Cryptocurrency and Blockchain: Background and Regulatory Approaches

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Overview

Cryptocurrency, a subset of digital currency, is held up by some as the "currency of the future," and the technology that allows its existence could revolutionize business and government. As cryptocurrency becomes more mainstream, governments around the world have taken the first steps toward regulation, however advances in technology frequently outpace legislation. This report is intended first to provide an overview on cryptocurrencies and blockchain technology for a non-specialist and therefore simplifies the issue's fundamental concepts. The purpose of the report is to describe the principal characteristics of cryptocurrencies and the underlying technology that enables its existence—decentralized, distributed ledgers based on blockchains; next, the report outlines recent developments in regulations in the United States by various federal regulatory and enforcement agencies and the most relevant case law. Then, the report explores developments at the state level. Finally, the report summarizes the global regulatory landscape of international responses to the regulation of cryptocurrency. This summary is not comprehensive, but highlights the responses of major economic players as well as innovative practices. The report as a whole is intended to assist lawmakers in gaining a broad perspective of the current global regulatory market and the breadth of proposals for further policy and legislative guidance.

Crucial terminology

For government officials who grapple with the challenges of regulating cryptocurrency, understanding a common set of terms for how digital currency operates is a crucial first step. As digital currency evolves, many sources use different terminology to discuss this topic.[1] To avoid confusion, these terms will not be used interchangeably in this report, although they are in many reference sources. **Digital currency**, of which cryptocurrency is a subgroup, is a type of currency that exists only in electronic form as a digital representation[2] of value of either **real currency**[3] or **virtual currency**.[4]

Virtual currency can be further divided into centralized and decentralized types.

1. A note on terminology: the terms used throughout this report are intended to accurately reflect a concept that is still evolving. Nevertheless, the proposed vocabulary aims to provide a common language for developing conceptual tools to help policymakers better understand how digital currencies operate.

2. **Digital representation** is a representation of something in the form of digital data, i.e., computerized data that is represented using discrete, discontinuous values to embody information, and functions as such only when it is linked digitally, via the Internet, to the digital currency system whereby it is stored and transferred electronically.

3. **Real currency** (also referred to as "fiat currency," "real money," or "national currency") is the coin and paper money of a given country that is designated as its legal tender. It is distinct from "e-money," which is the digital representation of real currency used to electronically transfer value denominated in fiat currency.

4. **Virtual currency** is any currency that exists in the virtual world and can represent either real currency or digital currency (an example of which would be World of Warcraft gold). Traditionally, the term seemed to be used primarily for online entertainment in virtual worlds (related to buying in-app or in-game items).

Centralized virtual currency has a single, third-party administrating authority.[5] This third-party administrator issues the currency, establishes the rules for its use, maintains a central payment ledger, and redeems the currency by withdrawing it from circulation. Centralized virtual currency—for example, World of Warcraft's in-game currency unit referred to as "gold,"[6]—is not the subject of this report.[7] **Decentralized virtual currency** has no central administrating authority and no central monitoring system or oversight. **Cryptocurrency** refers to a math-based, decentralized virtual currency that is protected by cryptogenic algorithms to implement a distributed, decentralized, secure information economy.[8] The decentralization is achieved by peer-to-peer (P2P) architecture.[9] In this type of P2P architecture, peers in the network can harness various resources (computation, storage, and bandwidth) to coordinate the operations among its peers, including resource location, replication, and caching. The ledger containing transaction history is the blockchain.

Like the name indicates, a **blockchain** is a chain of blocks that contains information. The term itself refers to a type of data structure that allows a group of connected computers to maintain a single, updated, and secure digital ledger without the need for a central, unifying authority to validate transactions. The digital ledger file is not stored in central entity servers (like a bank) or a single data center (like the Department of Motor Vehicles); the digital ledger file is distributed across the globe via a network of private computers that are both storing data and executing computations. Each one of these computers represents a "node" of the blockchain network and each has a copy of the digital ledger file, collectively validating each new block and keeping synchronized replicas of the entire ledger. This concept is known as "distributed ledger technology," of which blockchain represents one form of implementation.

However, blockchain is best known as the underlying technology that enables the

5. This third-party individual or entity functions as a neutral intermediary between the principals (e.g., sender and receiver or buyer and seller) and oversees the transaction. For example, PayPal acts as a third party in a retail transaction; a third-party escrow company facilitates a real estate transaction; and game developers control the money supply in massively multiplayer online role-playing games (MMORPGs), which are online role-playing games in which a large number of players interact with one another within a virtual world.

