number of crowdfunding platforms and Number of crowdfunding

platforms. The third-party payment development index is constructed through the two dimensions of Third-party internet payment transaction size and Third-party mobile payment transaction scale. The big data development index is also constructed through two dimensions: Big data core industry scale and Number of big data industry platforms.

**Table 6**: Internet Financial Development Index Three-level Indicator Data

| Year | IF$_{11}$ PCS | IF$_{12}$ million RMB | IF$_{13}$ K | IF$_2$ 1 PCS | IF$_{22}$ million RMB | IF$_{31}$ million RMB | IF$_{32}$ million RMB | IF$_{41}$ million RMB | IF$_{42}$ PCS |
|---|---|---|---|---|---|---|---|---|---|
| 2010 | 10 | 13.7 | 3 | - | - | 10,105 | 86.10 | - | 212 |
| 2011 | 50 | 31 | 28 | 3 | 0.9 | 22,038 | 798.70 | - | 254 |
| 2013 | 200 | 212 | 51 | 11 | 1.9 | 37,000 | 1,511.40 | - | 311 |
| 2013 | 800 | 1,057.74 | 250 | 29 | 3.35 | 54,000 | 12,197.40 | - | 482 |
| 2014 | 1,575 | 2,528 | 1160 | 142 | 21.58 | 81,000 | 59,924.70 | 84 | 856 |
| 2015 | 2,595 | 9,823.04 | 5860 | 283 | 114.24 | 119,000 | 122,000 | 116 | 1,755 |
| 2016 | 2,448 | 20,638.72 | 13,750 | 427 | 224.75 | 199,000 | 588,000 | 168 | 3,068 |
| 2017 | 1,931 | 28,048.49 | 1,713 | 209 | 220.25 | 280,000 | 1,203,000 | 234 | 5,489 |
| 2018 | 1,021 | 17,948.01 | 1,331 | 159 | 207.95 | 291,000 | 1,905,000 | 329 | 8,548 |
| 2019 | 343 | 9,649.11 | 726 | 67 | 141.04 | 250,000 | 2,641,000 | 436 | 11,983 |

Given that the dimension of these features and the magnitude of the values differ, using the original data values directly would lead to varying degrees of influence and hinder meaningful comparisons. Therefore, standardization is necessary. Data standardization involves two main processes: data co-trending processing and dimensionless processing.

Data co-taxis processing mainly solves the problem of data of different natures. Direct summation of indicators of different natures cannot correctly reflect the comprehensive results of different forces. It is necessary to consider changing the nature of the inverse indicators data first so that the effect of all indicators on the evaluation scheme is convergent.

Data dimensionless processing mainly solves the comparability of data. There are many methods for data standardization. Commonly used are "minimum-maximum standardization", "Z-score normalization" and "standardization by decimal calibration". This study will standardize the data based on the Z-score. This method normalizes the data based on the mean and standard deviation of the original data.

This study will directly use the descriptive analysis in SPSS software to standardize the Z-score of the collected raw data. Then calculate the arithmetic average to get the P2P lending development index (IF1), crowdfunding development index (IF2), third-party payment development index (IF3), and big data development index (IF4), and then get the Internet financial development index (IF). The index chart constructed accordingly is shown in Figure 2
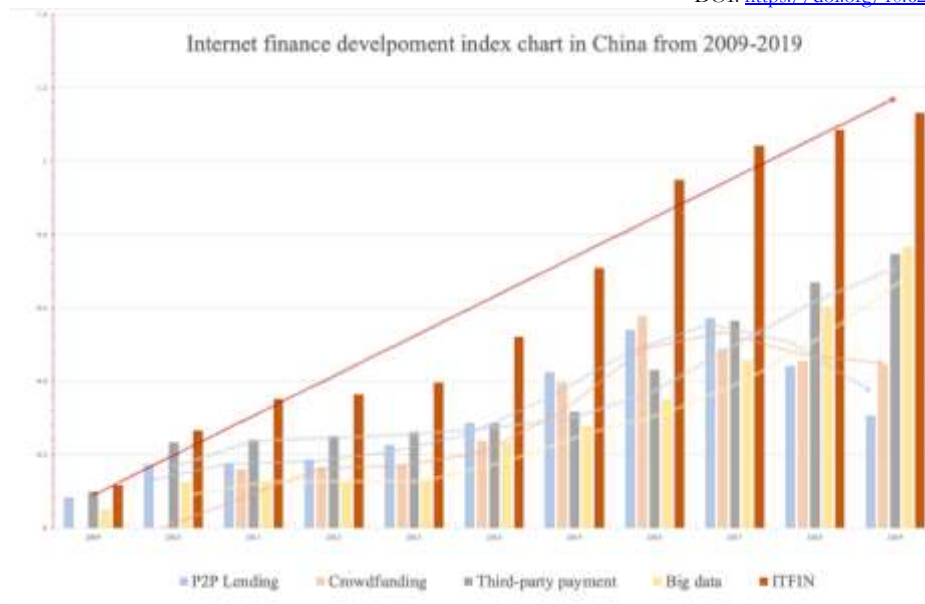
**Figure 2**: Internet Finance Development Index Chart in China from 2010-2019

