Application Research of Blockchain Technology in Financial Field

Chen-Xi ZHAO\textsuperscript{1,a} and Xian-Yong MENG\textsuperscript{2,b,*}

\textsuperscript{1}School of Economics and Management, Inner Mongolia University of Science and Technology, Baotou, China
\textsuperscript{2}Zhuhai College of Jilin University, Zhuhai, China
\textsuperscript{a}zhaochenxi1998@hotmail.com, \textsuperscript{b}mengxianyong@126.com

*Corresponding author

Keywords: Blockchain Technology, Financial Innovation, Security Certification.

Abstract. This paper focuses on the risks of fraud, credit risk, market risk and central institutions in traditional financial markets, as well as the main problems faced by blockchain technology in financial services such as supply chain finance, trade finance, credit reporting, transaction clearing, insurance, and securities. The problem, through the research and analysis of the basic model and composition technology of the block chain, proposes that the future blockchain technology in the financial field innovation and development direction is the block chain technology and distributed security authentication technology, artificial intelligence technology, security cloud storage technology and big data processing technology are effectively combined to design a financial service and management platform based on block chain.

Introduction

In 2008, a scholar who called himself "Satoshi Nakamoto" first proposed blockchain technology in his paper "Bitcoin: A Peer-to-Peer E-Cash System", which designed the bitcoin electronic cash system using cryptography and the consensus mechanism realizing secure electronic payment in the network environment. The system effectively solves the technical problems in the electronic payment field such as the repeated payment of electronic money and the bottleneck of the payment center.

In recent years, the rapid development of blockchain technology highly integrated with 5G, Internet of things, big data, cloud computing and artificial intelligence technology has attracted more and more scholars' attention to blockchain technology and explored its application in finance, e-commerce, financial management and other fields. At the same time, the United Nations, the International Monetary Fund and the governments of developed countries have also issued management regulations on blockchain technology, effectively promoting the application of blockchain technology in finance, securities, banking and other industries.

Blockchain is an underlying service that integrates information security, artificial intelligence, distributed storage, big data and other technologies, and provides secure and credible data storage and access control for network applications such as electronic currency, international settlement, equity transaction, insurance service, digital copyright, financial technology and electronic payment in the cloud environment[1,2].

In other words, blockchain technology is decentralized, distributed and verifiable, which can provide secure, efficient and convenient data storage and access control services for Internet financial businesses.

In 2019, JPMorgan Chase launched JPM Coin, a cryptocurrency based on blockchain technology. JPM Coin uses blockchain technology to realize real-time electronic payment and settlement, effectively improving the security and efficiency of electronic payment system. In 2019, Facebook, Microsoft, Google and other companies began to adopt blockchain technology in electronic transactions and financial business, such as the establishment of financial trading platform based on blockchain technology, to achieve the traceability of private equity or shares.
In 2019, Tencent signed a memorandum of cooperation with the University of Hong Kong to train financial management and technology development talents in blockchain. At the same time, Huawei, Alibaba, Baidu, JD and other well-known domestic enterprises have applied blockchain technology to financial services, artificial intelligence, data storage, product traceability, Internet of things and other fields.

The People's Bank of China, the China Securities Regulatory Commission, the China Insurance Regulatory Commission, the China Banking Regulatory Commission, the National Standards Commission and other five ministries jointly issued the "Financial Industry Standardization System Construction and Development Plan (2016-2020)" during "13th Five-Year Plan", which sets the digital currency as focus on construction areas to reduce the cost of money circulation, improve the central bank's ability to control money, reduce money laundering, tax evasion and other criminal activities;

In addition, in 2016, the State Council issued the “Notice of the State Council on the National Informationization Plan” during the “Thirteenth Five-Year Plan”. The blockchain was first written into the “13th Five-Year Plan” as a strategic frontier technology. At the same time, blockchain, as the underlying supporting technology of electronic money, has been applied in the financial industry with multi-agent, multi-level and all-round applications. The application of blockchain has extended from financial to Internet of Things, intelligent manufacturing, supply chain management, etc[3,4].