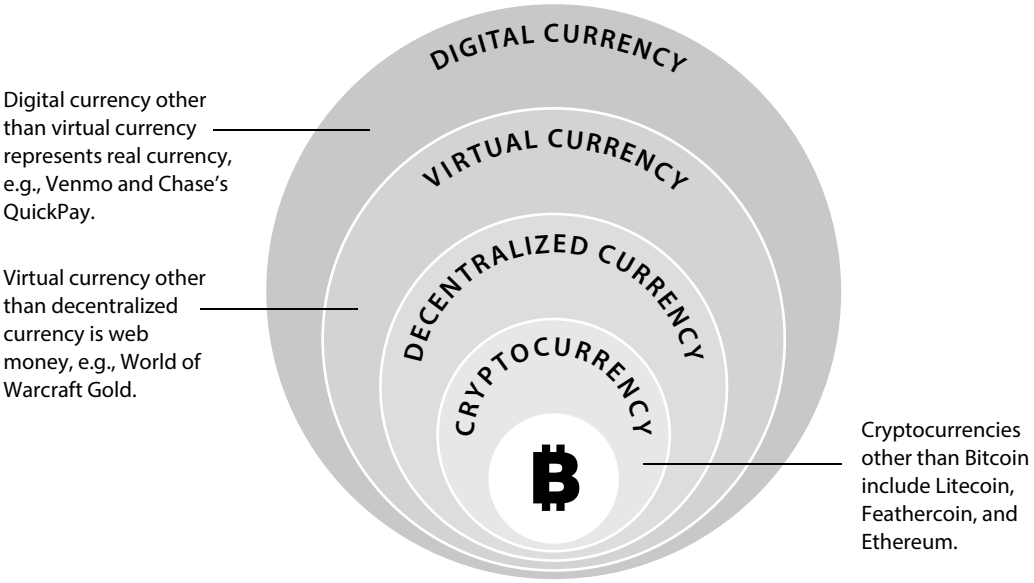
6. World of Warcraft, commonly referred to as "WoW," is an MMORPG developed and maintained by Blizzard Entertainment. Like other MMORPGs, WoW has a thriving virtual economy, based on WoW gold, whereby players can buy and sell items with each other as well as in-game characters, subject to artificial resource scarcities. Blizzard developers represent the centralized authority overseeing the WoW gold economy.

7. Note that virtual currency schemes can operate through a centralized, decentralized, or hybrid model. Other examples of centralized virtual currencies include e-Gold, Amazon Tokens, Liberty Reserve, Linden, etc. Examples of decentralized virtual currencies are Bitcoin, LiteCoin, FeatherCoin, Ethereum, etc.

8. **Cryptocurrency** is a type of digital currency that relies on digital security measures (cryptographic proofs) for confirmation of transactions. The term itself is a portmanteau of the words "cryptographic" and "currency." There is no one standard definition of cryptocurrency.

9. Peer-to-peer architecture (P2P architecture or P2P network) is a commonly used computer networking term in which each workstation (sometimes designated as a "node") has the same capabilities and responsibilities. Tasks are distributed among peers, simultaneously functioning as both "clients" and "servers" to other peers on the network. This is in contrast to client/server architecture in which some computers are dedicated to servicing others—communication is usually to and from a central server. The concept of P2P systems was popularized in the late 1990s by file-sharing systems like the music-sharing application Napster.

Figure 1. **Relationship of digital currencies**



existence of cryptocurrencies, like Bitcoin. Developed by the unidentified programmer known as Satoshi Nakamoto in 2008,[10] Bitcoin (or BTC) is an open-source, P2P payments network and represents the first and most well-known type of cryptocurrency. When Nakamoto published the original *Bitcoin White Paper*, Nakamoto's stated purpose was to avoid financial institutions and remove the necessity of a trusted third party to prevent double-spending. Today, there are over 1,800 cryptocurrencies and the total market capitalization of all cryptocurrencies is over $216 billion.[11] Most cryptocurrency is considered convertible as it is rapidly exchanged between digital currency and real currency. While some realized the appeal and potential of Bitcoin immediately, it took some others time before Bitcoin attracted widespread attention.

Yet, blockchains are not limited to Bitcoin or other cryptocurrencies. Blockchain technology has enjoyed a more stable appeal when compared to the volatility of Bitcoin. Financial institutions,[12] technology companies, and well-funded startups are focused on cryptocurrency (specifically) and the underlying blockchain (generally) to capitalize on the potential applications of this new technology. IBM, Microsoft, and Intel are offering blockchain as just another software tool for record keeping while companies like Goldman Sachs, Nasdaq, Walmart, and Visa have started to integrate the technology into

10. Satoshi Nakamoto (an alias), "Bitcoin: A Peer-to-Peer Electronic Payment System," p. 1, accessed January 30, 2018, https://bitcoin.org/bitcoin.pdf. Technically, the idea of secure electronic currency (ecash) appeared decades ago; see David Chaum, "Blind Signatures for Untraceable Payments," *Advances in Cryptology: Proceedings of Crypto* 82, no. 3 (1982): 199–203.

