

Review and Prospect of Digital Finance Research

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Abstract: Digital finance plays a prominent role in promoting economic development, improving efficiency, and reducing risks. By combing and summarizing literatures, this paper points out the context and key points of current digital finance research, which include network financing and digital currency, as well as shows the important achievements in the field of digital finance research. It is known that network financing takes many forms. Its driving factors include “hard power,” “soft power,” and the collective behavior of investors. The impact of network financing on the existing financial system is two-sided. Private digital currencies and central bank digital currencies have different design principles. It is generally believed that private digital currency cannot replace the currency, but central bank digital currency is able to do so. Both private and central bank digital currencies have some drawbacks that need to be addressed.

Keywords: Digital finance; Network financing; Digital currency

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1. Introduction

Recently, the concept of digital finance has received much attention. As an emerging field combining finance and technology, digital finance has begun to flourish all over the world. In the early stages, digital finance only focused on the technological innovation of individual products. However, in recent years, with the support of big data, blockchain, cloud computing, and other scientific technologies, digital finance has now expanded to various fields of the financial industry, such as mobile payment, investment and financing, as well as asset management. Digital finance is in the ascendant, and scholars, both at home and abroad, have done much research on it. Due to the different national conditions at home and abroad, the development situation and focus of digital finance are different. Therefore, in the following section, relevant research on digital finance at home and abroad is distinguished. The purpose of this paper is to briefly present the research framework and the trending topics in the field of digital finance as well as summarize the research results of existing literatures, in order to provide a macro research perspective for other researchers.

This paper is arranged as follows: the second part introduces the connotation of digital finance, followed by a brief introduction to the references of this paper in the third part; the fourth part introduces two hot research fields of digital finance: network financing and digital currency; the fifth part is a discussion, and the sixth part discusses the future prospect.

2. Definition of digital finance

At present, the concept of digital finance, which is related to the concept of “financial technology,” “internet finance,” and so on, has not been clearly defined. Internationally, Financial Stability Board (FSB), the core

of the global financial governance institutions, defines “fintech” as financial innovation resulting from technology that can create new business models, applications, processes, or products, which have significant impact on financial markets, financial institutions or the way financial services are provided. A study compared digital finance, fintech, and the concept of “electronic finance,” which appeared in the early years. It is understood that all the three terms describe the introduction and use of information and communication technology in the financial field; while “digital finance” emphasizes the digitalization of the financial sector, “fintech” emphasizes technological innovation and development ^[1]. In another paper, it was mentioned that “fintech” mainly highlights its technical characteristics, while “digital finance” is more neutral in concept definition, and “digital finance” is the use of digital technology by traditional financial institutions and internet companies to realize financing, payment, investment, and other new financial business models ^[2]. This paper adopts the definitions in the latter study, and no distinction is made between digital finance, fintech, and internet finance in the following sections.

3. Literature review

According to the Digital Financial Inclusion Index, constructed by the Institute of Digital Finance Peking University ^[3], the development of digital finance in China has shown a sustained and rapid upward trend from 2011 to 2018. From the perspective of overall literature, “fintech” and “digital finance” were searched on two foreign periodical retrieval websites (ScienceDirect and Web of Science) and a Chinese periodical retrieval website (China National Knowledge Infrastructure [CNKI]). The inclusion criteria in the database were slightly different, so some retrieval restrictions were added. Only literatures from the core collection of Web of Science and Chinese Social Sciences Citation Index (CSSCI) journals in CNKI were retrieved. The results are shown in **Table 1**.

Table 1. Research trends

	ScienceDirect	Web of Science	CNKI
2020	309	335	406
2019	182	235	243
2018	172	165	178
2017	51	74	96
2016	18	27	61
2015	4	6	58
2014	3	-	61
2013	1	-	57

From **Table 1**, it can be seen that from 2013 to 2015, there were more literatures on digital finance in China than in other countries. The reason for this may be that during this period, the Chinese government and financial regulatory agencies hardly issued any actual supervision and regulation measures for internet finance, which led to the brutal growth of digital finance in China. At this stage, China’s digital finance seems to be prosperous, but in fact, there is a lack of quality projects. Secondly, the development of digital finance in China after 2013 may be due to the emergence of Yu’ebao and WeChat Pay. Yu’ebao was introduced in 2013, which is often regarded as the first year of digital finance in China. The emergence of WeChat Pay has also changed the mobile payment market. Thirdly, the research on digital finance at home and abroad can be roughly divided into two stages; namely, before 2017 and after 2017. In China, the government and financial institutions began to overhaul the digital finance industry in 2016. In 2017, regulations were put in place to clean up the mess. It defined the two major themes of digital finance in the new era, which are risk prevention and service to entities, made it clear that serving the real economy is the foundation of the financial industry, including digital finance, and pointed out the direction and space for