It can be seen from the table that the trend of Internet finance has risen linearly from 2010 to 2019. It developed particularly fast in 2015-2019. Development slowed in 2013 and 2014. The development of P2P lending was the best in 2015-2017, and then slowed down and the trend was obvious. Crowdfunding peaked in 2016 and then declined, but slowly. The development of third-party payment and big data has accelerated year by year from 2010 to 2019.

## Conclusion

Through literature review and data analysis, it can be concluded that Internet finance has experienced significant growth and development in China in recent years, especially in the fields of P2P lending, third-party payment, crowdfunding, and big data. The development of Internet finance has brought many benefits, including increasing financing channels for individuals and small businesses, improving the efficiency and convenience of financial transactions, and promoting financial innovation. This can be seen from the study by Lavrinenko et al. (2023) on the impact of Internet finance on the financial development of EU countries, and by Kowalewski and Pisany (2023) on "The Rise of Fintech: A Cross-Country Perspective." However, the development of Internet finance also faces challenges and risks such as regulatory challenges, network security risks, and potential systemic risks in the financial system (Ediagbonya & Tioluwani, 2023). To ensure the sustainable development of Internet finance, regulators must strike a balance between promoting innovation and ensuring financial stability and consumer protection. Further research is needed to continue to monitor the development of Internet finance in China and identify strategies to reduce risks and promote responsible growth in the industry.

## References

Abdel-Basset, M., Ding, W., Mohamed, R., & Metawa, N. (2020). An integrated plithogenic MCDM approach for financial performance evaluation of manufacturing industries. Risk Management, 22(3), 192–218. https://doi.org/10.1057/s41283-020-00061-4

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). The Evolution of Fintech: A New Post-Crisis Paradigm? SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2676553

Ban, A. I., Ban, O. I., Bogdan, V., Sabau Popa, D. C., & Tuse, D. (2020). Performance evaluation model of Romanian manufacturing listed companies by fuzzy AHP and TOPSIS. Technological and Economic Development of Economy, 26(4), 808-836. https://doi.org/10.3846/tede.2020.12367

Boitan, I. A. & Barbu, T. C. (2021). EU FinTech Index: An Evaluation of Countries' Opportunities for FinTech Growth. In I. Boitan & K. Marchewka-Bartkowiak (Eds.), Fostering Innovation and Competitiveness With FinTech, RegTech, and SupTech (pp. 1-20). IGI Global. https://doi.org/10.4018/978-1-7998-4390-0.ch001

Bouraima, M. B., Qiu, Y., Yusupov, B., & Ndjegwes, C. M. (2020). A study on the development strategy of the railway transportation system in the West African Economic and Monetary Union (WAEMU) based on the SWOT/AHP technique. Scientific African, 8. https://doi.org/10.1016/j.sciaf.2020.e00388

Cámara, N., & Tuesta, D. (2017). Cámara & Tuesta, 2017. Bank of Morocco – CEMLA – IFC Satellite Seminar at the ISI World Statistics Congress on "Financial Inclusion" Marrakech, Morocco, 14 July 2017, (July).