11. At the time of publication, the total number of cryptocurrencies listed was 1,865 and the total market capitalization of all cryptocurrencies was $224,794,142,161 (https://coinmarketcap.com/charts/).

12. Philip Stafford, "Blockchain initiative backed by 9 large investment banks," *Financial Times* (September 15, 2015).

their businesses, including rethinking how to trade complex assets (like derivatives, syndicated loans, and corporate bonds as well as other back-office operations); increasing payment security; decreasing payment transaction costs; and issuing and transferring the shares of a privately held company without the need for paper stock certificates. States are also experimenting with blockchain technology. In Illinois, the Cook County Recorder of Deeds will be the first land-titling office in the United States to record property transfer on the blockchain.

How a blockchain transaction works

Let's use an example to demonstrate how a blockchain transaction would work. Susie and Charlotte are having lunch when Charlotte realizes she forgot her wallet. If Charlotte wanted to send Susie $15 over the Internet, she would traditionally rely on a third-party service provider like PayPal, which keeps a ledger of the account holders' balances. Then PayPal deducts the amount from Charlotte's account and adds it to Susie's account. PayPal would have some kind of transaction fee that is bound by geography. Without third-party intermediaries and their ledgers, this $15 could be spent twice. Here's how: imagine this transaction without PayPal but with the $15 as a digital file attachment to an email; Charlotte could send $15 to Susie by attaching the "money file" to an email message, but this does not remove the attachment from Charlotte's computer as she would retain the file even after she sent it. Charlotte could then send the *same* "money file" to Pam. In computer science, this is known as the "double-spending" problem.[13] And until Bitcoin, the double-spending problem could be solved only by employing a ledger-keeping, trusted third party to validate the transaction.

Now let's say that Charlotte wanted to send Susie a cryptocurrency payment over the Internet utilizing blockchain technology. Both Charlotte and Susie would have to download software that creates a "digital wallet" on their electronic devices.[14] This digital wallet software stores the account information, which gives each user a unique identity. Note that this process is passive in the sense that Charlotte and Susie do not do any of the following steps besides sending and accepting the transaction.

Charlotte requests the transaction by creating a message. This transaction message is then broadcasted to a P2P network consisting of private computers, or nodes. The computer network of nodes begins the process of validating the transaction by using a complex algorithm. Remember that a verified transaction can involve more than just money—contracts, records, and other types of information can be sent over the Internet. Once verified, the transaction is combined with other transactions to create a new block

13. David Chaum, "Achieving Electronic Privacy," *Scientific American* (August 1992): 96–101.

14. Peer-to-peer payment system examples: clearXchange, Circle, Facebook Messenger, Google Wallet, PayPal.Me, Snapcash, Square Cash, Venmo, Chase's QuickPay, and Wells Fargo's SurePay.

of data for the ledger.[15] This new block is then added to the existing blockchain in a way that is permanent and unalterable. Because the transaction block is recorded across many nodes, the record cannot easily be altered retroactively without the alteration of all subsequent blocks in the blockchain as well as the consensus of the rest of the nodes in a given P2P network.

Transactions themselves are verified through the use of **asymmetric encryption**.[16] Encryption is a generic term that refers to the process of taking a message and scrambling its contents so that only certain people can read the message. Asymmetric encryption relies on two "keys"[17]: a public key and a private key. Your public key can be given to anyone with whom you wish to communicate electronically. Another person can use your public key to encode a message to send to you over the network. Anyone else that might intercept this message cannot read it—the message makes sense only to you because you hold the private key that can decode the message into readable text. Many people use public-key encryption daily without realizing it—like when a user connects to a website via Hypertext Transfer Protocol-Secure (HTTPS).[18] To enable the secure connection to an HTTPS website, like your bank's website, a user starts the process by sending a request to the bank's site. The bank's site then sends its public key to the user, and the user's computer then generates a new, secure key (to be used in the HTTPS connection), encrypts it with the website's public key, and sends that back to the bank's site. The user knows that only the website that has the private key can decrypt the information the user just sent. With the new, user-generated key, the bank's website creates the secure connection with the user. The process is passive because all you do is sign in with your account name and password.