the further development of digital finance, thus triggering a new round of research on digital finance. In foreign countries, although digital finance started early, it has been restricted by strict regulatory authorities and strong traditional financial institutions, so the size of the industry has been relatively small. It was not until 2015 and 2016 that the concept of digital finance was frequently mentioned around the world, and the G20 Summit also took digital financial inclusion as an important topic, which was when the scale of digital finance in foreign countries gradually entered the new era.

In the research field of digital finance, according to several literatures [4-6], the current research on digital finance mainly focuses on network financing and digital currency. Therefore, this paper mainly focuses on these two aspects. **Figure 1** shows the composition of 39 references in this paper.

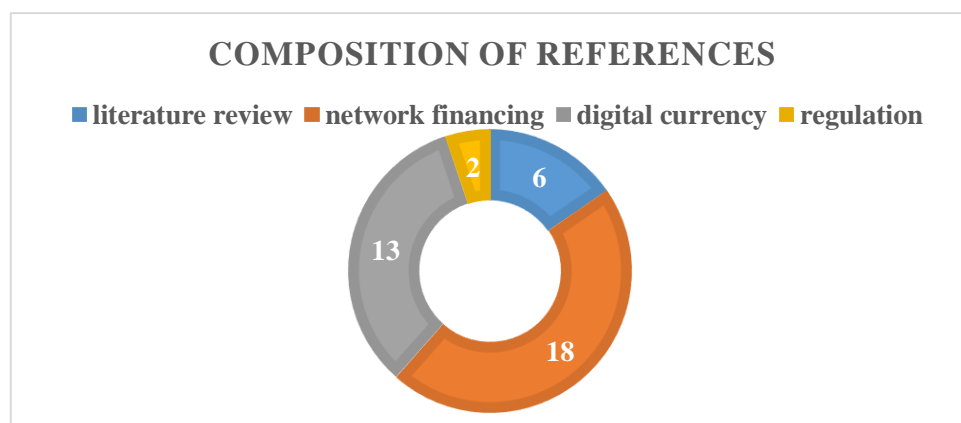


Figure 1. Composition of references

The 39 references in this paper include 6 literature reviews, 13 papers on digital currency, 18 on network financing, and 2 on financial regulation. They are derived from the most cited literatures on CNKI, Elsevier, and Web of Science, which represent the mainstream opinions in the field of digital finance.

3.1. Network financing

Network financing refers to the direct connection between investment and financing by relying on the internet, rather than relying on traditional financial intermediaries. According to a study [6], current research hotspots include crowdfunding and P2P online lending. This paper summarizes the existing research topics from three aspects.

The first is the operation mode of network financing. In the research field of crowdfunding, in addition to debt crowdfunding, it also includes equity, donation, and other forms. Some people associate crowdfunding with price discrimination. Belleflamme and other researchers have put forward two operating modes related to crowdfunding; namely, pre-purchase mode and profit-sharing mode. They analyzed the selection of crowdfunding modes in detail and constructed a theoretical model for pricing structure. In order to be successful, project sponsors will charge a lower price during the crowdfunding phase. Therefore, compared with consumers in the conventional sales stage, price discrimination is actually formed. The paper found that when the initial capital is small, enterprises are more willing to adopt the pre-purchase mode, but when the initial capital is large, enterprises are more willing to adopt the profit-sharing mode [7]. This conclusion is consistent with that in another literature, where the pre-sale of products is a form of price discrimination implemented by producers [8]. Some other researchers have linked crowdfunding to information asymmetry. In another paper [9], four types of market design mechanisms have been introduced: reputation signal, rules and regulation, crowd due diligence, as well as provision point mechanism. It is believed that the first three may reduce information asymmetry, while the fourth may reduce collective

action. In regard to P2P online lending, there are also different types of P2P, so literatures tend to discuss the P2P mode by classification. Three different P2P lending models represented by three famous companies (ppdai.com, CreditEase, and Hongling Paper) were discussed in a paper ^[10]. It is believed that ppdai.com has a simple intermediary P2P mode, while CreditEase has a compound intermediary P2P mode ^[11]. In another study ^[12], domestic P2P network loan modes were classified and summarized, and the P2P modes were divided into 4 types: pure platform mode, guaranteed principal mode, credit asset securitization mode, and creditor's right transfer model. The *Research on Internet Finance Mode* by Xie and Zou is different from such literatures; the paper did not classify P2P modes but discussed the mode of P2P market from three aspects: payment mode, information processing, and resource allocation ^[13].

