

# Prospect and Challenges of Cross-border Payment Posed by Digital Currency – From the Perspective of Blockchain Coalition

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**Abstract**—As international transaction increases, cross-border payment is seeing more risks of frauds, trading and capital, needing solutions by innovative financial technologies. This paper, from the perspective of block chain coalition, builds the theoretical framework and model for cross-border payment, and explores the prospect and challenges of application of digital currency and cross-border payment.

## 1 INTRODUCTION

In September 2019, People’s Bank of China released “FinTech Development Plan (2019-2021)”, emphasizing the power of fintech and technologies for risk control, and put forward that fintech is technology-driven financial innovation. Block chain, artificial intelligence, cloud computing, big data are the major ways for fintech innovation. According to “Annual Analysis of Cross-border Payment of China in 2019” released by Analysys, the cross-border payment in China has reached 700 billion yuan, a year-on-year increase of 55.56%. As countries and regulations differ, the cash flow routes vary. In this massive payment market, cross-border payment faces risks of frauds, trading risks and capital risks that require solutions by fintech innovation. From the perspective of blockchain coalition, this paper establishes a theoretical framework and model for cross-border payment, and explores the prospect and challenges of digital currency and cross-border payment.

## 2 LITERATURE REVIEW

Li and Zhu (2018) proposed that the central bank may issue digital currency as a supplementary to the print currencies. So far, there is no consensus as to the definition of digital currency. The author divides digital currencies into wide-caliber currencies and narrow-caliber currencies; the former includes electronic currencies, virtual currencies and encrypted currencies; while the latter includes only encrypted currencies, including encrypted currencies issued by the central bank and individuals. Digital currencies are subject to influences of four factors – technology, demand, payment environment and law. The digital currencies released by the central bank, i.e., official digital currencies allow individuals or enterprises to open an account in the central bank, and the control nodes of the central bank are introduced to manage the currency system, to adopt a decentralized system, provide negative interests (to encourage

consumption and investment), to increase trading efficiency, fight against money laundry and tax evasion. Encrypted digital currencies released by individuals are generally considered digital goods or capital, or tools for speculation. Li (2020) think that blockchain digital currency emphasizes “technical algorithm”, and official blockchain currencies reflect the “official status”. This paper put forward a cross-border payment system based on official digital currencies on the basis of regional economic cooperation. The central idea of this system is to use blockchain coalitions to build a digital currency equivalent in-kind platform and voting data information platform. The in-kind value evaluation system realizes control of the official digital currencies, and the voting system fulfills the operation of the coalition chain. Zhang (2018) put forward creating an e-commerce ecological system that consists of cross-border e-commerce comprehensive service platform, a credit risk management system, an intelligent credit risk management system, a cross-border logistics systema custom supervision platform based on the blockchain technology. Zou (2019) studied the official digital currency DC/EP released by the central bank, and revealed that cross-border payment based on digital currencies reflects the global impact of digital currency electronic payment (DC/EP). DC/EP to some extent is a supplementary to the third-party currency after the “break-and-direct-connect” mode (break the connection with the bank and directly connect with the Internet), and provides similar user experience. The programmability of DC/EP provides space for smart macro-regulation, and plays an unmatched role to cash or third-party payment. It supports policies of the central bank in promoting healthy cash flow, against money laundry, against terrorist finance, and against tax evasion. In his paper that analyzed the block chain and financial infrastructure, Zou (2019) evaluated the risks and supervision of the Libra project. The official digital currency DC/EP released by the central bank, the settlement currency between financial organizations, and the Libra program are all representative paradigms of

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token distribution. The paradigm of tokens is distributed, anonymous, traceable and has intelligent contracts. Wang (2019) think that the major reasons for point-to-point transactions of block chain technology are “decentralization” and “removal of trust”. According to the visits and management authorities, the block chains are divided into public chains, private chains and coalition chains. The trading does not lie in the mutual trust, but the trust between the platform and the block chain. The block chain technology can be applied to cross-border payment and settlement, alleviating the pain points of traditional agent bank modes, such as complicated settlement procedures, high cost, and low security. China Merchant’s Bank develops editable block chains, in which the coalition members enjoy technical advantages in cross-border payment and settlement. People’s Bank of China, Shanghai Branch (2018) studied the impact of block chain technology on the central bank’s payment and settlement systems. The block chain is the underlying layer of digital currencies, and it solves the confidence problems of agencies, and reduces the credit risks and system risks. The payment and settlement systems based on digital currencies also take block chains as the underlying technology. Compared with public chains and private chains, coalition chains are the best options for cross-border payment and can alleviate the problems of high costs and low efficiency. It realizes point-to-point payment, reduces the cost of intermediate links and multi-party communication, realizes 7/24 continuous operation, provides real-time services and reduces delays.

