

R3 Reports

Will Businesses Ever Use Stablecoins?

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A hand is shown reaching towards a digital globe. The globe is composed of a wireframe mesh and is surrounded by various currency symbols (€, \$, ¥, £, ₩) and a network of white dots connected by thin lines, suggesting a global digital or financial network. The background is dark and blurred, showing what appears to be a cityscape at night.

Contents

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- 1. Introduction 1**
- 2. Stablecoin Use Today 2**
- 3. The Stablecoin Landscape 2**
- 4. The Next Wave 6**
- 5. Conclusion 12**



Will Businesses Ever Use Stablecoins?

George Calle*, Diana Barrero Zalles

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Abstract

Stablecoins are blockchain-based payment instruments that aim to eliminate the volatility of cryptocurrencies. So far, stablecoins have seen significant use within the cryptocurrency ecosystem, specifically as a volatility hedge, a tool for tax evasion and a vehicle for payments outside the banking system. Yet stablecoins have also been proposed as a payments solution for businesses. This paper answers why businesses and financial institutions do not currently use stablecoins, and proposes how these instruments or future iterations may fit into the existing financial system.

1 Introduction

Stability in financial assets isn't something people usually associate with cryptocurrency, but that may be changing. Bitcoin, the first cryptocurrency, did not inherit the price stability of a major fiat currency. It was a completely new digital asset with no tie or backing to other stable financial assets or fiat regimes.¹ Your local coffee shop likely does not accept your bitcoins, because if it did, the directional exposure to bitcoin, if not immediately hedged, would turn the shop into a cryptocurrency hedge fund.² Instead, most people buy bitcoin as an investment.

Payments, however, were intended to be the primary blockchain use case. More specifically, bitcoin solved the problem of censorship-resistant digital cash that "would allow online payments to be sent directly from one party to another without going through a financial institution".³ It was a new payment rail, with no single central operator, that functioned largely outside of – and even sought to challenge – the existing regulated financial system.

Stablecoins are blockchain-based payment instruments that aim to achieve the price stability demanded by end users for payments. Some stablecoin approaches are backed by forms of fiat money. Others use a range of other non-fiat types of assets to collateralize the stablecoin. Last, some attempt to use algorithms to achieve price stability without collateralization at all.

Stablecoins have solved problems that exist strictly within the cryptocurrency ecosystem, and certain implementations have seen billions of dollars' worth of daily volume. However, all are somewhat experimental, with the current range of practical uses limited beyond cryptocurrency exchanges, issuers, and speculators.

The paper answers whether stablecoins will eventually break out of the closed-loop cryptocurrency world, and into our broader financial system. Further, it points to areas within existing payments

*The authors thank Kevin Rutter for his extensive feedback, along with Alisa DiCaprio and Neepa Patel.

¹JP Koning, "Fedcoin: A Central Bank-issued Cryptocurrency", (2016). The paper outlines several reasons why use of bitcoin at the scale required for broad adoption is somewhat unlikely. Price volatility is a commonly cited reason for why relatively few businesses or merchants in developed economies accept bitcoin as a means of payment.

²A few payment processors, notably Square, support bitcoin payments and provide services to vendors for converting bitcoin into fiat. Conversely, in January 2018 Stripe, announced that they would stop supporting bitcoin.

³Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System", (2008).

systems where stablecoins may be applicable. The paper finds that with the right architecture and approach, stablecoins may expand into more common business interactions and payment scenarios.

2 Stablecoin Use Today

Stablecoins have seen initial traction within the cryptocurrency ecosystem. Specifically, they are popular among existing cryptocurrency traders, miners and users. There are three primary functions that dominate current stablecoin use:

Lock in Profits: Cryptocurrency speculators and traders often convert cryptocurrencies into stablecoins to temporarily “lock in” profits, shifting their exposure to relatively stable assets. This is particularly useful at exchanges which do not have a fiat currency pair equivalent. Similarly, cryptocurrency miners convert their cryptocurrencies into stablecoins to reduce their directional exposure to the cryptocurrency they mine.

Stable Tax Haven: Stablecoins avoid reintroducing money into the regulated financial system, where taxes on gains may apply and reporting is required.

Payments Outside the Banking System: Some miners, speculators, or users may not have commercial bank accounts in a certain jurisdiction. Stablecoins allow greater global digital access to currencies that have similar properties to a desired fiat currency, beyond the borders of that fiat currency’s issuing country. For example, a USD stablecoin allows international access to a digital USD, without requiring users to hold a domestic banking presence in the United States.

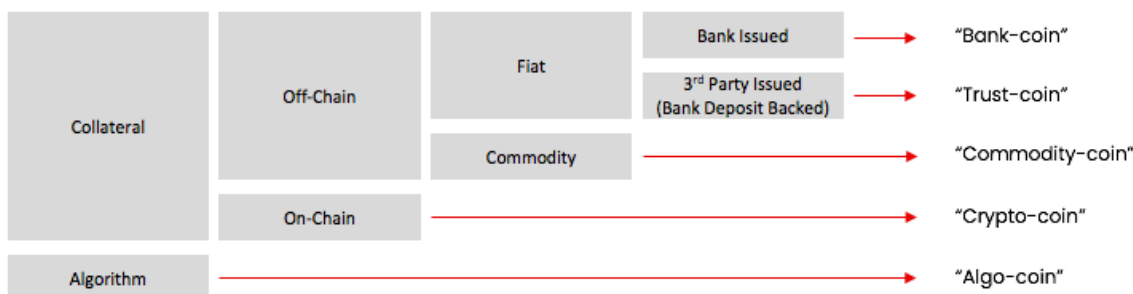
Stablecoins have been discussed as a bridge currency for remittances. Additionally, since stablecoins are open 24/7, when ACH (Automated Clearing House), wire transfer systems, or other payment infrastructure are closed, stablecoins may be used to transfer value during those times.

Some use stablecoins to avoid potential frictions from having funds blocked or temporarily held caused by KYC procedures or flags that may occur when introducing money back into the traditional financial system. For example, stablecoins are used by cryptocurrency trading firms or hedge funds to move value around across different jurisdictions in a more fluid way.

3 The Stablecoin Landscape

This section walks through the several methods that stablecoin issuers use to attempt to achieve relative price stability, and how they have evolved over time. Figure 1 outlines the five types of stablecoins that will be expanded on throughout the remainder of this section.

