Proceedings of the 3rd International Conference on Business and Policy Studies
DOI: 10.54254/2754-1169/75/20241700

Traditional Banking Evolution in China Amidst the Fintech Revolution

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Abstract: This paper aims to investigate how the evolution of fintech could impact the traditional banking industry in China by reviewing the existing research. It provides a brief introduction to Chinese banks, outlining their structures, and functions against the background of the development in the Chinese financial market. The paper also discusses how fintech could potentially interact with Chinese banks and the possible changes in bank financing systems, clearing systems, and credit rating systems in light of the fintech revolution. The final section of the report provides a summary of the accomplishments of fintech in the banking industry. It also explains the reasons behind the fintech revolution in the banking sector and suggests practical solutions for traditional Chinese banks to integrate fintech into their regular operations. This integration can help improve the efficiency of financing, clearing, and credit rating systems by utilizing fintech techniques already in use such as P2P lending, blockchain, and artificial intelligence (AI).

Keywords: banking, fintech, P2P lending, blockchain, artificial intelligence (AI)

1. Introduction

Over the past two decades, the Chinese banking sector witnessed a dramatic increase in capitalization due to the globalization of the Chinese financial market and openness to the banking industry. This growth was achieved by improving the quality of financial services and, more importantly, by promoting the efficiency of banking interaction with the market and the role of financial intermediaries, which may be attributed to the capital accumulation and steady output growth in recent years [1]. Furthermore, two large-scale non-performing asset cleanups carried out in 2005 and 2008 contributed to the expansion of the Chinese banking sector, resulting in a significant decrease in the default rates of the banking system. According to the most recent data, the Industrial & Commercial Bank of China (ICBC), the China Construction Bank (CCB), the Agricultural Bank of China (ABC), and the Bank of China Limited (BOC) are currently the world's top 4 leading banks in terms of asset value. Compared to banks with specialized functions in Western society, Chinese banks have a more comprehensive responsibility as one bank can play diverse roles incorporating the features of retail, commercial or corporate, and investment banks. This further contributes to the complexity of their corporate structures and the uncertainty of management.

Fintech, on the other hand, is a relatively new and emerging topic that has seen rapid growth in the banking industry in recent years. The COVID-19 pandemic and the competition from emerging fintech companies have led to an increase in digital finance usage over the past three years. Studies

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show that during this period, there has been a spike of 21% to 26% in daily downloads of finance-related apps due to the pandemic's spread [2]. Neo-bank apps have become popular for individual and corporate clients to handle banking businesses, especially in developing economies. Despite the challenges posed by the pandemic, it has also resulted in a thriving and prosperous fintech revolution that has facilitated the application of cutting-edge technologies such as big data, machine learning (ML), and artificial intelligence (AI). For example, Chen et al. used ML techniques to address the fairness issue in banking performance assessment [3]. Lyonnet's research shows how ML and AI techniques can be used in the decision-making process in investment [4]. Additionally, Cornelli et al. research shows an upward trend in credit lending launched by fintech and big tech platforms whose analytical processes are based on the big data collected [5].

Based on current research, there are promising indications that the banking industry will witness a significant evolution through the fintech revolution. However, Chinese banks still face severe obstacles to innovation considering their complex corporate structures and diverse functions. The increasingly strict sanction and policy restrictions on financial institutions enacted by the supervision department in China in recent years may impose negative effects as well. It is challenging to determine the extent of the efficiency that fintech is conductive to the Chinese banking system. This paper aims to provide insight into possible directions in this area and explore possible solutions to help the Chinese banking sector evolve against the rapid iteration of fintech.

2. Basic concepts and previous studies for fintech and conventional banks

2.1. Some basic concepts of fintech

It is difficult to define the boundary of fintech due to the variation of the existing definition and the continuous progress of relevant technologies. However, some prevailing ideas may appropriately describe the basic concepts of fintech. Lee and Teo determined fintech in five rules: low-profit margin, light asset, expandability, innovation, and easy compliance [6]. The Financial Stability Board describes fintech as a financial technology innovation that leads to new business models, applications, processes, or products [7]. Based on the empirical findings regarding the relevant research, the latest hotspots of the fintech research realm are mobile payment, micro-finance, P2P lending, crowdfunding, and blockchain [8]. For now, cutting-edge fintech implementations are updating to involve AI applications with a mix of ML and big-data analysis models. These techniques have been somewhat proven to be practical in various areas with progressive acceptance by major financial institutions and banks to serve as significant instruments for digital transformation. However, it is argued that the growing participation of fintech in the traditional financial sector will progressively squeeze the working opportunities of fundamental workers as jobs are increasingly replaced by machines with self-study algorithms. On the one hand, the development of fintech, whose techniques are gradually deployed by conventional banks, indeed contributes to profitability and operational efficiency. However, on the other hand, the use of fintech to replace human workers can result in an imbalance of work within a corporation. Therefore, further integrating fintech into traditional banking systems remains difficult at this stage.