In our example, both Charlotte and Susie would have two "keys" in order to conduct the transactions. These keys are generated when they download the digital wallet software, which is an address within the cryptocurrency network, onto their electronic devices. A public key, which helps identify their transactions on the blockchain as well as function akin to an account number, and a private key, which is necessary to conduct a transaction with a public key as well as function akin to a password. Access to the wallet

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15. To understand transaction data and the miner's "proof of work," cryptographic hashing (or just "hashing") is the process of mapping digital data of any arbitrary size to data of a fixed size. Basically, hashing takes some information that is readable (for example, hello) and translates it into something that is not (for example, "hello" → # → "8rs00nb2p7ojh6kj9mno"). Blocks hold batches of valid transactions that are given hash values and encoded into a Merkle tree. A Merkle tree is a cryptographic concept introduced by Ralph Merkle in 1980; Ralph C. Merkle, "Protocols for Public Key Cryptosystems" (conference paper, Oakland, CA, April 1980). A Merkle tree is a generalization of a hash list and hash chains. Note that this explanation vastly oversimplifies a complex topic and process. For a nontechnical, beginner's explanation on how the process works, see Daniel Drescher, *Blockchain Basics: A Non-Technical Introduction in 25 Steps* (New York: Apress, 2017). For an explanation on the significance of cryptocurrency, see Andreas M. Antonopoulos, *The Internet of Money* (New York: Merkle Bloom, 2016).

16. For a beginner's introduction on public-key encryption, see Christof Paar, Jan Pelzl, and Bart Preneel, eds., "Introduction to Public-Key Cryptography," *Understanding Cryptography: A Textbook for Students and Practitioners* (New York: Springer, 2010): 149–171. Also note that the term "public-key cryptography" is used interchangeably with "asymmetric cryptography" and "public-key encryption"; they both denote exactly the same thing and are used synonymously.

17. Keys are metaphorical. It is really information about encoding and decoding messages.

18. An HTTPS website will have the icon (frequently a lock symbol) in the browser window. This example is adapted from a CRS Report, R45116, *Blockchain: Background and Policy Issues*, by Chris Jaikaran (2).

is based on possession of the wallet's private key. Only those with a private key can decrypt data encrypted with the public key or encrypt the data for public key decryption, thereby creating a signature.[19]

In the same transaction message that Charlotte just created, the message also contains Susie's public key and Charlotte's private key, which only acts to authenticate that Charlotte initiated the message (i.e., Charlotte is the originator of the payment).[20] Charlotte's message is then encrypted by using Susie's public key to ensure that *only* Susie, with her corresponding private key, can read it once opened. Once the message is sent, not even Charlotte could look at that message if she intercepted it because *only Susie's private key* can give meaning to the scrambled message. To put it simply, Charlotte's message cannot be read in its original form unless Susie's private key is used to decode the message.

The transaction—thus the transfer of ownership—details are recorded, time-stamped, and displayed in one "block" of the blockchain and will now be added to the transaction pool to await authentication by the nodes in the network. The P2P network depends on users providing their computer's processing power to do the logging and reconciling of transactions. Every block in the blockchain is revalidated during the formation of each new block, so as the blockchain grows, solving each block through cryptography becomes more difficult. Upon verification, the block is completed and added to the blockchain.

The verification and reconciliation of transactions require solving increasingly complex mathematical problems, and the process is commonly referred to as mining.[21] Miners provide the computing power needed to verify encoded transactions on the cryptocurrency's network. By completing this task, miners receive newly created crypto-coins, like Bitcoin, as payment for their services.[22] Think of these miners as competitive bookkeepers—miners that solve the problems the fastest get rewarded and get to unlock and claim the next pool of transactions. [23] In the initial days of mining, solving could be done on a regular laptop. As more processing power is dedicated to mining, the protocol increases the difficulty of the mathematical problems to ensure that mining happens at a predict-

19. For more information on encryption, see Chris Jaikaran, "Encryption: Frequently Asked Questions," *CRS Report* R44642 (September 28, 2016).

20. The scheme described in this example assumes that there is a means for the sender of the message to obtain an authentic copy of the intended receiver's public key.

21. Please bear with any simplifications the report makes; the solving of complex algorithms has a lot of multifaceted, mathematical research behind it outside our present scope.

22. "To perform the work of mining, bitcoin miners download free bitcoin software that they use to solve complex equations. These equations serve to verify the validity of bitcoin transactions by grouping several transactions into a block and mathematically proving that the transactions occurred and do not represent double-spending of a bitcoin. When a miner's computer solves an equation, the bitcoin network accepts the block of transactions as valid and creates 25 new bitcoins and awards them to the successful miner." (U.S. Gov't Accountability Off., GAO-13-516, "Virtual Economies and Currencies: Additional IRS Guidance Could Reduce Tax Compliance Risks," 6 (2013). See also Christopher Rajotte, Andrew Ittleman, and Mitchell Fuerst, "Bitcoin Taxation: Understanding IRS Notice 2014-21," *Bitcoin Magazine* (April 4, 2014).