Figure 1: Categorization of Stablecoins



Source: Author

Stablecoins backed by fiat money have captured the vast majority of volumes. There are three types of fiat money: physical cash, central bank reserves, and commercial bank money. Currently, commercial bank money is the most likely to be used as collateral for stablecoins.

- **Cash:** For a stablecoin to be backed by physical cash, there would need to be a warehouse storing dollar bills, and a trust or custodian that monitors and issues a digital token 1-for-1 with the dollar bill. Collateralizing a stablecoin with physical bills 1-1 is impractical for many reasons.
- **Digital Central Bank Money:** Several central banks⁴ have examined central bank-issued digital currency (CBDCs), and several private-sector initiatives have attempted to use digital central bank money (M0) as collateral.⁵ Since this approach requires broader regulatory and economic change to the existing financial market system, these initiatives have a significantly longer time to market, and do not currently exist. They are out of the scope of this paper, but in practice this approach could ultimately bring consumers, within a domestic region, the most benefit.⁶
- **Commercial Bank Money:** Currently, stablecoins backed by fiat generally refer to commercial bank money. There are two different approaches used by stablecoin issuers, referred to throughout this paper as “bank-coin” and “trust-coin”. Both are described below.

Table 1 provides an overview of twelve prominent stablecoins, including one bank-coin, five trust-coins, two commodity-coins, three crypto-coins and one algo-coin.

Table 1: Stablecoin Landscape

Issuer	Type	Collateral	Chain	Licenses	Auditors
JPM Coin	Bank-coin	Bank reserves	Quorum	Central Bank regulatory agencies	Already 'Big 4' clients
Tether	Trust-coin	Cathay Bank, Hwatai Bank, others	Bitcoin	MSB, Limited company in Hong Kong	Friedman LLP
TrueUSD	Trust-coin	US Bank, Alliance Bank, Mercantile Bank, others	Ethereum	MSB, Nevada Department of Business and Industry (DBI)	Cohen & Company
USD Coin	Trust-coin	Several banking partners	Ethereum	MSB, BitLicense (NY), E-Money Issuer (UK), others	Grant Thornton LLP
Paxos	Trust-coin	FDIC-Insured banks	Ethereum	New York Trust Charter	Withum
Gemini Dollar	Trust-coin	State Street	Ethereum	New York Trust Charter	BPM
Digix Global	Commodity-coin	Gold vault at The Safehouse	Ethereum	N/A	Bureau Veritas
Tiberius	Commodity-coin	Warehouse with metals	Ethereum	N/A	N/A
Maker DAO	Crypto-coin	\$150 in ETH: \$100 in DAI	Ethereum	Governance in code (MKR token)	N/A
BitUSD	Crypto-coin	\$2 worth of BTS token	BitShares	Governance in code	N/A
Reserve	Crypto-coin (hybrid)	Basket of tokens + fiat	Ethereum	Governance in code	N/A
Basis*	Algo-coin	Base Bonds and Base Shares (to manage supply)	Ethereum	Governance in code	N/A

Source: Various

** Basis is now defunct.*

⁴Bank of Canada, Monetary Authority of Singapore and Bank of Thailand have all experimented with CBDCs.

⁵Bank for International Settlement (BIS), "Proceeding with Caution – a Survey on Central Bank Digital Currency", (2019). The paper claims 70% of central banks surveyed are currently or will soon be engaged in CBDC work.

⁶JP Koning, "Approaches to a CBDC in Brazil", (2018).

Bank-Coin

Banking institutions are in a position to leverage their credibility, existing compliance measures, AML/KYC practices, and audit measures to issue their own stablecoins. This type of stablecoin is a substitute to the traditional bank deposit at your local bank, as it is issued directly by the bank. Each coin, like a bank deposit, is backed by the asset portfolio of that particular issuing bank and is subject to the bank's default risk.

However, this approach is different from traditional bank deposits because the blockchain itself serves as definitive record of ownership. This differs from traditional bank accounts where the commercial bank adjusts customer accounts balances on their own books, through either book-entry adjustment, or through the interbank payment system. This subtle difference means that commercial banks likely will need to maintain an omnibus account of all deposits issued on the blockchain system, to avoid inconsistencies regarding legal ownership between the blockchain's ledger and the commercial bank's internal bookkeeping.

Stablecoins of this type are live, though Silvergate Bank has only recently begun to offer the service. Silvergate was first bank to issue and redeem stablecoins to facilitate real time peer-to-peer payments. Silvergate Network (SEN) payments can only be made directly between the issuing commercial bank's own customer network. Other 'challenger' banks that have already established relationships with cryptocurrency companies may be the next to follow.

The experience of these initial banks can provide key lessons for larger mainstream banks to embrace stablecoins as a market opportunity. Outside of Silvergate, most notable is JPM Coin, which is an initiative intended to target payments between businesses that have an account at JP Morgan. Despite some progress, JPM Coin is currently a prototype, and actual implementation in production at scale may be several years away.

Trust-Coin

While the previous example has characteristics similar to commercial bank accounts, this category is more similar to the Venmo, TransferWise, or PayPal model, in that a third party issues the stablecoin with money that they hold in their own bank accounts. In this model, there is an additional intermediary - the trust or third party - unlike the last model where a bank issues stablecoins itself.⁷ The end user's collateral is often segregated from all other funds of the third party trust or company.⁸ Additionally, the trust or third party issuer does not necessarily always use bank accounts held at one commercial bank, but can diversify banks across several accounts.

This is the most common, and most widely used approach for stablecoins today. Tether is an example of this category, and still dominates in market share, with over 95% of the daily trading volume for stablecoins.⁹ Tether launched in 2014 and issues a coin, USDT, which aims at 1:1 parity with the USD. The company maintains that the amount of USDT issued is collateralized by equivalent bank deposits held at a bank.¹⁰ Tether has been involved with a number of different banks over its four-year history.

There are two sources of risk in the Tether model. The first source is the solvency of the bank that Tether uses to hold collateral. The second source is the credibility of Tether itself, specifically the company's claim to maintain a banking relationship and fund it 1:1 with the amount of USDT issued. Scepticism regarding Tether's collateralization has previously caused the value of USDT to fall below \$1. On October 13th, 2018. Tether's peg broke, most likely as a result of a broken relationship it's bank, Noble Bank in Puerto Rico.¹¹

⁷For every trust-coin created there's a dollar in custody earning interest for the stablecoin company, but they do not necessarily pass along the interest as a bank would.

⁸Charles Casarilla, "Paxos Standard White Paper", (2018).