2.2. Previous study on fintech application in banking

Jagtiani and Lemieux emphasize the fintech increasing role in shaping the financial industry. Fintech institutions have access to big data tools, which give them better default risk-bearing and credit-rating ability for a wider range of borrowers, leading to intense competition in the traditional banking landscape. In contrast, traditional banks constrained to conventional evaluating criteria tend to impose higher financing costs given the same risky clients, which contributes to the shift for lenders to fintech

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loaning [9]. Therefore, the multi-dimensional competition generated from the fintech evolution faced by traditional banks facilitates the fintech transformation of this area.

AI is a hot and emerging topic in the fintech world, but it can be challenging to describe precisely. Alan Turing's research conducted the renowned Turing test that a machine cannot be distinguished from a human in a conversation will be considered intelligent [10]. In modern parlance, general AI implies the capacity of a device to express, deduce, and work independently in both usual and unusual circumstances in a comparable way to human beings, which is overreaching the range of the current methods and is outstripping the meaning of the term 'AI' being commonly referred nowadays. Besides, AI is often used interchangeably with ML, a specific form of which is deep learning. Its technique has prevailed in the high-tech, automotive-assembly, and financial industries as the supplement tool for programming, manufacturing, and investing processes for the last few years. The wide adoption of AI in real life accelerates the evolution of its underlying models. According to Kelly and Xiu, who discuss the suitability of ML applied to financial research, their study provides insight into the indispensability of ML for developing the financial markets phenomena [11]. Fethi and Pasiouras's study shows the potential role AI techniques played in the evaluation of market efficiency, banking failure prediction, and bank creditworthiness, covering the period from 1998 to early 2009 [12]. Although AI research has increased in the banking sector, there is still uncertainty about how AI can be integrated into traditional banking operations. The solution to this issue will be discussed and concluded in the next part.

2.3. Possible directions for fintech application in Chinese banking systems

2.3.1. Financing system

In China's social financing system, banks play the role of intermediaries to provide capital to businesses, consumers, and investors. This indirect financing method has been the primary source of financing for Chinese enterprises, particularly for small and medium-sized enterprises that have received strong support from the Chinese government in recent years. However, with the surge in the number of small and medium-sized enterprises and other industries, traditional bank credit financing with strict credit standards is no longer suitable for most of them. This has resulted in an increasing gap in financing demand. A major cause of this gap is that state-owned enterprises in China are more likely to receive higher capital accumulation from banks, compared to small and medium-sized private-owned enterprises [13].

The stereotypical relationship between state-owned enterprises and banks effectively stimulates fintech financing such as crowdfunding and peer-to-peer (P2P) lending in China. Crowdfunding involves funding projects or businesses through large individual monetary donations. There are three entities involved in crowdfunding: the project or business sponsor, the organization that provides the crowdfunding website or platform (i.e. the middleman), and the person or entity that provides the funds or subscribed funds (i.e. the contributor). Equity crowdfunding and debt crowdfunding are the most relevant types of crowdfunding for commercial businesses, where contributors earn a return by paying equity interest or loans or promising to repay the loan principal with interest. P2P lending involves lending funds to businesses through online services. The loan can be secured or unsecured and is suitable for a variety of purposes. Middlemen providing these services are often online and have lower operating costs than traditional financial institutions, resulting in lower costs for borrowers.

Research has found that when state-owned enterprises increase their R&D activities, it does not necessarily increase the search for fintech finance. However, household ownership has a significant positive impact on the correlation between R&D intensity and fintech finance. Additionally, innovative household firms are more inclined to seek fintech finance, and these firms are typically

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small and medium-sized enterprises. This suggests that for small and medium-sized enterprises, fintech finance is now more of an attractive supplementary source of financing rather than a mandatory source of financing.

Furthermore, it has been observed that companies facing financial constraints tend to rely more on fintech finance. Some argued that state-owned firms may have an advantage in accessing credit from state-owned banks. Additionally, companies with high levels of state ownership may not feel the need to maintain high levels of cash as credit is easily available from state-owned banks, even in cases where the company faces financial distress and loses access to private external funding. In light of this, fintech financing can be a useful option for companies in financial distress.