The Application of Blockchain Technology in the Financial Field

Blockchain is the underlying security service platform that provides data trust mechanism and access control mechanism in cloud environment. Therefore, blockchain has the potential to change the Internet financial infrastructure. Financial services can innovate financial service business models, service scenarios, and business processes by integrating blockchain technology, which will lead to innovations and changes in financial products, financial services, financial markets, financial institutions, and financial formats. Therefore, blockchain technology can be applied to digital currency, cross-border payment and settlement, supply chain finance, securities issuance and trading, customer credit and other fields. At the same time, using blockchain technology, transaction data of various digital financial assets, such as stocks, options, bonds, notes, funds, etc., can be stored in a distributed cloud book based on blockchain, automatically complete the storage of transaction data and the transfer of financial assets on the blockchain [5,6].

Supply Chain Finance

The core of supply chain financial services is to solve the problem of financing difficulties and financing for SMEs. At present, there are three main types of supply chain financial financing models in the market: account receivable financing mode, confirming warehouse financing mode and financing warehouse financing mode. Among them, the main providers of financing services include financial institutions, supply chain companies and service providers, service platforms and other participants.

Blockchain technology can provide identity verification for participating entities in supply chain finance. At the same time, blockchain technology can verify the authenticity and validity of all bills in the entire supply chain financial service process, and prove the authenticity and effectiveness of the transfer of credit certificates. Preventing forgery of debt certificates, and solving the difficulties of credit financing in supply chain. In the framework of the supply chain financial trust system, obtain the credit of the core enterprise of the supply chain financial service in the form of digital warrants, including bills, credit lines or payment confirmation rights, and use the intelligent contract of the blockchain to prevent the performance risk and ensure the credit along the supply chain is effectively transmitted, and a credible mechanism is established among the participating entities in the supply chain finance to improve the efficiency of compliance. At the same time, the supply chain financial service platform adopting blockchain digital warrants can realize the automatic splitting and circulation of funds of upstream and downstream enterprises relying on intelligent
contract technology, significantly improve the turnover rate of funds and reduce the risk of compliance, effectively solve the financing difficulties and the problem of expensive financing of SMEs.

Supply chain financial services using blockchain technology effectively integrate the assets of core enterprises with the funds of financial institutions, and use the accounts receivable of core enterprises as the underlying assets to verify the accounts receivable of suppliers. And through the blockchain technology to achieve the automatic split and transfer of the creditor's rights certificate, to ensure the authenticity and validity of the supply chain relationship. At the same time, according to the circulation path of the credit certificate in the supply chain financial system, the supply chain assets of the registered chain can be completely traced, and the credit tracking of the multi-level suppliers by the core enterprises can be realized[7,8].

**Trade Finance**

Banks use blockchain technology to realize the digitization of letters of credit, letters of guarantee, forfeiting, factoring and bills of trade finance, and establish an inter-bank message exchange network in the form of alliance chains to realize domestic and foreign banks interconnection in the form of peer-to-peer, sharing and freedom. At the same time, banks and regulators use the blockchain platform to provide identity authentication services and verify the authenticity and validity of bill transfer, such as customs, taxation, justice and other regulatory agencies.

Using blockchain technology, the opening, notification, delivery, acceptance message, and payment message of the letter of credit in trade finance can be safely, quickly and traceably transmitted on the chain to replace the SWIFT settlement method, in order to achieve an efficient, secure and credible trade finance letter of credit exchange system. Similarly, trade finance using blockchain technology can track and trace guarantee information, forfaiting information and factoring information on current notes on the alliance chain.

**Credit**

In the credit information market, credit data of capital market credit assessment agencies, commercial market assessment agencies, and individual consumer market assessment agencies need to achieve cross-domain, cross-industry, and cross-institutional security sharing and complete traceability on the network platform to prevent data tampering. Therefore, the use of the decentralization and non-tampering of blockchain technology can realize the sharing of credit data and eliminate the current situation of credit data islands in trade finance services.

At the same time, the use of blockchain technology to establish credit reporting standards to develop credit reporting standards to share bad credit records among various credit reporting agencies, open up the path of interconnection and intercommunication in various regional credit reporting markets, and provide shared services and unified supervision for future credit reporting services.