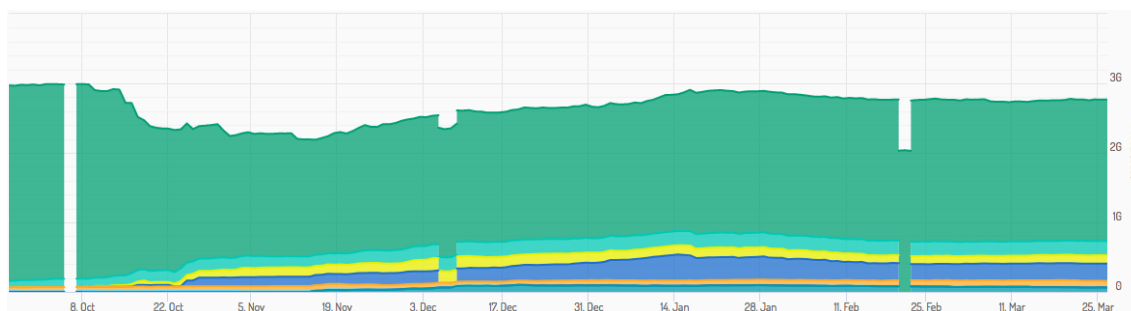
⁹The Stablecoin Index (website)

¹⁰Yogita Khatri (CoinDesk), "Tether Says it's USDT Stablecoin may not be Backed by Fiat Alone", (2019). CoinDesk reports (March 14 2019) that Tether updated it's website to say that Tether's reserves "... include traditional currency and cash equivalents and, from time to time, may include other assets and receivables from loans made by Tether to third parties...".

¹¹Bitfinex, an exchange closely tied to the stablecoin, also cut ties with Noble Bank at the same time.

In October 2018, a group of firms launched stablecoins intended to provide alternative options in the wake of the Tether scandal. Gemini, Paxos and Circle each issued stablecoins, backed by collateral held at commercial banks. Though all other stablecoins have significantly smaller volumes than Tether, they are growing. Figure 2 shows the market capitalization of stablecoins over a six month period.¹² Over this period, the reported average volumes of stablecoins within this category have grown, though it should be noted that exact figures are likely inflated by wash trades. As of March 2019, USD Coin (Circle), Paxos Standard Token, and Gemini Token, and an additional option, True USD – represent a combined daily volume of over \$138 million. This is roughly 90% of Venmo’s \$158 million average daily volume.¹³ In comparison, Tether’s average daily volumes for the same period was reported to be roughly \$7-8 billion.

Figure 2: Stablecoin Market Cap / Time (6 month)



Source: *Stablecoin Index*

Note: *Tether (green)*

This new pack of trust-coins have diversified their banking affiliations and forged relationships with more reputable entities for their collateral reserves. These include US banks that have a stronger track record than those designated to hold Tether’s dollar reserves. This also led to a step up in third party audit relationships – while still not ‘Big Four’ firms, at least closer to top 50 auditors. Importantly, these startups are taking measures to portray regulatory compliance by seeking licenses to provide levels of credibility akin to banking entities. However, there is still no agreement over which licenses would deem a stablecoin as adequately regulated.

Commodity-Coin

Stablecoins can be pegged to the value of non-fiat assets, or a basket of assets such as cash-like securities or commodities. There are a wide range of assets that can back this type of coin, each with their own characteristics. For example, commodity-coins can be backed by treasuries, high quality liquid assets, or traditional physical commodities. However, regardless of the asset, this approach will always involve a trusted custodian. An example of this is Digix Global, which issues the GDV token that can be converted for an ounce of gold.

Crypto-Coin

These are pegged to the value of a crypto-asset, or a basket of crypto-assets. Since the collateral backing the stablecoin is held on-chain, crypto-coin issuers claim to reduce reliance on third parties. However, this approach is inherently speculative due to the volatility and risks of the underlying

¹²This source calculates stablecoin market capitalization by multiplying the quantity of stablecoins issued and the price (roughly \$1). Since these stablecoins are (or claim to be) backed 1:1, market capitalization is a good measure of size of the issuer’s operation. However, it does not account for the volume - or more specifically - if people are actually using the stablecoin.

¹³TradeBlock, "The Hard Fork – Weekly Market Commentary", (2018). The newsletter claims “On-chain stablecoin volume is more than half the payment volume at Venmo”. This data was collected on January 28 2019. The paper recalculates volumes for March 1 2019.

coins. Long term price stability is likely compromised, and high correlations of cryptocurrency prices limit the benefits of diversification for a basket of coins.¹⁴

A notable stablecoin of this variety was issued by cryptocurrency company, Maker, which issues the stablecoin, DAI. DAI is an ERC-20 token, meaning that it exists on the Ethereum network. The currency is collateralized by the ether cryptocurrency. To counter the exposure to ether, DAI must be overcollateralized.¹⁵ While overcollateralization and long/short hedging strategies can partly counteract some of these risks, a massive cryptocurrency price drop could still break the peg. So while this approach was creative, it ultimately fails the test of creating a stable currency that is not exposed to cryptocurrency volatility. It is also extremely capital inefficient.

Algo-Coin

Algorithmically governed stablecoins do not rely on collateral held elsewhere. Rather, they attempt to achieve stability by hard-coding a set of rules into the stablecoin itself that, for instance, adjust supply of the stablecoin to meet demand. In this way, the system is in theory self-sufficient, needing no connection to existing monetary regimes, assets, or even other cryptocurrencies.

One potential version involves seigniorage shares, an instrument used by central banks to manage sovereign currencies.¹⁶ Basis was an example of the seigniorage share approach. Basis attempted to maintain the 1:1 dollar parity of Basecoin, using a unique approach involving three separate instruments that are issued to incentivize investors to either buy Base Shares (when the price of Basecoin is too high) or Base Bonds (when the price is too low).¹⁷ While some still believe that algorithmically governed stablecoins are a viable option to reduce the counterparty risk of trust-coins, bank-coins and commodity-coins or the asset risk of crypto-coins, others are doubtful. It has proven difficult, if not impossible, to code away risk. Notably, the collapse of Basis has proven the fickle nature of creating a currency and maintaining its price.¹⁸

In general, this approach can be highly speculative and raises questions on how to ensure fair practices in the measurement of value, price stability, and control over the supply of coins.

4 The Next Wave

Stablecoins have already found a product-market-fit within the cryptocurrency ecosystem. Specifically, they have been used to lock in gains made on the speculative cryptocurrency markets, dodge taxes, and make certain types of payments without a bank account.