To sum up, most scholars think that official digital currencies are supplementary to print currencies. Official digital currencies have approval from the government, the same attributes as the print currencies, and backed by the block chain technology, it is decentralized, immune from tampering and has intelligent contracts, which can solve the problems facing cross-border payment currently.

### 3 STATUS QUO OF CROSS-BORDER PAYMENT IN CHINA

#### 3.1 Cross-Border Payment Modes in China

Currently, there are two cross-border payment modes: bank transfer (suitable for large-sum cross-border transactions) and online payment (suitable for small-sum cross-border retailing).

Bank transfer has the following forms:

##### 1) Wire transfer

Wire transfer means that transferer makes a deposit in the bank, and the bank sends transfer information to the branch bank or agency (the paying bank) of the payee, commanding the paying bank to pay a certain sum of money to the payee.

##### 2) Professional transfer company

Professional transfer companies refer to companies specializing in transfer and realize remittance or withdrawals in their agencies across the globe through quick transfer, such as Western Union and Money Gram.

##### 3) Hong Kong offshore bank account

Hong Kong offshore bank accounts are corporate bank accounts opened in Hong Kong, through which transfer and payment can be made. It is applicable to traditional foreign trade or cross-border e-commerce of scale.

Online payment comes in the following forms:

##### 1) Credit card

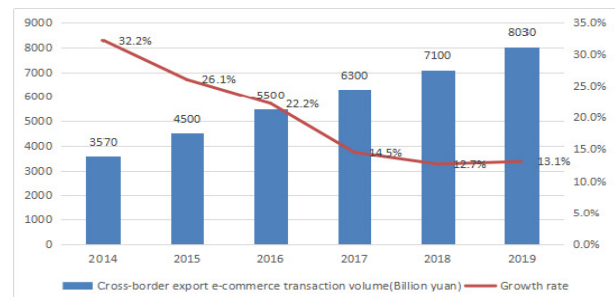
Cross-border e-commerce websites can, by collaborating with international credit card issuers like Visa and MasterCard, or overseas banks, open channels that receive payment by credit cards of overseas banks.

##### 2) Third-party platforms

Third-party platforms refer to platforms built by non-bank organizations that use communication, computing, and information security technologies to realize payment, cash transfer, capital settlement, search and summary between the users and the bank payment systems. Compared with commercial banks that have high rates and professional transfer companies that cover a very limited region, third-party payment platforms are convenient, have a low rate and thus are enjoying popularity among users.

#### 3.2 Status Quo of Cross-border Payment in China

##### 1) Stable growth of the cross-border payment market

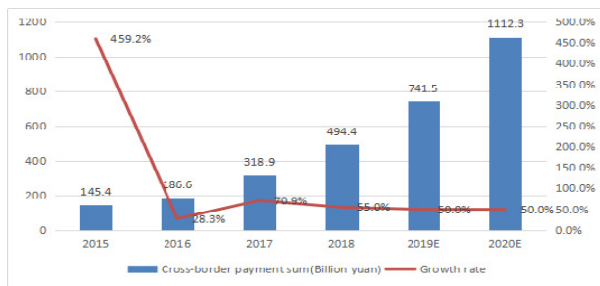


Source: WJS e-commerce research center

Figure 1. Cross-border E-Commerce Industry Transaction Scale in China and Growth Rate

Influenced by policies and the favorable market, export cross-border e-commerce has replaced general export trading and has taken a dominating position in the foreign trade industry since 2012. As Figure 1 shows, as of 2019, China’s export cross-border e-commerce transaction presented a year-on-year growth trend; though the growth rate dropped, it remained at 13.1%, making a stable growth of the cross-border e-commerce trading in China. The stable growth ensures demand of foreign trade companies for cross-border payment services, thereby in turn, promotes stable growth of the cross-border payment market.