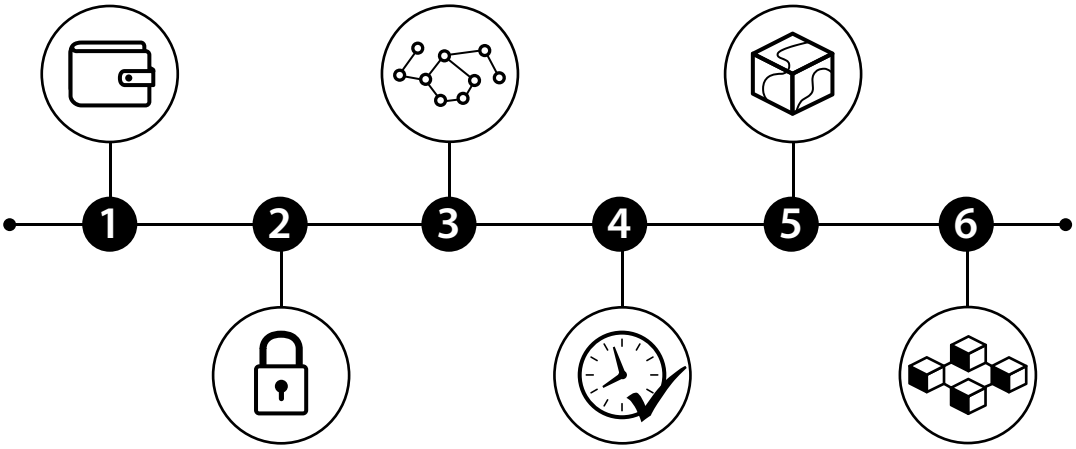
23. Omri Y. Marian, "Are Cryptocurrencies 'Super' Tax Havens?" *Michigan Law Review* 112, no. 38 (2013): 41–42. Each Bitcoin has its own private, digital fingerprint that cannot be used again after it was mined.

Figure 2. **Charlotte and Susie's cryptocurrency transaction**

1. Charlotte and Susie download digital wallets, providing the encryption keys neccessary for the transaction.

3. The message is broadcast to a peer-to-peer (P2P) network consisting of private computers, or nodes.

5. The transaction is combined with other transactions to create a new block of data for the ledger.



2. Charlotte creates a message requesting a $15 transaction to repay Susie. The message is encrypted using Susie's public key, ensuring that only Susie can decrypt the message using her private key. The message also includes Charlotte's private key to validate her status as the initiating entity.

4. The network validates the transaction and Charlotte's user status, then records and time-stamps it to verify that the cryptocurrency has changed possession.

6. The new block of data is added to the existing blockchain in a way that is permanent and unalterable.

able and limited rate. As the difficulty level increased, so did the level of processing power. Nowadays, you would need an expensive and dedicated machine worth thousands of dollars to be competitive. According to Digiconomist's Bitcoin Energy Consumption Index, as of August 16, 2018, Bitcoin's current annual electricity consumption stands at 73.12 terawatt hours. If Bitcoin were a country, its use is closest to the annual electricity consumption of Austria. However, the process of mining will not continue forever, at least for Bitcoin. It is important to note that there is a finite number of Bitcoins available. Satoshi Nakamoto chose to cap the total number of Bitcoins at 21 million, which miners are projected to reach in 2140.[24]

Federal regulatory activity

Most of the federal regulatory activity has been on cryptocurrency rather than blockchain technology.[25] Digital currencies, especially cryptocurrencies, do not fit comfort-

24. Ritchie S. King, Sam Williams, and David Yanofsky, "By reading this article, you're mining bitcoins," *Quartz* (December 2013), http://qz.com/154877/by-reading-this-page-you-are-mining-bitcoins/. The limit of the total number of Bitcoins that can be mined is meant to resemble other resources, like gold, that have a limited and finite supply.