Trust-coins are the most used. However, bank-coins are likely to be competitive with these soon, and show promise for forward-looking use cases. Table 2 outlines some of these potential applications.

¹⁴One approach to counteract this can be to create a self-referential collateral token that appreciates in value with transaction fees, or a portion of stablecoins during expansion periods. Yet even this approach still lacks an asset of reliable value to back a stablecoin, which is the purpose of such.

¹⁵BitMEX Research, "A Brief History of Stablecoins (Part 1)", (2018). This post explains the on-chain collateral (crypto-coin) approach through two examples: BitShares (BitUSD) and MakerDAO (Dai).

¹⁶Robert Sams, "A Note on Cryptocurrency Stabilization: Seigniorage Shares", (2015).

¹⁷Smith and Crown, "The Cryptoeconomics of Seigniorage Shares Stablecoins: Basis and Carbon", (2018).

¹⁸Preston Byrne, "Basecoin (aka the Basis Protocol)", (2017). Regardless of whether the price of Basecoin was over or under \$1 at any given time, the two mechanisms that existed to stabilize price both relied on the assumption that demand for the asset would continue to increase in the long run.

Table 2: Uses for Stablecoins

Current Stablecoin Uses	Potential Stablecoin Uses
Payments outside banking system	Customer to merchant payments
Lock in profits	Peer to peer payments
Price arbitrage	Automated payments to suppliers, customers, employees, etc.
Tax avoidance	Remittances and international fund transfers
Speculation	Inter-bank payments (commercial, retail, etc.)
	Supply chain financing
	Debt payments
	Structured debt
	Interest payments
	Dividend rights
	Investment offerings
	Security and equity token purchases and transfers
	Tokenized assets
	Currency exchange transactions

Source: Author

First, this section considers a few potential explanations for why the current set of stablecoins has relatively limited use outside the closed-loop cryptocurrency ecosystem. The second part of this section looks forward at the applicability of stablecoins to established payments systems. To accomplish this, we provide an overview of the diverse array of existing payments systems. Third, we explore situations where stablecoins can improve on one of those systems or fill a niche not currently served by those systems, and determine questions that future issuers will face.

4.1 Why is Current Use Limited?

There are multiple functional and non-functional considerations for business transactions that stablecoins in their current implementation do not meet. Notably, stablecoins have immature approaches to identity, privacy, regulatory compliance, and many lack a credible audit process.

Immature regulatory approach: Cryptocurrencies or stablecoins not built with regulatory regimes or structure in mind will not be adopted by regulated businesses as settlement mechanisms. Compliance with existing regulation is key. (See Appendix A for a list of applicable regulations.) While some issuers have obtained specific regulatory licences, coverage is far from comprehensive. (See Appendix B for a list of applicable licences.) Ensuring the safety of stablecoin transfers also implies measures to screen individual participants, as well as fund movements to detect and deter suspicious activity, particularly fraud.

Reluctance of auditors: Major auditing firms may find current stablecoin issuers too risky to assess, and so the task has fallen on less reputable entities. Methods to ensure collateralization and proof of reserves remain uncertain, and the audit reports covering this information may not hold the legitimacy to provide guarantees. Moreover, collateral is often held by multiple fragmented entities, making it less reliable than dollar reserves held at major banks. These issues leave open questions regarding custody and the ability to prove adequate reserves at all times.

Here, stablecoins issued by banks offer clear advantages, as these institutions already have robust audit measures in place to ensure proof of reserves, in addition to a history of regulatory compliance and AML practices.¹⁹ They are not considered too risky for legitimate third party auditors to evaluate, and current audit practices could be tailored to these institutions dealing with stablecoins in a rather straightforward way. Large banks in particular could benefit from their strong ties with central banks that issue and remove currency from the economy.

Lack of institutional focus: Issuers must understand how the stablecoin will be used in order to optimize design for, say, institutional vs. retail transactions. While existing payments systems

¹⁹With regard to cryptographic technology, these institutions have shown an interest in its applications to improve their operations. This would add an additional layer of audit checks to ensure the right levels of privacy and the right controls to prevent hacking.

are flexible enough to handle both, transaction governance and execution differ based on who is using the network and for what purpose.²⁰

Privacy is another area where retail and institutional customers have different requirements. Gossip networks that broadcast all information to all parties are unsuitable for business transactions, yet this is an inherent characteristic of the public chains most current stablecoins are built on. Some initiatives, like JPM Coin, are intended for wholesale clients, but may use a technical solution that is a better fit for retail.

Additionally, financial institutions are required to know their counterparty, whereas pseudonymity is a purported feature of cryptocurrencies. With most stablecoins, no legal identity is required to be directly associated with a receiving address prior to funds being sent. In fact, cryptocurrencies are intentionally designed in a way that allows the networks to operate without a robust identity structure. This architecture, and platforms that fork this architecture, inherit an unsuitable approach to legal identities for regulated corporates and financial institutions, while post-hoc changes to the architecture cause complications.

4.2 How Stablecoins Could Fit into the Payments Landscape

Corporates and financial institutions require blockchain based payments systems to settle transactions they make on these networks. If stablecoins are going to deliver on this opportunity, they must align with the uses of payment systems currently in place.

Using the United States as a case study, there the five primary methods of payments: cash, cards, checks, ACH and wire. It is worth noting that consumer and company preferences regarding payment methods can vary somewhat significantly from country to country.²¹

There are many different ways to facilitate a payment, and each of the following methods fills its own niche. While there are countless factors to consider when looking at payment systems, this section will focus mainly on who uses the payment systems (individuals, corporates, financial institutions), for what uses, and how the payment value chain functions at a high level (push vs. pull payments).²² The applicability of blockchain will be dependent on these factors, and thus will differ across payment systems. For example, ACH and wires are most relevant for digital business payments.

The difference between push and pull transactions is an extremely important lens to view payments systems in the context of stablecoins, since stablecoins are a push payment system. Push transactions mean that the payment is initiated by the sender. Think of how when a friend puts cash in your hand, they are pushing ownership of the money to you. On the other hand, pull transactions are initiated by the recipient. Think of depositing a check, where ownership is dependent on you telling your bank to pull money from the senders account into yours.

²⁰The next part of this section will look forward to how established payments systems handle retail v. institutional transfers. For example, NACHA is an independent organization focused on providing transaction codes and governance frameworks for ACH transfers based on who is sending money and for what purpose. There is no comparable entity for stablecoins.