Castelnuovo, G., Limonta, D., Sarmiento, L., & Molinari, E. (2010). A More Comprehensive Index in the Evaluation of Scientific Research: The Single Researcher Impact Factor Proposal. Clinical Practice & Epidemiology in Mental Health, 6(1), 109–114. https://doi.org/10.2174/1745017901006010109

Chun-jie, B. (2008). Index system construction on comprehensive evaluation. Journal of Naval University of Engineering.

Dong, J., Yin, L., Liu, X., Hu, M., Li, X., & Liu, L. (2020). Impact of internet finance on the performance of commercial banks in China. International Review of Financial Analysis, 72. https://doi.org/10.1016/j.irfa.2020.101579

Ediagbonya, V., & Tioluwani, C. (2023). The role of fintech in driving financial inclusion in developing and emerging markets: issues, challenges and prospects. Technological Sustainability, 2(1), 100-119.

Gu, W., Basu, M., Chao, Z., & Wei, L. (2017). A unified framework for credit evaluation for internet finance companies: Multi-criteria analysis through AHP and DEA. International Journal of Information Technology and Decision Making, 16(3), 597–624. https://doi.org/10.1142/S0219622017500134

Guo, F., Kong, S. T., & Wang, J. (2016). General patterns and regional disparity of internet finance development in China: Evidence from the Peking University Internet Finance Development Index. China Economic Journal, 9(3), 253–271. https://doi.org/10.1080/17538963.2016.1211383

Guo, F., Kong, T., & Wang, J.Y. (2017). Analysis of the Spatial Agglomeration Effect of Internet Finance: Evidence From the Internet Finance Development Index. International Monetary Review, 9.

Guo, F., Wang, J.Y., Wang, F., Kong, T., Zhang, X., & Cheng, Zh.Y. (2020). Measuring the Development of Digital Financial Inclusion in China: Index Compilation and Spatial Characteristics. Economics (Quarterly), 19(4), 1401-1418.

Hua, X., & Huang, Y. (2021). Understanding China's fintech sector: development, impacts and risks. The European Journal of Finance, 27(4-5), 321-333.

Jiang, Q., Zhang, X., Lin, Q., Chen, G., Zhang, R., & Liu, S. (2020). Internet Penetration and Regional Financial Development in China: Empirical Evidence Based on Chinese Provincial Panel Data. Scientific Programming, 2020. https://doi.org/10.1155/2020/8856944

Khera, P., Ng, S., Ogawa, S., & Sahay, R. (2022). Measuring Digital Financial Inclusion in Emerging Market and Developing Economies: A New Index. Asian Economic Policy Review. John Wiley and Sons Inc. https://doi.org/10.1111/aepr.12377

Kowalewski, O., & Pisany, P. (2023). The rise of fintech: A cross-country perspective. Technovation, 122.https://doi.org/10.1016/j.technovation.2022.102642

Lavrinenko, O., Čižo, E., Ignatjeva, S., Danileviča, A., & Krukowski, K. (2023). Financial Technology (FinTech) as a Financial Development Factor in the EU Countries. Economies, 11(2). https://doi.org/10.3390/economies11020045

Liao, Y.P. (2015). Research on the Development of China's Internet Finance and Its Risk Supervision - Taking P2P Platforms, Yu'e Bao, and Third-party Payment as Examples. Economics and Management (02), 51-57.

Liu, J. (2018). Research on internet finance: Its business models and development trend. In ACM International Conference Proceeding Series (pp. 169–172). Association for Computing Machinery. https://doi.org/10.1145/3278252.3278253

Liu, L., & Li, S. (2017). A New Method of Recognizing Enterprise Core Financial Indexes Based on Similarity Calculation. Proceedings of the 2017 VI International Conference on Network, Communication and Computing.