Therefore, Chinese banks need to prioritize enhancing their efficiency in leveraging fintech financing to foster the growth of the small and medium-sized enterprises market in the appropriate direction, which will subsequently have a positive impact on fintech financing in other industries.

2.3.2. Clearing system

Blockchain or distributed ledger technology (DLT) has gained a lot of attention from various industries in recent years due to its highly secure, distributed, and immutable characteristics. Its potential for financial applications has been primarily used in laboratory environments until now. However, the discussion of its application to bank clearing systems is still vague. This part aims to provide some advice in this area.

Clearing refers to a company that provides valuable financial clearing or settlement services. The clearing process involves all activities from trade commitment to completion, including the clearing of cheques, which facilitates payment into the appropriate bank account after the cheque has been issued. Clearing also involves essential tasks such as closing positions, pre-settling credit exposure management, reporting and monitoring, risk hedging, liquidation of single-head positions, tax processing, and troubleshooting.

Some banks also provide their clients with services for other types of markets, such as OTC (over-the-counter trading) and interbank trading. For centuries, secure transactions have been completed within a few days to reduce transaction risk and ensure both parties deliver vouchers or cash. However, the settlement times may change with the advent of instant settlement of modern digital currency transactions, such as Bitcoin, and the increasing adoption of CBDCs (central bank-issued digital currency) by many central banks worldwide, including the Bank of England. The ultimate goal is to settle transactions as quickly as possible, faster than current systems allow, to support economic growth and development.

Achieving an instant clearing system through a fintech application can be challenging due to several obstacles. It is important to note that not all institutions may participate in the project. Additionally, the software size will become too large to update once the clearing system incorporates the vast majority of institutions and companies in the Chinese market. However, it is imperative to overcome these challenges as the benefits of fintech are substantial. The further development of fintech clearing systems is vital to help banks address this issue.

Fintech has a significant advantage over traditional banking in its ability to harness big data analytics based on historical data. This feature enables the bank's clearing system to swiftly reject any transaction as soon as it is approved, allowing it to take appropriate measures. For instance, if a person who is on a blacklist attempts to make a transaction, the bank's clearing system will automatically reject the transaction and update its blacklist to prevent such transactions in the future [14].

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2.3.3. Credit-rating system

The rapid adoption of technology has brought both opportunities and challenges to the banking sector. Innovative technologies like AI, big data, blockchain, and ML are transforming payment solutions, investment management, and risk assessment. But on the downside, data security, privacy, customer experience, and regulatory compliance have become increasingly complex with technological advancements.

ML is a subset of AI that trains machines using statistical techniques from a defined dataset, generating optimized models that best explain the data. This avoids the use of exogenous assumptions, limits potential biases, and enables better assessments and decision-making. Therefore, these models are widely used for forecasts and predictions [15].

The use of ML to explore pertinent financial issues has increased due to the strength of the underlying algorithms, as noted by Gan, Wang, and Yang [16]. Tang, Cai, and Ouyang reported a higher incidence of accuracy from ML models in measuring the credit risk of the energy industry in China [17].

Traditionally, studies employ parametric and non-parametric methods to predict credit risk and credit ratings. Gogas et al. used an ordered probit regression framework to forecast the credit ratings of the banks in the US [18]. Öğüt et al. predicted the banks' financial strength ratings by employing an ordered logistic regression [19]. However, the precision of these methods has remained questionable, and ML models are better suited for complex data, as noted by Kumar and Bhattacharya [20].

Li et al. trained a model using macro and company-level factors. They found macroeconomic factors more critical for investment-grade credit ratings, while company-level factors were prominent for speculative-grade credit ratings. Capitalization becomes more relevant as ratings approach default mode, as new capital injections become difficult and the quality of existing capital becomes critical. The random forest model had the highest predictive accuracy across all three measures. However, the CART algorithm showed significant improvement in accuracy for speculation and default predictions. Integrating the CART algorithm with random forest can optimize pressure prediction [21].

These findings have important implications for Chinese banks and relevant stakeholders, as credit ratings are closely related to equity liquidity, IPO pricing, corporate governance, and capital structure selection.

3. Conclusion

This paper provides an overview of the emerging literature on fintech, focusing on its interaction with the banking sector. The paper examines specific issues related to fintech financing, blockchain clearing, and ML credit-rating assessments in the context of Chinese banks. With China being home to numerous small and medium-sized enterprises, Chinese banks face significant challenges, such as integrating numerous companies into their clearing systems. Blockchain or distributed ledger technology may be an effective solution to this problem once the capacity issue is resolved. Additionally, AI techniques using ML models can help improve the credit-rating system once the precision problem is addressed.

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