25. Federal agencies are currently in the process of evaluating blockchain (distributed ledger) technology. The US Government Services Administration's Emerging Citizen Technology Program recently launched the US federal blockchain program

AML—Anti-money laundering law

BSA—Bank Secrecy Act

BTC—Bitcoin

BTCST—Bitcoin Savings & Trust

CBOE—Chicago Board Options Exchange

CFTC—Commodity Futures Trading Commission

CME—Chicago Mercantile Exchange

CRS—Congressional Research Service

DCO—Derivatives Clearing Organization

DOJ—US Department of Justice

FinCEN—Financial Crimes Enforcement Network

GSA—Government Services Administration

HTTPS—Hypertext Transfer Protocol-Secure

ICO—Initial coin offering

IRS—Internal Revenue Service

MMORPG—Massively Multiplayer Online Role-Playing Game

MSB—Money service business

P2P—Peer-to-peer

SEC—Securities Exchange Commission

ably within any existing statutory definition—it is neither money nor currency, but instead a digital representation of value issued by private developers and denominated in their own unit of account.[26] These cryptocurrencies have the properties of electronic payment systems, a currency, and a commodity, among other things. In late 2013, the first congressional hearing on virtual currency was held to outline the pros and cons of Bitcoin, the most well-known example of a cryptocurrency.[27] In a letter to US senators ahead of the congressional hearing, then-Federal Reserve Chairman Ben Bernanke said that virtual currencies "may hold long-term promise, particularly if the innovations promote a faster, more secure, and more efficient payment system."[28]

Money. Both the US Department of Justice (DOJ)[29] and the Financial Crimes Enforcement Network (FinCEN) of the US Department of the Treasury have issued official statements regarding the regulation of virtual currencies. In March 2013, FinCEN issued

for federal agencies and US businesses interested in exploring using distributed ledger technology within government. The GSA hosted the first US Federal Blockchain Forum in July 2017, bringing together more than 100 federal managers from dozens of unique agencies to discuss use cases, limitations, and possible solutions. A list of current programs, initiatives, pilots, or other efforts in progress is available at https://emerging.digital.gov/.

26. To be clear, digital currency once again should be distinguished between electronic money, the digital equivalent of cash, whereby monetary value is electronically stored on a technical device in possession of the customer and is increased or decreased whenever the owner of the device uses it to make a sale or purchase.

27. Historically, virtual currencies have been viewed as a form of "electronic money" or "stored-value." It is an innovation that has been discussed since 1995. See U.S. House Subcommittee on Domestic and International Monetary Policy, *The Future of Money—Part 2* (hearing, Washington DC: Government Printing Office, 1996), October 11, 1995.

28. U.S. Senate Committee on Homeland Security and Governmental Affairs. *Virtual Currencies*, by Ben Bernanke (Washington DC: Government Printing Office, 2014), September 6, 2013. The hearing, which was prompted by the closure of the Silk Road website, ended up providing a financial boost for the currency, because US officials talked about it as a legitimate source of money, as opposed to discussing only its role in illegal activities.

29. Jennifer Shasky Calvery, "Combating Transnational Organized Crime: International Money Laundering as a Threat to Our Financial Systems," (statement for the record before the Subcommittee on Crime, Terrorism, and Homeland Security of the House Committee on the Judiciary, February 8, 2012), http://www.justice.gov/ola/testimony/112-2/02-08-12-crm-shasky-calvery-testimony.pdf.

guidance on the application of the Bank Secrecy Act (BSA)[30] to virtual currencies and determined that Bitcoin and other virtual currencies are covered by 18 U.S.C. § 1960, as well as the money laundering and spending statutes 18 U.S.C. §§ 1956 and 1957.[31] This is because FinCEN classified digital currencies as "money service businesses" (MSBs).[32] Pursuant to 31 U.S.C. § 5330, all MSBs are required to file registration paperwork (and renew it every two years), maintain records, complete currency transaction reports, and file suspicious activity reports. In addition, the DOJ guidance states plainly:

> Any money transmitter that fails to register with FinCEN or to obtain the requisite state licensing may be subject to criminal prosecution under 18 U.S.C. § 1960. Additionally, the general money laundering and spending statutes, 18 U.S.C. §§ 1956 and 1957, cover financial transactions involving virtual currencies. Finally, where virtual currencies are used in furtherance of underlying criminal activity, the Department can rely on traditional criminal statutes proscribing that activity, such as narcotics, cybercrime, child exploitation, and firearms laws.

The FinCEN further delineated that the guidance is not specific to currency as it applies to a value that acts as a substitute for money and ultimately applies to digital currency. Less than a year later, FinCEN issued another document that clarified the application of its regulations to virtual currency mining. In early March 2018, FinCEN published a letter, which had previously been sent a few days earlier to Senator Ron Wyden of the Senate Committee on Finance, that reiterated that the Bank Secrecy Act and anti-money laundering laws and regulations applied to virtual currency exchanges and administrators that are based in the United States or that do business in whole or substantial part in the United States.