##### 2) Sharp growth of the transaction scale of third-party payment platforms



Source: Payment and Clearing Association of China, Mob Research Institute

**Figure 2.** Cross-border payment sum of third-party payment organizations of China and Development Trend in China between 2015 and 2020

Since third-party payment platforms won approval from the central bank, they are entering a right track, and are developing from mere payment services to meeting the diverse demands of cross-border trading companies, and by dint of its convenience, they are becoming the mainstream payment method for foreign trade companies. As Figure 2 shows, it is expected that by the end of 2020, the cross-border transaction volume realized through the third-party payment platforms would have reached 1100 billion yuan, with rapid growth, which means the future cross-border payment will continue to grow in the future.

### 3.3 Problems in Cross-Border Payment in China

#### 1) Fraud risks

The authenticity of cross-border payment is the lifeline of foreign trade, the bottom line that cross-border trade must hold; otherwise, cross-border trade will be reduced to a place plagued by frauds, a hotbed of crimes to dodge supervision, anti-money laundry, anti-corruption and anti-online frauds. However, it is difficult to control the authenticity of trading entities or the trading content: first, there is no effective means to identify the identity of cross-border payment organizations, so it is difficult to determine that the cross-border payment entity is real; second, it is difficult for cross-border payment organizations to obtain real information of overseas customers, including the operation range, the financial standing, etc., so it is impossible to determine whether the cross-border trading content is real.

#### 2) Trading Risks

In cross-border trading, after the cargo or the service is provided, and before the fees are collected, the changes in the foreign exchange rate will lead to a reduction in the receipt or an increase in the payment on either of the party involved. Even though in the case of instant payment, it takes time to complete the payment and it is inevitable to incur losses on either part of the transaction.

#### 3) Capital risks

When making cross-border payment through a third-party payment platform, the platform becomes an “intermediate platform” of cash during transaction: the payer transfers the fee to the platform, and after the buyer confirms receipt of the goods, the platform transfers the fee to the payee; in this case, the fee will be reserved on the platform for a while, and due to information

asymmetry, the supervising authority will find it hard to monitor how the provisions are managed or used by the platform, so the third-party platform may appropriate the provisions and fail to meet the needs for settlement of regular customers.

Therefore, as international trading grows, we need to find a more suitable way to solve problems in cross-border payment. If we can use the novel blockchain coalition technology to build a high-credit cross-border payment and clearing system, we can improve the efficiency and security of cross-border payment, and thereby further the development of international trade.

## 4 APPLICATION OF DIGITAL CURRENCIES IN CROSS-BORDER PAYMENT UNDER BLOCKCHAIN COALITION

### 4.1 Development of digital currencies

To adapt to the needs of digital economy, digital currencies developed based on blockchain technologies have seen rapid progress. Currencies are general equivalents, a common scale for the value of general commodities, have such functions as value scale, transaction means, storage means, and payment method. Currencies are the products of the market. With the advent of the Internet and e-commerce, to meet the needs of customers, e-currencies and virtual currencies in e-payment come into being. Digital currencies that were evolved on that basis have become a favored option of banks and third-party payment organizations. Based on the definition and categories of digital currencies given by Li and Zhu (2017), this paper focuses on the application of narrow-caliber digital currencies. Narrow-caliber digital currencies refer to encrypted digital currencies, including official digital currencies issued by the central bank and encrypted digital currencies issued by individuals. In these years, encrypted digital currencies issued by individuals like bitcoin, Ethereum and Ripple are popular in the market, but because of their large fluctuations in value and vulnerability to supervision, they are circulated in small ranges, and most of them are taken as a tool of investment rather than a measure of value or pricing tool of circulation.

With technological progress, most central banks around the globe announced intentions to issue governmental digital currencies. In 2015, Ecuador released its official digital currency, and so far, six countries including Ecuador, Tunisia, Senegal, Marshal Islands, and Uruguay have issued their respective official digital currencies. In May 2017, the Digital Currency Research Institute of People’s Bank of China was opened, and the digital currency DC/EP issued by People’s Bank of China moved towards maturity. Besides, Sweden, Thailand and Russia have drawn plans to release their digital currencies.