²¹BIS, Statistics on payment, clearing and settlement systems in the CPPI countries

²²Carol Benson and Scott Loftness, *Payments in the US: A Guide for the Payments Professional*, (2010), "Payments Systems Overview", 27.

Table 3: Payments Systems and their Niches

Payment system	Market segment	Initiation flow	Function in (Cor)Dapps
Cash	Retail	Push	Digital bearer instruments: Retail CBDC, cryptocurrencies
Card	Primarily retail	Pull	Tokenized loyalty
Check	Retail & enterprise	Pull	NA
ACH	Retail & enterprise	Push or pull	Stablecoin: Financial leg of supply chain apps, payment vs. invoice
Wire	Businesses, FIs	Push	Stablecoin: DvP, FX settlement

Source: Author

Note: Within this framework, checks would have a similar blockchain mapping to ACH. Since checks rely on physical representations, the paper will focus on ACH.

Cash

As a bearer instrument, physical cash is the simplest form of a push payment. However, unlike cryptocurrencies or stablecoins currently on the market, issuance is controlled by the government and distribution is dependent on Federal Reserve Bank members.²³

Central banks have conducted research on retail focused central bank digital currencies, which could potentially function as a digital version of cash if made private and widely distributed. However, such systems do not currently exist at scale.

While not backed by or denominated in fiat, digital currencies like Bitcoin resemble cash in that they are both bearer assets. Similarly, neither system can be perfectly censored,²⁴ and neither requires the involvement of a custodian to prove ownership, redeem or initiate a payment. Some have claimed stablecoins could replace cash by solving bitcoin’s volatility problem, but this is unlikely given that existing fiat denominated stablecoins exist as liabilities of either a company or bank.

Card

While there are a wide variety of cards (charge, credit, debit and prepaid), all card networks connect a two-sided value chain involving banks that facilitate issuing (customer-side) and acquiring (merchant-side) payments.

Cards are not highly used for payments between businesses.²⁵ For now, the enterprise blockchain application most disruptive to traditional card payments would be tokenized loyalty points, which could be modeled similarly to closed-loop network debit card payments.²⁶ However, the merits of such a system have not yet been successfully demonstrated and the use case is niche.

Checking

Though still a popular payment method,²⁷ checks are in slow decline, and are unlikely to be modeled on blockchain networks due to their physical nature. Checks are still included in this paper for

²³Benson and Loftness, *Payments in the US: A Guide for the Payments Professional*, “Cash”, 118-119.

²⁴Many refute the censorship resistance of bitcoin because the global ledger is public, and thus visible to regulators. However, the author argues this does not differentiate it from physical cash as any enforcement would exist outside the system.

²⁵Benson and Loftness, *Payments in the US: A Guide for the Payments Professional*, “Cards”, 74.

²⁶In open loop card networks, end users interact with the payment system through intermediaries (in this case the merchant’s bank and the bank that issues the card to the customer). However, corporate credit cards are a subset of closed-loop systems in which a customer may only interact with one merchant. In other closed-loop networks card companies may assume responsibilities that in open-loop networks are facilitated by either the issuing or acquiring bank.

²⁷For enterprises, checking accounts are commonly used for payroll, benefits and vendor payments.

completeness and because of their relevance to clearing houses, which emerged to manage the settlement of checks in situations where banks had no preexisting bilateral netting agreement.

ACH

The ACH (Automated Clearing House) system traces its origin to the 1970's when the computerization of banking presented an opportunity for automating the check clearing process.²⁸ ACH has the built-in benefit of being widely accessible to all bank checking accounts. ACH payments are commonly used by corporates, including for supplier payments, intra-company funds concentration, and government tax collection. It is important to note that ACH systems are domestic.

ACH is unique in that it is the only payment system that supports both push and pull payments. Specifically, ACH Credit payments are initiated by the payer, while ACH Debit payments, like physical checks, are initiated by the payee. Either way, the originator delivers transactions to a bank, which either credits or debits the originator's account, then passes the transaction to the operator who passes reciprocal instructions to the receiving bank to perform on the receiver's account.

Wire

Wire transfers are commonly referred to as "large value systems", since they only represent a fraction of transaction count but a substantial portion of the value of all payments. Wiring money is near instantaneous, but also expensive.²⁹ Wire transfers are often used by financial institutions in situations such as settling securities delivery or in the foreign exchange market. Wire transfers are also used for international payments. Wire transfer systems are enhancing remittance capabilities to edge into the supplier payments market. Under certain circumstances, wire transfers are used by individuals.

There are two wire transfer systems in the United States - Fedwire, which is run by the Federal Reserve, and CHIPS, which is privately owned.³⁰ They function similarly in that payment is initiated by a sender who instructs a bank to irreversibly move money to another account. However, they have different approaches to settlement, which has implications for the risk and liquidity provided by each system. Fedwire is a RTGS (real time gross settlement) system, meaning that each transaction is settled as it occurs, and balances are updated in real time. This dramatically reduces the risk of bank failure on the system. On the other hand, CHIPS facilitates netting between banks between 9AM - 5PM. CHIPS multilateral netting provides added liquidity to the market during the day, and remaining payments are settled at the end of the day via Fedwire.

On-us transactions

An important, yet often overlooked segment of payments are internal bank transfers, also known as on-us transactions. While virtually unreported, it is estimated that on-us transactions have grown in percentage as banks become more concentrated. This is particularly relevant to the stablecoin discussion since a number of banks are starting to issue their own coins. This means that a user can have an account and make transfers to any other user of that bank in real time. Indeed, JPM Coin is intended to facilitate "instantaneous transfer of payments between institutional accounts."³¹ For both JPM Coin and the Silvergate network, transfers are between accounts within the same bank.

The ownership structure of payments systems provide additional context for the stablecoin market. The stablecoins with the highest relevance to enterprise use cases (fiat denominated), fall into two groups: bank issued and trust issued, which is interesting because many payments systems were

²⁸The fundamental difference between ACH and checks is that even though checks can be scanned and processed on computers, the underlying instrument is physical. The designers of ACH realized that the only information banks really needed to settle checks was the MICR data. So instead of extracting MICR data from physical checks, ACH just exchanges MICR data directly.

²⁹A wire transfer costs about \$20, compared to roughly \$1 for ACH.

³⁰SWIFT is often mistaken for a payments system, but is in fact a financial messaging system.

³¹JP Morgan, "J.P. Morgan Creates Digital Coin for Payments", (2019).

initiated by banks. For example, ACH and Fedwire have always been owned by banks. Additionally, major credit card companies, such as American Express and MasterCard, were originally owned by banks, and are now owned by non-bank private companies.