Securities/Investment Contracts. According to the Securities Exchange Commission (SEC) Chairman Jay Clayton's most recent statement, Bitcoin can be considered an "investment contract" because it passes the four factors of the *Howey* Test.[33] In addition,

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30. The Bank Secrecy Act of 1970 (BSA), also known as the Currency and Foreign Transactions Reporting Act, is a US law requiring financial institutions in the United States to assist government agencies to detect and prevent money laundering. The BSA is sometimes referred to as an anti-money laundering law (AML) or jointly as BSA/AML. It has been amended several times, including provisions in Title III of the Patriot Act, which amended the BSA to require financial institutions to establish anti-money laundering programs.

31. Per DOJ guidance: "Any money transmitter that fails to register with FinCEN or to obtain the requisite state licensing may be subject to criminal prosecution under 18 U.S.C. § 1960. Additionally, the general money laundering and spending statutes, 18 U.S.C. §§ 1956 and 1957, cover financial transactions involving virtual currencies. Finally, where virtual currencies are used in furtherance of underlying criminal activity, the Department can rely on traditional criminal statutes proscribing that activity, such as narcotics, cybercrime, child exploitation, and firearms laws."

32. The two-prong test provided by FinCEN for money transmitters who administer or exchange digital currencies involves an entity that "(1) accepts and transmits a convertible virtual currency, or (2) buys or sells convertible virtual currency for any reason." (Department of the Treasury Financial Crimes Enforcement Network, "Application of FinCEN's Regulation to Persons Administering, Exchanging, or Using Virtual Currencies," March 18, 2013, 3). Note that state laws regarding MSB registration and filing requirements are scattered and vary greatly by region.

33. The *Howey* standard refers to the Supreme Court's long-established standard in *SEC v. W.J. Howey Co.*, 328 U.S. 293 (1946) to determine whether certain transactions qualify as "investment contracts." Under this test, an investment is a security under the Securities Act of 1933 and the Securities Exchange Act of 1934 if there is "an investment of money in a common

in July 2017, according to a Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934, the SEC concluded that "Decentralized Autonomous Organization (DAO)[34] tokens are securities" and that "foundational principles of the securities laws apply to virtual organizations or capital raising entities making use of distributed ledger technology." SEC's report indicates the need for greater cryptocurrency regulation. The SEC offered additional caution to the ICO market on December 11, 2017, when it issued a cease and desist order to Munchee Inc., a smartphone app developer that sold digital tokens to raise funds.[35] In March 2018, Chairman Clayton released the "Statement on Cryptocurrencies and Initial Coin Offerings," scrutinizing the characterization of tokens, including an example of when token use may not be considered securities. Through this latest guidance, the SEC has clearly signaled its intent to monitor the ICO market and proactively enforce securities regulations.

Commodities. In 2015, the Commodity Futures Trading Commission (CFTC)[36] determined that virtual currencies are "commodities" and any fraud or manipulation involving cryptocurrencies in interstate commerce falls under its authority. In 2017, the CFTC issued a statement arguing that there is no inconsistency between the SEC's position that some virtual currencies can be securities and the CFTC's position that virtual tokens may be commodities or derivatives contracts depending on the facts and circumstances. Later that same year, Bitcoin derivatives were introduced to the cryptocurrency market by LedgerX, a CFTC-regulated Swap Execution Facility (SEF), and Derivatives Clearing Organization (DCO). The CFTC also allowed the CBOE exchange operator to trade Bitcoin futures.[37]

Property. To make things even more confusing, the Internal Revenue Service (IRS) adds another classification because it determined that virtual currencies should be treated as "property" under US tax law. In late March 2014, the IRS issued a guidance that explained how existing general tax principles apply to virtual currencies. In late December 2017, and embedded in the Tax Cuts and Jobs Act, Congress tweaked the language of Section 1031 of the Internal Revenue Code to ensure that cryptocurrency holders could

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enterprise with a reasonable expectation of profits to be derived primarily from the entrepreneurial or managerial efforts of others" (*Id.* at 301).

34. DAO was a decentralized venture fund based on Ethereum (an open-source, public, blockchain-based, distributed computing platform and operating system as well as a type of cryptocurrency-ETH). It was an Initial Coin Offering, commonly referred to as an ICO, which is a fundraising mechanism in which new projects sell their underlying crypto-tokens in exchange for bitcoin and ether. An ICO functions like an Initial Public Offering (IPO) in which investors purchase shares of a company.

35. Known colloquially as "the Munchee Order," this order emphasizes that the SEC will apply the facts and circumstances analysis under *Howey* to ICOs irrespective of token labels or classifications.