## 4.2 Features of official digital currencies

Compared with privately issued digital currencies, official digital currencies have won approval from the government, cover wide ranges, have high financial benefits, and can improve the effect of currency policies by designing the interest rate transmission mechanism. Its traceability can help prevent crimes and money laundry, improve the nation's ability for macroeconomic regulation, improve the competitiveness of the local currency.

In countries with underdeveloped financial infrastructure, the advantages of official digital currencies are more salient. The motives for developed countries to issue digital currencies are to preclude monopoly of private payment companies, and developing countries are to promote financial benefits and avoid arbitration.

As classified by IMF, currencies for circulation include cash, encrypted currencies, bank deposit and private e-currencies. In recent years, countries are exploring fast payment systems, the largest advantage of which is that they can fulfill payment at any time any place, providing a convenient experience of "pay by a click". Many countries including South Korea, South Africa, America, China, India, Turkey and Italy have established fast payment and clearing systems. Take China as an example. Quick pay has been introduced to the NetsUnion Clearing Corporation (i.e., a non-bank online payment and clearing platform subject to supervision of the central bank) through the third-party payment system YuEBao, a branch of AliPay, and it is called third-party payment before and after the "break-and-direct-connect" mechanism.

The official digital currencies and quick pay share the same payment supervision procedures, but there are differences. The comparison results are shown in Table 1.

**TABLE 1.** COMPARISON BETWEEN DC/EP AND QUICK PAY

	DC/EP	Quick Pay
<b>Differences</b>	Account loose coupling	Account tight coupling
	Account anonymity	Not anonymous
	A type of M0 that can be freely exchanged in any scenario	Transfer can only be completed under the same third-party account
	Alternative to cash, helping cash flow supervision, precluding money laundry and tax evasion	Alternative to bank cards and cheque, without much help for implementation of policies
<b>Similarities</b>	1. The targets are general users, especially retail users	
	2. Decentralized and based on the central bank – commercial bank binary model	
	3. Have complicated impacts on currency supply and currency multiplier	
	4. Digital currencies do not pay interests, and the third-party payment organizations also pay no interests for the balance.	

## 4.3 Application of the blockchain technology

According to the level of access to users, the block chains can be divided into public bitcoin block chains, private chains under central control and coalition chains with limited access. As the transaction volume of public chains is limited, the energy consumption of mining is enormous, so they are not suitable for high-frequency and small-sum cross-border payment; private chains, because of limited intermediate nodes and its unsolvable confidence problems, are also not applicable to cross-border payment that cover large ranges. The coalition chains are relatively secure, and are feasible for clearing and storage.

The application of coalition chains in cross-border payment has the following features:

### 1) Secure

Coalition chains are secure because they are decentralized. Any node on the network will have a public account, without relying on a central calculation center. However, a 51% risk of attacks on the calculation exists, and to avoid the risk of "double payment", the smart contract can be used in large-sum cross-border payment to trigger clearing by private chains.

### 2) Timeliness of clearing

As coalition chains need to generate block chains, the broadcasting settlement will take time, and the delay for single transactions is uncontrollable. Compared with traditional cross-border settlement, the timeliness is improved.

### 3) Feasibility of storage

When the coalition chains are used, each participant account will preserve a public account book, so this method is a storage consumption method. Yet, as the technology improves, the storage termination technology of bitcoins can be used to simplify the payment confirmation process and improve the settlement efficiency.

### 4) Programmability of smart contracts

The trust mechanism of the coalition chains is the consensus mechanism, in which all participants make decisions through negotiation. It not only preserves the decentralization idea of public chains, but also have the advantages of private chains in storages and access control. Coalition contracts give coalition chains higher scalability. The smart contracts are highly programmable, and can trigger corresponding mechanisms in specific scenarios, trigger emergencies and solve crises.