4.3 Considerations for Stablecoin Implementation

Since the majority of transactions between businesses are facilitated by ACH or wires, stablecoin design must satisfy the requirements of users for one or both of these systems. There are two dimensions to adoption: risk profile of the stablecoin and how they integrate into existing - or new blockchain based - payment scenarios.

4.3.1 Integration into Payment Scenarios

There are a diverse array of potential uses for stablecoins within each payment systems. Below we provide one hypothetical example for each.

ACH

Given its existing use as a means of payment between businesses, ACH is relevant when considering settlement for blockchain applications, particularly those that involve the transfer of physical goods.³² Companies with complex supply chains have already piloted blockchain trials to manage the shared deal process. Stablecoins could obviate the need to settle off-chain through ACH in these situations. For example, a smart contract can be set up that initiates payment upon confirmation of delivery of a good that satisfies mutually agreed upon conditions.³³

Wire

Stablecoins have been frequently discussed as a replacement for wires within financial institutions. Within the wild-west cryptocurrency ecosystem, stablecoins facilitate the instant settlement of cryptocurrencies into a fiat form of money. Connections are drawn to wire transfers, which within the world of regulated financial services, are used for settling equities and FX trades. Stablecoins offer a new feature – 24/7 transfers. However, there are trade-offs. For example, rigidly set trading windows are a feature, not a bug, of the CHIEFS architecture, allowing the system to pool liquidity during the day.

4.3.2 Risk Profile of Stablecoin

This creates a few open questions regarding future stablecoin design:

- Will future bank-coins continue to be siloed within the issuing commercial bank? (e.g. JPM Coin and Silvergate Network: coins can only be sent to account holders of the same bank.)
- If banks issue and transfer stablecoins between each other, how will they handle the resulting directional exposure to their competitors?

³²George Calle and Alisa DiCaprio, “Can Supply Chains Future-Proof Supply Chains: A Brexit Case Study”, (2019).

³³It is out of scope to answer whether settling on-chain would be optimal for transacting parties, or even define ‘optimal’.

5 Conclusion

So how could this market pan out?

Just as multiple legacy payments systems coexist, there won't be 'one coin to rule them all'. One instrument cannot address all the use cases for global settlement. Rather, approaches to collateralization and regulatory structure will depend on the particular use.

Stablecoins will likely find value in the regulated financial system by providing a new niche - providing value for blockchain-based applications. That is, they will not provide value strictly from the *payment* leg, but from the benefits an on-ledger form on money will bring the *delivery* leg, or what-ever other asset is being exchanged for the payment.

There may end up being inherent advantages and disadvantages for certain types of payments using a stablecoin. For example, a tokenized capital markets ecosystem would separate the prevention of double spend from the useful services custodians provide, like making a payment. This would reduce bottlenecks of third parties and potentially enable new services.³⁴

The stablecoins that will find the most success will facilitate payments across one or multiple blockchain use cases where significant amounts of value are transferred. As a result, they will likely be designed to operate on blockchain systems that host the most credible applications and users.

Significant progress has been made in the stablecoin space. Notably, just in the past few months, stablecoins have emerged that have taken regulatory and compliance measures more seriously. Additionally, existing financial institutions are beginning to think creatively about how these assets can bolster their existing product offerings. The development will continue, with a range of offerings to support the diverse needs of transacting parties.

³⁴Antony Lewis, "Banking When the Bank Is Shut Down" & "Tokens - Lowering the Barriers to Innovation", (2018).

Appendix A: Applicable Regulations

In terms of regulation, there is widespread recognition on the need for adequate measures for the cryptocurrency space. Many countries have been slow to issue laws, and those that have also created a fragmented regulatory landscape on a global level. While regulators still catch up with cryptocurrency innovations, criminals have abused them and left legitimate users vulnerable to theft, fraud, and other risks. For example, regulatory voids that excluded crypto-to-crypto exchanges allowed criminals to exchange transparent coins like Bitcoin for privacy coins like Monero and eventually integrate fiat funds earned from illicit activities into the financial system.

There is an international element to regulation, as both local and foreign entities operating in a given jurisdiction will have to comply. As cryptocurrency providers, stablecoin issuers must keep up with regulatory developments in order to position themselves as credible providers of financial services. This will require setting and implementing adequate governance programs, customer identity practices, and AML measures in compliance with standards and legal requirements.

In addition to keeping up with cryptocurrency regulations, stablecoin issuers that aim to enter the payments space will also have to pay attention to rules governing payments providers. These rules are also evolving as the financial crime landscape shifts with trends in and online fraud. In order to attain the credibility to function as a cash alternative at the enterprise level, stablecoin issuers must understand these regulatory developments and take action accordingly:

Financial Act Task Force (FATF)

- *Global standard-setter for anti-money laundering/counter-terrorism financing (AML/CTF) regulation*
- *2015 guidance encouraged countries to regulate exchange services between fiat and virtual currencies, without the desired results*

Applicability for Stablecoin Issuers

- Recommendations scheduled for June of 2019, addressing the risks of virtual assets: defined as cryptocurrencies, initial coin offerings (ICOs), and other digital payment and investment technologies
 - Emphasis on urgent need for a coordinated international approach to inhibit criminal and terrorist uses of virtual assets
 - Expectation for more robust regulation of virtual assets: expanding the scope of existing regulatory regimes, and censuring countries not taking sufficient measures
 - Oversight expected to extend beyond fiat-to-virtual currency conversions, to include virtual-to-virtual currency conversions and related services
 - Expanding scope of entities subject to existing AML/CTF regulations
-

Know Your Customer (KYC)

- *Global standards to verify the identity of customers (individuals and legal entities), assessing their risks of engaging in illicit activity*

Applicability for Stablecoin Issuers

- Identity verifications cover initial onboarding and ongoing checks of customers
- Enhanced Due Diligence (EDD) refers to more detailed verifications for higher risk customers

- Customer Due Diligence (CDD) refers to customer risk assessments including background checks
 - Latest CDD Rule of 2018 requires information about beneficial owners, who control or own at least 25% of a legal entity customer
 - Watch list screening refers to ensuring customers do not belong to sanctions lists, terrorist lists, etc.
 - Transaction monitoring refers to observing and detecting patterns of activity in order to identify suspicious behavior
 - Customer Identification Program (CIP) refers to a USA PATRIOT Act provision requiring financial institutions to verify the identity of individuals they transact with
-