**Transaction Clearing**

The blockchain technology can realize real-time transaction clearing function and improve the clearing/settlement efficiency of the financial system. Financial system clearing/settlement business participants can share a set of trusted and mutually-recognized ledgers through the blockchain platform. All clearing/settlement records of the financial system can be checked on the blockchain to realize safety, tamper resistance, traceability of financial system clearing/settlement data, and greatly improve the efficiency and accuracy of synergy. In addition, the blockchain platform can automatically execute the transaction clearing/settlement process by carrying smart contracts. At the same time, the block-based financial institution's synergy platform, through the way of adding capital information and transaction information to the blockchain establish a trust mechanism between the financial institutions to improve the efficiency and accuracy of synergy.
Insurance

The blockchain fusion IoT technology can provide credit services and traceability services for insurance business. The traceability service can ensure the uniqueness of the insured object in time and space, and can effectively prevent the forgery of art and collectibles. At the same time, based on blockchain technology, it can realize the management of insurance business data across time and space, and innovate insurance products and services, laying the foundation for refining insurance services and establishing dynamic insurance solutions.

Blockchain integration big data processing technology can establish a chain of alliances that serve insurance scenarios, provide risk actuarial and risk management services, and accurately analyze relevant data of insurance products to provide customers with personalized insurance products. At the same time, based on the blockchain technology, the relevant data of the insurance products and the data of the insurance process, the circulation process, the marketing process, and the claims process can be written into the blockchain to realize the full process trace of the insurance data, and then in the insurance company, the supervision department, consumers establish a trust mechanism and a sharing mechanism to form a secure, credible and complete insurance service information flow on the insurance system platform.

Securities

Blockchain technology can improve the intelligence and automation level of securities issuance, distribution, trading and other operational behaviors, and improve the efficiency of securities processing. At the same time, blockchain technology can improve the transparency of securities trading information and effectively limit illegal trading behavior. Regulatory departments and social intermediaries can improve the convenience of securities supervision by using blockchain technology, and simplify the process in the securities clearing and settlement. In the securities system, the buyer and the seller are automatically matched through the smart contract function, realizing automatic payment allocation, automatic asset purchase and automatic income distribution, realizing the automatic synchronization and auditing function of the account book, realizing automatic clearing/settlement, improving the efficiency of securities trading, and financial institutions use financial leverage for effective regulation.

The use of blockchain distributed, high credibility, openness and other technical characteristics can improve the security, liquidation efficiency and regulatory efficiency of securities assets, realize the traceability of securities transactions, and ensure the free flow of securities assets between different institutional platforms, realize the visualization of the asset transfer process, improve the credibility of the securities assets, realize the traceability of securities asset transactions, financing, securities lending records, and ensure the consistency of the securities institution trading platform data.

Conclusion

The blockchain technology studied in this paper is characterized by security, high efficiency, convenience, decentralization, distribution, and intelligence. In the cloud environment, technologies such as information security, artificial intelligence, distributed cloud storage, and big data analysis can be integrated, and provide secure and trusted data storage services for financial services such as supply chain finance, trade finance, electronic payment, international settlement, equity trading, and online insurance. In addition, the blockchain consensus mechanism and intelligent contract mechanism can be used to automate and intelligentize financial business processing. At the same time, the application of blockchain technology will provide a good development path for financial service innovation and its derivatives innovation.

This paper proposes blockchain technology and distributed security authentication technology, artificial intelligence technology, secure cloud storage technology and big data processing technology to address the risk of fraud, credit risk, market risk and central institutions in traditional financial markets. Designing of blockchain-based digital ticket payment model, cross-border...
payment model based on blockchain technology, asset securitization business management based on blockchain technology, etc. is the mainstream direction of future blockchain innovation and development.

Acknowledgement

This project was funded by the Collaborative Education Platform Project (XTYRPT2018002), Quality Engineering Project (ZLGC20180704), and Innovation Cultivation Project (2018XJCQ006) of Zhuhai College of Jilin University.

References