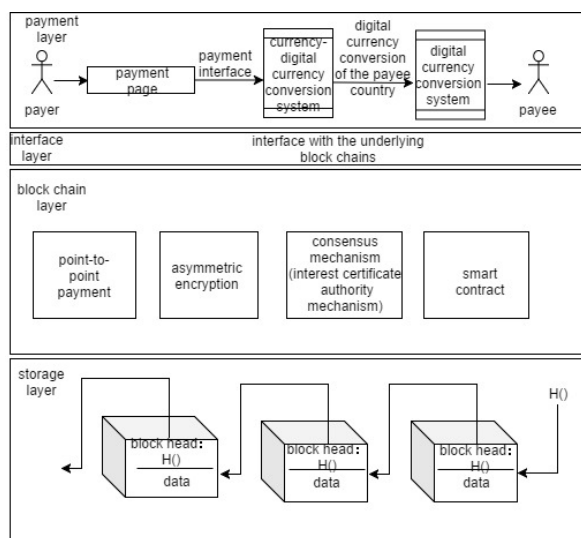
## 4.4 Cross-border payment by coalition block chains

When official digital currencies are applied to cross-border payment scenarios, the coalition block chains support point-to-point payment of distributed accounts, improve clearing efficiency, reduce transaction costs, satisfy the status of official payment method of digital currencies, and realize cross-border payment by dint of the advantages of regional economic cooperation. The official digital currencies of countries serve as a supplement to official print currencies. Under regional economic cooperation, parties involved can reach a consensus for value cooperation and transfer based on

trade cooperation, issue digital currencies of the coalition, and realize settlement of digital currencies for cross-border payment. Figure 1 shows the cross-border payment mechanism of coalition block chains.

Cross-border payment data are stored in the storage layer through the hash algorithm, and the blocks are connected through the hash pointer  $H()$  to realize quick search and visit. Above the storage layer is the block chain layer; the block chains provide technical support of official digital currency payment through point-to-point payment, asymmetric encryption, consensus mechanism and smart contracts. The consensus mechanism includes the interest certificate and authority mechanism of the coalition chains, and the smart contract can trigger the relationship setting between the regional partners in the coalition chains through the programming module, thereby improving the security of the payment. The interface layer realizes connection between the underlying block chain technology and the application payment layer.

The application payment layer includes the customer payment interface and the digital currency exchange system, the payee collection system. Take the payment of one sum of cross-border payment for example. The payer pays an e-commerce transaction fee, cross-border travelling fee or overseas study fee on the payment interface. The currency used for payment may be the official currency, the e-currency or the cheque of the paying country; the currency used for payment is changed into the official digital currency in the exchange system that supports conversion into the official digital currency of the payee country. Under the smart contract, the official digital currency of the payee country in the conversion system can be converted into other forms of currencies, like cash or e-currencies. If the official digital currency sees wide application in the market, the payer and the payee can make exchanges by taking the official digital currencies of different countries as MO. In this case, the payment procedure of cross-border payment can be more simplified, and the digital currencies of the payer country and those of the payee country can be exchanged to complete cross-border payment.



**Figure 3.** Coalition block chain cross-border payment mechanism model

## 5 CONCLUSIONS AND SUGGESTIONS

This paper finds that the official digital currency can serve as an alternative to quick pay. It has high payment efficiency, and provides support for policies against money laundry and tax evasion. However, digital currencies are still in the infancy stage in most countries around the globe and need multi-dimensional exploration from both theories and technologies. The following suggestions are proposed based on this study.

1) Strengthen regional trade cooperation and promote financial innovation

In the coalition block chain-based cross-border payment model analysis, the premise of using digital currencies in cross-border payment is that the countries involved in the trading sign a free trading contract and pursue the same trading goal. On the basis of regional cooperation, the range of trading should be expanded to promote further development of free trade around the world.

2) Accelerate issuance of official digital currencies

The pain points in cross-border payment should be solved by financial innovation, and one method to solve these problems is to use digital currencies to improve the security and efficiency of digital currencies. To avoid monopoly by privately-issued digital currencies and reduce the consumers' trust of digital currencies, maintain financial stability, countries should pick up their pace in issuing their official digital currencies.

3) Design reasonable currency transmission mechanism

If official digital currencies are only used as an alternative to quick pay, the central banks will find less motive to issue their official digital currencies. For countries with underdeveloped financial infrastructure, the official digital currency can improve the financial payment efficiency and improve financial benefits. Under the pressure of inflation and deflation, countries that are vulnerable to international arbitrations should design reasonable currency transmission mechanism, issue official digital currencies, promote regional trade cooperation, improve the international status of the currency of the central bank, which may be a feasible solution for these countries.

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