Bank Secrecy Act (BSA)

- *Primary US anti-money laundering (AML) law, established in 1970 and updated several times*
- *Amended by the USA PATRIOT Act of 2001, requiring financial institutions to enforce specific AML compliance programs*

Applicability for Stablecoin Issuers

- Currency is defined as legal tender, which excludes virtual currencies as long as they don't meet that requirement as of yet
 - Foreign exchange dealers are defined as entities exchanging the currencies of at least two countries, which excludes entities that manage fiat-to-crypto and crypto-to-crypto exchange
-

Financial Crimes Enforcement Network (FinCEN)

- *US Treasury Department bureau collecting and analyzing data on financial transactions to combat money laundering, terrorist financing, and other financial crimes*
- *Oversees BSA compliance*

Applicability for Stablecoin Issuers

- Expected clarification on the applicability of BSA regulations to create, obtain, distribute, exchange, accept, and transmit virtual currencies
 - Additional guidance on the application of 2013 FinCEN regulations to use, administer, and exchange virtual currencies
 - Entities engaging in virtual currency transactions fall under the MSB Rule, which updates MSB regulations for foreign exchange and money transmitting services
 - Real currency defined as “the coin and paper money of the United States or of any other country that [i] is designated as legal tender and that [ii] circulates and [iii] is customarily used and accepted as a medium of exchange in the country of issuance”
 - Virtual currency defined as “medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency” like legal tender
 - Convertible virtual currency defined as having an equivalent real currency value, and can substitute a real currency
-

Fifth Anti-Money Laundering Directive (AMLD5)

- *Enforced by the European Parliament, as the European Union's most comprehensive set of AML regulations*
- *Passed as the implementation of FATF recommendations*

Applicability for Stablecoin Issuers

- Fifth iteration after AMLD4 expands the scope of AML regulations to cryptocurrencies
 - Intended to bring crypto measures in line with US regulations, and a key step toward harmonizing cryptocurrency regulations and reducing regulatory arbitrage for criminal activity
 - Specifically covers exchanges between fiat and virtual currencies and custodian wallet providers that hold users' private keys
 - Formalizes AML/CTF and KYC requirements for crypto businesses, including CDD and transaction monitoring
 - EU-wide adoption expected by the end of 2019
-

Markets in Financial Instruments Directive (MiFID II)

- *EU legislative framework for financial markets, to improve investor protection, reporting requirements, and restoring confidence after the 2008 financial crisis*

Applicability for Stablecoin Issuers

- European Securities Market Authority (ESMA) advised to the European Commission, Council, and Parliament that all crypto platforms that trade crypto assets qualifying as financial instruments must to comply with MiFID II rules
 - MiFID II rules cover crypto asset trading platforms with central books and/or matching orders (multilateral trading platforms) and entities executing client orders with proprietary capital (broker dealers) (3 categories)
 - All EU regulations apply to crypto assets that qualify as financial instruments
 - Minimum AML rules apply to crypto assets that don't qualify as financial instruments, as well as additional disclosure requirements to inform investors about risks
 - Expected efforts to tailor EU rules to address risks and issues pertaining to crypto assets and asset tokens, such as the definition of "transferrable securities," "commodities," and the MiFID list of "financial instruments"
 - Expected reconsideration of required pre- and post-trade transparency measures, transaction and trade reporting to apply to crypto assets
-

General Data Protection Regulation (GDPR)

- *EU legislation to safeguard protection of personal data and privacy, and give individuals greater control over their information*

Applicability for Stablecoin Issuers

- Requirement for business processes to integrate policies and practices to keep data private, process it with individuals' consent, and withdraw it at any time upon individuals' request

- Processing of personal data must have a lawful basis, and individuals' consent must be freely given, specific, informed, and unambiguous
 - Individuals and data subjects are in charge of their own data and have a right to use it across institutions, a right to withdraw it and make it "forgotten", and a right to be informed about breaches impacting their rights and freedoms
-

Second Payments Services Directive (PSD2)

- *EU legislation for third party payments providers, with frameworks for all firms to adjust to*

Applicability for Stablecoin Issuers

- Requires corporate treasuries to optimize liquidity and visibility
 - Requires measures to prevent fraud and increase transparency and security
 - Provides measures to standardize and provide structure to the payment process (single secure messaging systems, subscription charges over single payment fees, mobile payments, dashboards integrating bank accounts)
 - Payment providers can request access to sensitive data from customers in order to make payments or collections on behalf of services
 - Allows consolidating multiple bank accounts through APIs
 - Allows direct interactions with other providers and financial institutions
-

Payment Card Industry Data Security Standard (PCI DSS)

- *Intended to promote a secure environment for transactions*

Applicability for Stablecoin Issuers

- Compliance measures for any entity accepting card payments and storing or processing consumer data
-

Appendix B: Applicable Licenses

Stablecoin issuers may fall under the following licences, regardless of whether they currently hold them officially. These licenses are not all mutually exclusive and can be acquired in combination. But because there is little clarity as to which licenses stablecoin issuers are required to comply with, issuers have thus far adopted them in fragmented ways.

Trust Company

This denotes a stablecoin issuer as a trustee, administering financial assets on behalf of stablecoin users. Taking the role of a fiduciary, an issuer typically commits to managing, recording, monitoring, and safeguarding the assets under its control. A number of stablecoin issuers have acquired state-issued limited purpose trust company charters, which are designated for specific trust functions such as depositing and safekeeping assets. Responsibilities for cryptocurrency activities yet remain open-ended, and so trust company status alone may not be sufficient to ensure adequate governance.

Money Services Business (MSB)

This is a license to transmit and convert money, intended for a broader scope of institutions than mainstream banks. MSB licenses also set significant anti-money laundering (AML) measures. Stablecoin issuers fall under the category of virtual currency “exchangers” managing conversions from fiat to stablecoin, cryptocurrency to stablecoin, etc. They are also virtual currency “administrators” by issuing and redeeming coins, placing and withdrawing them from circulation. Operating as “money transmitters,”³⁵ they are subject to MSB standards for registration, reporting, and record keeping.

These measures also apply to stablecoin issuers as potential payments providers, since they transfer and convert money. It would be difficult to justify a case for limitation or exemption from money transmitter status, due to their activities as representatives of money and exchangers of money related instruments. MSB licenses can have varying meanings in different jurisdictions, which can raise questions in case of disputes.