The second is the driving factors of investment and financing behavior. In this research field, researchers mainly focus on the factors that affect the success of network financing. There is no significant difference between domestic and foreign studies; they are mainly divided into "hard power" studies, such as borrower's information and project information, as well as "soft power" studies. In terms of "hard power," there have been studies that discussed about the factors, including the borrower's education background, credit status, project quality, and so on ^[14-16]. *The Dynamics of Crowdfunding: An Exploratory Study* by Mollick is a representative of this kind of literature. This study found that the investment of investors is often related to three types of indicators: the first is about project quality, including the project's goal, category, fundraising time, whether the project has been recommended on the homepage, and whether there are spelling mistakes in the project profile; the second indicator is the social network of the borrower; if a borrower has a large social network, then he or she is more likely to succeed; the third indicator is geographical location; it has been found that different categories of projects have different patterns of concentration, and their geographical distributions are uneven ^[16]. In terms of "soft power," a study classified the sentiment of financing project comments through convolutional neural network. The dependent variable was set as whether the platform collapses, and the Logit binary choice model was constructed. From there, it was found that the textual sentiment in project comments is significantly correlated with investors' investment behavior ^[17]. Some indicators that reflect the physical characteristics of some borrowers, such as age, race, obesity, and so on, have been listed in a study ^[18]. In that study, 25 subjects were asked to rate the credibility of those borrowers. Following that, the binary choice model of lender credibility and financing success was constructed. The study found a significant positive correlation between creditworthiness judged by a borrower's appearance and the probability of getting a loan; in addition, the study also found that a reliable borrower can promise an annual interest rate of 136 basis points lower than an unreliable borrower with the same probability of getting a loan. At the same time, due to the obvious information asymmetry in network financing, investors' herd behavior is the main focus of researchers. In another study ^[19], a series of regression equations were established, and it was found that investors have rational herd behavior and will actively learn by observing the behavior of other investors. In *Smart Investors: Incomplete Market Interest Rates and Risk Identification – Evidence from P2P Network Lending* ^[20], the number of investors and the bidding time were taken as explained variables for OLS regression. It was found that the default risk is significantly positive at the level of 1%, which means that the investors are intelligent. In view of the same borrowing rate, if the probability of default is high, the borrower will need more people to participate as everyone will be lending him less money, which is indirectly reflected in the longer bidding time. In short, many of these literatures show that investors are rational.

The third is the impact on the real economy. For one thing, many studies have shown that online financing is conducive to inclusive growth and financial inclusion. Research has found that P2P and other network financing can help reduce the information asymmetry between borrowers and lenders, thus enabling more borrowers to obtain credit opportunities with better conditions ^[21]. In a study ^[22], a

bidirectional fixed effect model between digital finance and residents' income was constructed along with a binary choice model for family entrepreneurship. The study found that the development of digital finance has a significant positive impact on the family income and entrepreneurial behavior of rural residents, thus narrowing the income gap between urban and rural areas in China and promoting inclusive growth. For another, network financing has greatly changed the existing financial intermediary structure and enhanced the market competition. Another study assumed the ratio of formal financial assets to GDP as the core variable and whether the borrower defaults as the dependent variable to construct a binary choice model [23]. The paper found that P2P borrowers in cities with wider access to formal financing are more likely to default and have poorer credit quality, indicating that formal finance crowds out the P2P lending market. Another study assumed China's digital financial inclusion index as the explanatory variable and the structure of the bank's debt side as the explained variable; it was found that the development of digital finance makes the bank's debt side more dependent on wholesale funds, such as interbank lending, and leads to the increase of the preference of the bank's asset side [24]. Therefore, the impact of network financing on the real economy is twofold.

3.2. Digital currency

Digital currency is an alternative to electronic money, also known as cryptocurrency because of its use of cryptographic technology to secure transactions. Depending on the issuer, digital currencies can be divided into private and central bank digital currencies. The largest and most representative digital currency is Bitcoin, which was proposed by Satoshi Nakamoto in 2008 [25]. Up to now, foreign countries have carried out numerous studies on digital currencies represented by Bitcoin, while China's research on private currencies is relatively few. However, China is at the forefront of the world in terms of central bank digital currency. China began exploring about central bank digital currency in 2014, with the launch of Digital Currency Electronic Payment (DCEP) in 2020. This paper summarizes the existing research topics from three aspects. Bitcoin is used in the following sections to represent private digital currency, while China's DCEP is used to represent central bank digital currency.

