

# Programmable money

Will central banks take the lead?

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# Blockchain comes alive

The financial services industry is exploring the promise of blockchain technology. A variety of consortia, including the business-focused Digital Trade Chain Consortium and the technology-focused Hyperledger, have been having thoughtful discussions. These discussions and experimentation have given rise to collaborative pilots and private implementations. Some of these pilots have now matured into production systems. Many high-impact projects are likely to be implemented within the next 12 months.

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## A spectrum of commercial potential

Blockchain networks hold tremendous power in their ability to boost security, which can help ensure data integrity, promote transaction and settlement efficiency, and verify identity. However, many current business applications of blockchain are still in experimental stages. Use cases range from academic research experiments to the eventual issuance of central bank digital currency. Although mainstream adoption of blockchain applications is nascent, it's advancing swiftly.

Bankers, in particular, seem cautiously optimistic about blockchain. In a 2016 survey of 200 banks across 16 countries by the IBM Institute of Business Value, 91 percent of the surveyed banks said they are investing in blockchain solutions for deposit taking by 2018.<sup>1</sup> As technologies mature, commercial initiatives often become more imaginative and bold, so as blockchain adoption moves out of the sandbox, the drivers will become more ambitious. Goals may include new revenue generation, enhanced client experience, improved competitive advantage and increased social impact.

### The future of money

Blockchain came to prominence as the digital ledger technology for the crypto-currency known as Bitcoin. This programmable money has been a double-edged sword to the world. On one hand, it proved the feasibility of a self-regulating, global, digital, peer-to-peer payment network, operating without a trusted third-party intermediary (such as a bank, credit card company or payment company). On the other hand, Bitcoin has tended to promote the perception among an increasingly digital populace that banks are no longer necessary.

Many consumers believe that money should move as easily as email. A growing number of articles debate whether the current banking system or even banks themselves are becoming obsolete. Many people believe that if banks were cut out as an intermediary, payments could be simpler, autonomous and instantaneous. A number of these articles describe the

following principles for ideal digital money.

The first is that money should be intrinsically connected to the internet, unconstrained by geography or institutions. Second is that foreign exchange should be immediate. Third is that all transactions should be free. The thinking goes that if sending messages using email is free, why shouldn't sending money also be free?

Although the principles of digital money are valuable and achievable, banks will continue to play a key role in the global financial system and economy established by central authorities. These authorities direct banks to allocate funds from savers to borrowers in an efficient, fair and equitable manner. Banks also will continue to perform critical everyday operational tasks such as verifying identities, monitoring transactions for fraud, preventing money laundering and filing suspicious activity reports to government and law enforcement. These activities are invisible to most retail consumers of banking services.

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## Blockchain payment networks: near and clear

Blockchain has emerged as an ideal technology for payments because of its exemplary transaction and settlement security, data integrity, record-keeping and efficiency features.

The payments industry offers promising opportunities. Cross-border e-commerce is now growing at more than 20 percent annually, which is more than double the growth rate for domestic e-commerce.<sup>2</sup> On aggregate, cross-border payments account for about 40 percent of global banking revenues with payment flows of more than \$135 trillion during 2016.<sup>3</sup>

Even though there is no practical reason in the digital era why a global payment transaction should cost any more than a domestic transaction, global payments have higher complexity and currency exchange costs than their domestic counterparts. . In fact, the friction plus fee reconciliation is what makes cross-border payments expensive.

### **It's expensive to be poor!**

Setting aside the risk and regulatory concerns for programmable money, few technical barriers prevent the creation of a real-time, cost-effective global payment network capable of supporting most transaction types with straight-through processing.

Within the more complex wholesale banking space, international settlement volume is measured in trillions of dollars (USD) each day.<sup>4</sup> The opportunities to increase operational efficiency alone are enormous. But the institutional structures and relationships supporting this volume are resistant to change.

Blockchain will be an important catalyst and enabler for an impending major paradigm shift in payments. But in the meantime, early adopters want to see stable, scalable and cost-effective solutions that can be deployed in parallel to existing financial rails, so migration can be gradual, rather than a risky all-or-nothing proposition.