Regional Licenses

Depending on their intended uses and jurisdictions, stablecoin issuers may pursue licenses for specific lines of activity (US money transmission licenses, EU e-money transmission licenses, international company licenses, etc.). Yet these may be limited in scope in relation to overall stablecoin operations and may be implemented in fragmented ways. Moreover, if these licenses are not designed for cryptocurrencies, their applicability to stablecoins may require additional interpretation.

For example, a BitLicense is a business license for virtual currency activities involving New York state or its residents, issued by the New York State Department of Financial Services. BitLicenses clearly specify compliance for activities defined as receiving and transmitting virtual currencies; storing, holding, and maintaining custody or control on behalf of others; buying and selling virtual currencies; exchange services; and controlling, administering, or issuing virtual currencies. Because it is specifically designed for cryptocurrencies, this license may represent a higher stamp of legitimacy. While the exact numbers are unclear, as of Feb 2019, it is estimated that less than 15

³⁵“An administrator or exchanger that (1) accepts and transmits a convertible virtual currency or (2) buys or sells convertible virtual currency for any reason is a money transmitter under FinCEN’s regulations, unless a limitation to or exemption from the definition applies to the person. FinCEN’s regulations define the term “money transmitter” as a person that provides money transmission services, or any other person engaged in the transfer of funds. The term “money transmission services” means “the acceptance of currency, funds, or other value that substitutes for currency from one person and the transmission of currency, funds, or other value that substitutes for currency to another location or person by any means.” . . . The definition of a money transmitter does not differentiate between real currencies and convertible virtual currencies. Accepting and transmitting anything of value that substitutes for currency makes a person a money transmitter under the regulations implementing the BSA.”

BitLicenses have been granted to entities globally.³⁶ Stablecoin issuers would benefit from holding a BitLicense because they engage in most of the activities it covers.

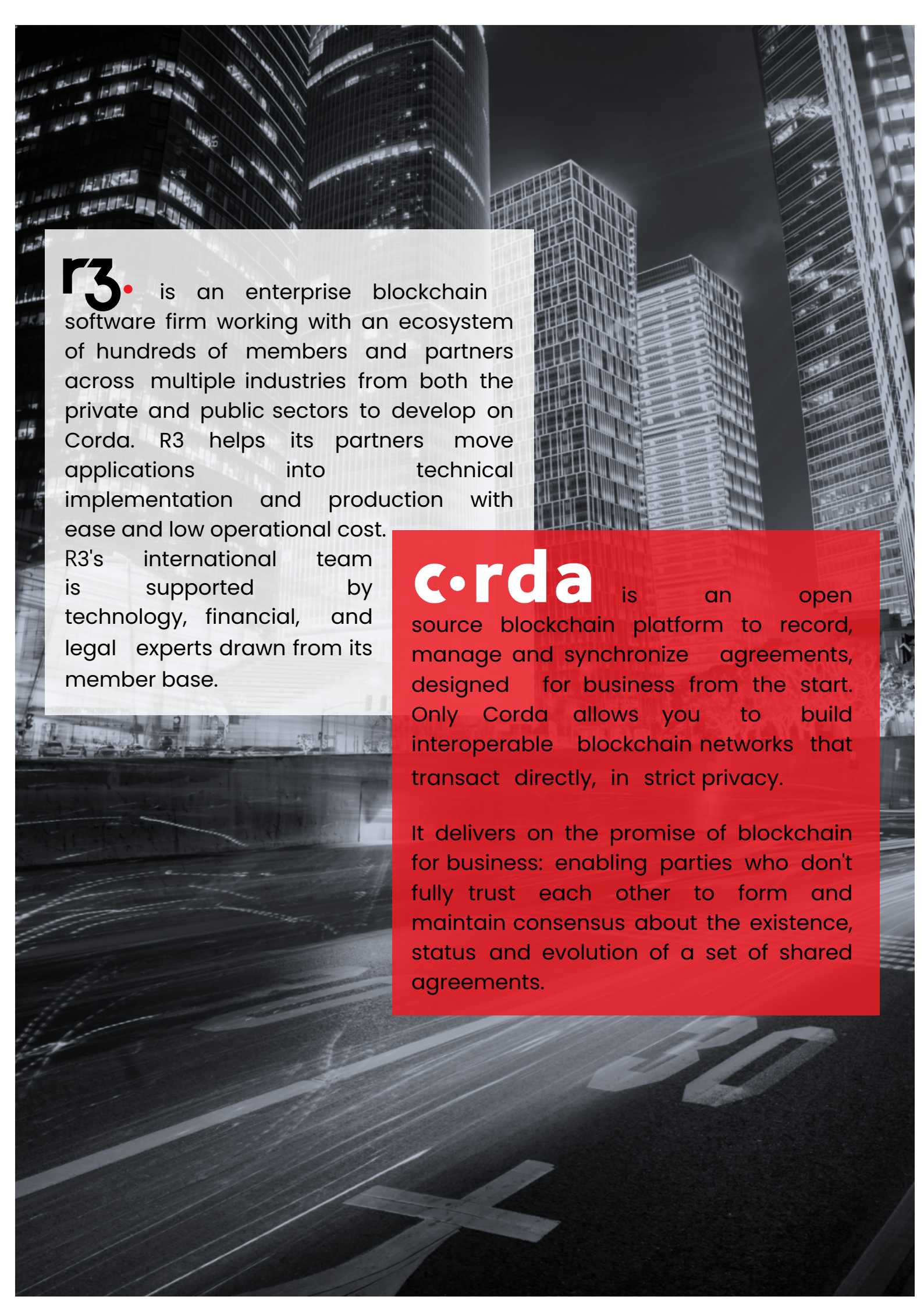
Future Governance in Code Standards

These would be highly relevant to issuers of algo-coins, as there are currently no licence standards for automated governance. Developments toward the replication of legal frameworks on the blockchain, such as a DAO-based legal system, may aim to uphold central banking activity on a blockchain/DLT system, in a context of consistent demand for stablecoins. Yet there still remain high barriers in order to achieve this, including cooperation with regulators and regulated entities.

³⁶BitLicenses have been issued to Circle, Ripple, Coinbase, bitFlyer, Genesis Global Trading, Xapo, Square, BitPay, and Robinhood.

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corda is an open source blockchain platform to record, manage and synchronize agreements, designed for business from the start. Only Corda allows you to build interoperable blockchain networks that transact directly, in strict privacy.

It delivers on the promise of blockchain for business: enabling parties who don't fully trust each other to form and maintain consensus about the existence, status and evolution of a set of shared agreements.