The first is the origin and principle of digital currency. Many literatures focus on studying the origin and principle of digital currency. In foreign studies on private digital currencies, Tschorsch and Scheuermann proposed that the most basic idea of Bitcoin protocol is to eliminate banks, decentralize, and protect ledgers with work proof [26]. According to another literature [27], its foundation is blockchain, and the biggest contribution of Bitcoin is decentralization as well as the protection of privacy and openness. With the rapid development of information technology and the launch of new technologies, such as mobile payment, trusted cloud computing, and blockchain, traditional paper money issued by the central bank is facing many new challenges. It has been suggested that digital currency may have a positive impact on the central bank to reduce the high cost of issuance and circulation of traditional paper money as well as to further improve the payment system along with the efficiency of payment and settlement [27]. Therefore, many Chinese scholars focus on central bank digital currency. Drawing on the three feasible systems (completely open, alliance, and completely closed) proposed by the founder of Ethereum, three schemes have been proposed for the issuance of central bank digital currency: (1) completely open system; (2) alliance system; (3) completely closed system [28]. All these three schemes are based on the varying degrees of application of distributed ledger technology and the adoption of a bookkeeping method different from the centralized paper currency by the central bank's digital currency. In *Some Thoughts on the Central Bank's Legal Digital Currency* [29], Yao and Tang stated that the design principles of the legal digital currency system include four aspects: centralized management and control and distributed technical architecture; easy to carry and quick payment; anonymity; security. The core principle has three elements: one currency, two repositories, and three centers. This idea has been applied to the framework of DCEP.

The second is the function and use of digital currency. Private digital currency has no government credit endorsement; therefore, many studies have pointed out that bitcoin has no monetary properties and cannot be used as a currency ^[30,31]. According to a literature ^[31], currency generally has three characteristics: (1) it is a medium for exchange; (2) it is a unit of measurement; (3) it is a mean of storing value. However, Bitcoin underperforms as a unit of measurement and a mean of storing value because it exhibits very high time series volatility, which undermines its usefulness as a unit of measurement. At the same time, Bitcoin's daily exchange rate has little correlation with that of other major currencies, making its value almost entirely independent of other currencies and its risk almost impossible to hedge for businesses and customers, so it is impossible to use Bitcoin as a risk management tool. In addition, due to its weak connection with the existing financial system, the role of Bitcoin as an alternative currency has not been widely successful for the time being ^[32]. It can be seen that the main reason researchers do not consider the use of Bitcoin as a currency is that Bitcoin itself has no value and does not have the characteristics of a currency. In addition, it is weakly connected with the existing financial system. Baur, Hong, and Lee provided a new understanding of the purpose of Bitcoin ^[33]; it is neither a currency nor a traditional asset, but a new speculative asset. Firstly, the supply of Bitcoin is predictably likely to outpace demand after 2040, causing the price of Bitcoin to rise. This deflationary effect makes it more likely to be used as an investment rather than a currency. Secondly, by analyzing the correlation coefficient, the study found that there is no correlation between Bitcoin returns and other traditional asset reports. Thirdly, the largest percentage of Bitcoin users are hybrid (investors, merchants, and consumers who hold bitcoin to buy goods and services), while the second largest are passive investors, with only a small percentage of users using Bitcoin as a medium of exchange. Chinese scholars generally emphasize that central bank digital currency is the development direction of digital currency. With national credit as guarantee, central bank digital currency has the advantage of sovereign legal tender and is a form of legal tender. It is believed that in terms of the nature of currency, in the modern credit monetary system, only the currency issued by the state is the real currency ^[34]. As modern credit money itself is not as valuable as gold, the reason why it can perform the function of money is that it has the support of national credit, which is legal tender and mandatory. From this perspective, central bank digital currency belongs to the monetary base (M0). Several researchers have emphasized that digital currency should not be narrowly understood as Bitcoin ^[35], reminding people to distinguish between legal digital currency and private digital currency in terms of technical characteristics, economic characteristics, and institutional arrangements of the similarities, differences, and relevance.