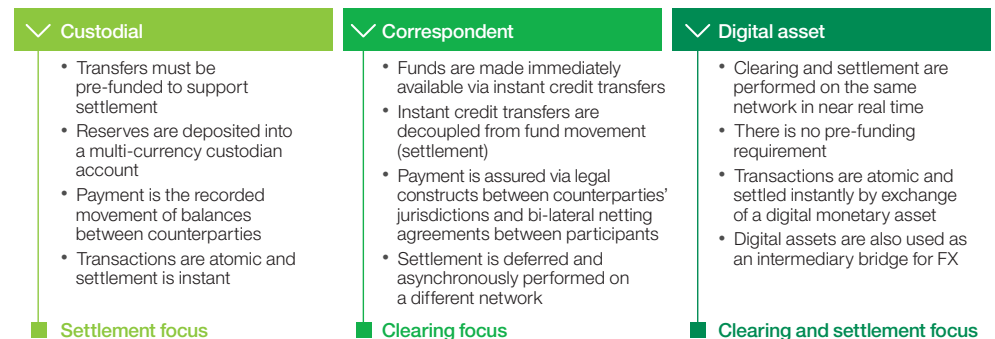
## Three design patterns for international payments

Numerous blockchain experiments for international payments have been conducted in recent years. Virtually all of them fall into three design patterns: the custodian model, the correspondent model, and the digital asset model (see Figure 1). The custodian and correspondent models are well represented within today's existing payments networks. These models are used by large foreign-exchange settlement firms that support daily net settlement of major banks around the world. They also are used for vast correspondent messaging networks that support payment instruction routing and clearing. Applying blockchain technology to either of these models can offer incremental innovation to existing functionality. However, blockchain doesn't offer the transformational change that Bitcoin has inspired.

Unlike the custodian and correspondent models, the digital asset model addresses clearing and settlement on a single network. It has been popularized by the design principles of Bitcoin and appears to offer the most disruptive potential. Under this model, payment instruction history, along with an immutable transaction ledger, and the means for settlement, are combined onto a single network. The digital asset model provides an integrated network for

initiating transfer instructions and a native asset to settle those transactions near real-time. Because the settlement asset or digital currency is a purely digital instrument, near real-time foreign exchange becomes just another step within a composite transaction. All of the steps, from payment instruction to clearing, to settlement and foreign exchange, can be encapsulated into a single atomic transaction that executes in near real-time.

**Figure 1**  
Blockchain design approaches



Source: IBM analysis

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## It's time for a close-up

The problem with the digital asset model is the lack of confidence in the underlying digital asset. Legitimate questions arise about who controls the exchange rates for digital currencies, resurfacing fears of foreign exchange market manipulation and concerns for liquidity provision. Although some “altcoin” alternatives might satisfy the digital asset requirements for this design pattern, only a few are actually viable.

One of the alternatives is Bitcoin, but concerns about transaction costs, transaction speed, contentious forking, scalability and especially a limited money supply have hindered Bitcoin's widespread adoption as a commercial payment solution. For example, even at a price of USD 10,000, Bitcoin only has a market capitalization of about USD 170 billion.<sup>5</sup> In contrast, almost five years ago, JP Morgan alone was moving USD 2-5 trillion daily.<sup>6</sup> Alternatives to Bitcoin have been built specifically for payment applications and feature scalable, secure technology.

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## Central bank obsolescence? Not likely

None of this discussion is lost on central bankers. Around the world, central bankers are actively involved in understanding and even experimenting with digital currencies. In fact, nothing is stopping a central bank from issuing a digital version of its fiat currency today.<sup>7</sup>

Currently, in Sweden, Riksbank is experimenting with eKrona, and the Bank of Canada is working on a proof-of-concept with CADcoin.<sup>8</sup> Issuing fiat on a blockchain has numerous benefits. The traceability of blockchain would help prevent financial crimes such as money laundering and corruption, and the efficiency of blockchain will reduce transaction and settlement frictions.

### The bottom line

The mass adoption of Bitcoin shows that the world has an appetite for blockchain-based digital currencies and payment. Whether it's Bitcoin or a central bank issuance, digital currencies can offer tangible improvements to financial services by increasing security and reducing friction, particularly in international payments. Generally, more transparency, traceability and security can promote trust between counterparties and help accelerate financial inclusion. Anyone with a mobile device could access a digital money wallet to serve as a bank account, essentially “banking” a large percentage of the approximately two billion unbanked adults.<sup>9</sup> Programmable money can be designed to flow as easily as email without sacrificing regulatory controls, monetary policy or personal privacy.

The future of programmable money is dawning. While blockchain adoption is still in a formative stage, it offers tremendous potential to revolutionize the global financial system. No place on earth will be out of reach.

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#### Notes and sources

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