Medina-León, A., Ricardo-Alonso, A., Piloto-Fleitas, N., Nogueira-Rivera, D., Hernández-Nariño, A., & Cuétara-Sánchez, L. (2014). Comprehensive indexes to management control: considerations and theoretical foundation.

Miao, S. H., & Chang, Y. (2018). Research on the regional differences decomposition and convergence mechanism of internet finance development of seven regions in China. In International Conference on Management Science and Engineering - Annual Conference Proceedings (Vol. 2018-August, pp. 301–308). IEEE Computer Society. https://doi.org/10.1109/ICMSE.2018.8745054

Mourhij, M. (2020). The Comprehensive Index to Evaluate the Performance of Commercial Banks. Political Economy - Development: Political Institutions eJournal.

Mysková, R., & Hájek, P. (2017). Comprehensive Assessment of Firm Financial Performance Using Financial Ratios and Linguistic Analysis of Annual Reports. The Journal of international studies, 10, 96-108.

Peking University Internet Finance Research Center Research Group. (2016). Compilation and analysis of the Internet Finance Development Index. New Finance Review (01), 101-129.

Ren, J., & Xiong, Y. (2010). An optimised method of weighting combination in multi-index comprehensive evaluation. Int. J. Appl. Decis. Sci., 3, 34-52.

Shen, C., & Liu, X.T. (2017). Internet Finance, Market Power and Commercial Bank Performance. Journal of Modern Economic Science.39(05):16-29-124

Shen, Y., & Huang, Y. (2016). Introduction to the special issue: Internet finance in China. China Economic Journal. Routledge. https://doi.org/10.1080/17538963.2016.1215058

Solangi, Y. A., Longsheng, C., & Shah, S. A. A. (2021). Assessing and overcoming the renewable energy barriers for sustainable development in Pakistan: An integrated AHP and fuzzy TOPSIS approach. Renewable Energy, 173, 209–222. https://doi.org/10.1016/j.renene.2021.03.141

Svirydzenka, K. (2016). Introducing a New Broad-based Index of Financial Development. IMF Working Papers, 16(05), 1. https://doi.org/10.5089/9781513583709.001

Thomas, P. S. (1980). Hybridization of denatured RNA and small DNA fragments transferred to nitrocellulose. Proceedings of the National Academy of Sciences of the United States of America, 77(9), 5201–5205. https://doi.org/10.1073/pnas.77.9.5201

Wang, R.S. (2018). Application and Innovation of Big Data in Internet Finance. Modern Business (24), 20-22.doi: 10.14097/j.cnki.5392/2018.24.009.

Wu, C., Kao, S., Wu, C., & Cheng, H.H. (2006). Examining Retailing Performance Via Financial Index. Asia-Pacific Management Review, 11, 83-92.

Xiang, J. & Zhang, R.F. (2016). Research on the Development Prospects of Equity Crowdfunding in China under the Background of Internet Finance. Contemporary Economy (01), 20-21.

Xie, P., Zou, C., & Liu, H. (2015). Internet finance in China: introduction and practical approaches. Routledge.

Xu, R., Mi, C., Mierzwiak, R., & Meng, R. (2020). Complex network construction of Internet finance risk. Physica A: Statistical Mechanics and Its Applications, 540. https://doi.org/10.1016/j.physa.2019.122930

Xuefeng, X., Hua, F., Jiange, L., & Xiaoyan, K. (2016). The situation and development research of internet finance. In 2016 International Conference on Logistics, Informatics and Service Sciences, LISS 2016. Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/LISS.2016.7854342

Yang, M., & Lim, W. X. (2015). Recent Development of Internet Finance in China. East Asian Policy, 07(03), 46–60. https://doi.org/10.1142/s1793930515000276

Yao, T., & Song, L. (2021). Examining the differences in the impact of Fintech on the economic capital of commercial banks' market risk: evidence from a panel system GMM analysis. Applied Economics, 53(23), 2647–2660. https://doi.org/10.1080/00036846.2020.1864275

Zhang, Z. X., & Zhao, X. E. (2017). Analysis of the Connotation and Model of Internet Finance. Journal of Finance and Accounting Monthly. 17(02): 84-91.