The third is the disadvantages of digital currency. In foreign studies on private digital currencies, it is believed that digital currencies have four major shortcomings compared with traditional currencies: (1) high exchange rate volatility makes Bitcoin unsuitable for planning or signing long-term contracts; (2) the time cost of using digital currency is higher than that of using traditional currency because digital currency is not adequately integrated with modern financial system; (3) operating errors will bring irreversible losses as the digital currency system requires a relatively high level of market participants; (4) the capacity of all digital currencies is very limited ^[32]. In short, the biggest drawback of blockchain and all digital currencies is the technical weakness of their protocols. In the face of this problem, many scholars have proposed an improvement scheme for Bitcoin ^[36]. At the same time, central bank digital currencies have emerged in the face of competition and risks from private digital currencies. As it is legal tender and mandatory, it can solve the problems of private digital currency, but according to Philippon, there are still common problems: the lack of relevant laws and regulations, difficulties in circulation environment, impact on the financial system, and technical system implementation issues ^[37]. In order to solve these problems, it has been suggested that China's Digital Currency Law should be formulated as soon as possible, the top-level design of information system architecture should be fully expropriated, non-banking institutions and personal digital wallets should be linked with commercial banks, the monitoring and analysis department of digital

currency and financial system should be established, multiple measures should be taken simultaneously, and digital currency should be promoted step by step. Of course, it should not be disdained that the mandatory central bank digital currency would run counter to the competitive, decentralized, and open vision created by the creators of modern digital currency.

4. Discussion

First of all, the research focus is different at home and abroad. Foreign studies focus more on digital currency, while domestic studies focus more on network finance. In terms of digital currency, foreign research focuses more on private digital currency, while domestic research focuses more on central bank digital currency. Such research differences are related to the different development paths of digital finance in China and foreign countries. China's vast consumer market makes it easier for online financing platforms, based on the internet and big data, to play economies of scale, so domestic research on online financing is relatively developed. At the same time, private digital currencies such as Bitcoin originated abroad, and China's regulation of private digital currencies is relatively stricter, leading to abundant foreign studies on relevant technologies, laws and regulations, as well as economic consequences.

Secondly, in the aspect of network financing, researchers mainly focus on the operation mode, driving factors, and the impact of network financing on the real economy. This study has found that the operation mode of crowdfunding may be related to price discrimination and information asymmetry, and the operation mode of P2P can be divided into several types. The driving factors of network financing include "hard power," "soft power," and the rational herd behavior of investors. In terms of its impact on the economy, network financing has a duality. On the one hand, online financing has promoted financial inclusion by helping individuals and enterprises who are unable to borrow from financial institutions; on the other hand, network financing has challenged and impacted traditional financial institutions.

Thirdly, in terms of digital currency, researchers mainly focus on its origin and principle, functions and uses, as well as its shortcomings. Private digital currencies are very different from central bank digital currencies. Researchers generally agree that private digital currencies cannot replace any currency. Others argue that private digital currency is a speculative asset, while central bank digital currency is the equivalent of M0 in the financial system. When it comes to the disadvantages, the common weakness of digital currencies is the technical weakness of their protocols, and central bank digital currencies can compensate for some of the shortcomings of private digital currencies, such as high exchange rate volatility.

5. Conclusion

The field of digital finance is gradually advancing, with many research directions to be explored. This section looks into the future research directions.

Firstly, there is relatively little research on the economic impact of digital finance. Network financing carries out direct financing activities in a decentralized way, which has a great impact on existing financial institutions. Digital currency has impacted the traditional money supply. The overall decentralization and diversified services of digital finance have also posed great challenges to financial supervision. However, the literature on the influence of digital finance is not enough. Future research should focus on the relationship between digital finance and traditional finance, and how to find a balance point between them. Secondly, the development of digital finance has exerted an imperceptible influence on the change of demand. For example, the development of mobile payment has changed residents' consumption patterns. Therefore, whether other areas of digital finance also affect the consumption patterns, investment and financing patterns, as well as the preferences on the demand side can be the research focus in future studies. Thirdly, the healthy development of digital finance is inseparable from sound laws and regulations. The

limitations of the current regulatory system cannot keep pace with the evolution of digital finance. According to literatures ^[38, 39], the existing regulatory system cannot adapt to the current situation of disintermediation and decentralization of financial transactions, nor can it cope with the relevant risks faced by the decentralized digital financial market. The scope and mode of supervision also affect the position of digital finance in the financial system. Subsequent research should focus on how to look at digital finance, where its boundaries lie, and how to regulate it effectively.

Disclosure statement

The author declares that there is no conflict of interest.

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