36. The CFTC is the regulatory body responsible for overseeing the on- and off-exchange trades of futures contracts. The CFTC has oversight over futures, options, and derivatives contracts, regardless of whether they involve virtual currencies. The primary statute that gives power to the CFTC is the Commodity Exchange Act (CEA).

37. The CME Group, CBOE's rival and the world's leading derivatives marketplace, announced the introduction of Bitcoin futures trading on their markets.

not argue that their exchange fell within the meaning of Section 1031.[38] The sale or exchange of cryptocurrency, or using cryptocurrency to pay for goods or services, has tax consequences that would now result in a tax liability or tax reporting obligations or both for income tax purposes.

This section highlights the fundamental problem in trying to graft a complex network of laws, which are enforced by different federal agencies, onto a new technology. Depending on the circumstances, virtual currencies can look like commodities, securities, or other forms of investment, money, funds, or assets The next section on case law demonstrates that courts face the exact same fundamental problem faced by federal agencies.

Relevant case law

Despite somewhat conflicting classifications by federal regulators as to what cryptocurrency actually is, a few courts have addressed this issue directly. Although litigation in cryptocurrency is relatively new, it can generally be broken down into four categories: regulatory litigation and proceedings; summary suspensions/cease and desist orders; civil litigation involving investors in ICOs, including class actions; and litigation brought by cryptocurrency companies against regulators or key market players. Currently, case law available for review that is relevant to cryptocurrency is limited and so the possibility remains for higher courts to overturn lower level court decisions.

US v. Faiella.[39] In the Southern District of New York, Robert Faiella was prosecuted for a violation of 18 U.S.C. § 1960[40] for operating as an unlicensed MSB by taking cash deposits, exchanging them for Bitcoins, and laundering the Bitcoins. During his trial, Faiella argued that Bitcoins are not money, that operating a Bitcoin exchange does not facilitate transmitting money as prescribed under 18 U.S.C. § 1960, and thus he was not acting as a money transmitter. The court disagreed. US District Judge Jed Rakoff ruled that Bitcoin qualified as money, arguing that "[m]oney in ordinary parlance means 'something generally accepted as a medium of exchange, a measure of value, or a means of payment.' Bitcoin clearly qualifies as 'money.'"[41] This ruling provided the first definition of "Bitcoin," and by extension other convertible cryptocurrencies, by considering Bitcoin akin to money at least in federal case law.

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38. The language had included reference to "property" and was replaced with "real property."

39. United States v. Faiella, 39 F. Supp. 3d 544 (S.D.N.Y. 2014).

40. 18 U.S.C. § 1960, the federal prohibition against operating an unlicensed money transmitting business, seems to be a popular tool used by the government to prosecute Bitcoin businesses. Section 1960 defines "money transmitting" to include "transferring funds on behalf of the public by any and all means."

41. In the determination of whether Bitcoin is money, the court leans heavily on Merriam-Webster's definition of what is money, noting that money may be something that functions as a unit of account when a coin or physical currency does not exist. Because Bitcoin can be used to purchase goods and services, in the eyes of the court, Bitcoin is money.

US v. Ulbricht.[42] In the Southern District of New York, the federal government prosecuted Ross Ulbricht for money laundering under 18 U.S.C. § 1956, among other charges. Ulbricht (alias "Dread Pirate Roberts") created in 2011 an online black market website known as "Silk Road." The website functioned as a part of the darknet market[43] (which is a part of the dark web), an overlay network that uses the Internet but requires specific software, configuration, or authorization in order to access. Silk Road enabled users around the world to buy and sell illegal drugs as well as other illicit goods and services anonymously.[44] Silk Road "was used by several thousand drug dealers and other unlawful vendors to distribute hundreds of kilograms of illegal drugs…to well over a hundred thousand buyers worldwide, and to launder hundreds of millions of dollars derived from these unlawful transactions."[45] Just like in the previous case, the court's treatment of Bitcoin suggests that it is categorized as "money" for certain purposes under federal law.

SEC v. Shavers.[46] In 2014, the Eastern District of Texas addressed the nature of Bitcoin as it applies to investment securities. The SEC accused Trendon Shavers, the first defendant and founder of the Bitcoin Savings & Trust (BTCST), of running a Bitcoin Ponzi scheme that defrauded BTCST investors of more than 700,000 bitcoins—worth $4.5 million at the time of Shavers's arrest. The court determined that the BTCST investments the defendants sold met the definition of "investment contract" and, as such, are securities. Magistrate Judge Amos Mazzant issued a memorandum opinion, arguing:

It is clear that Bitcoin can be used as money. It can be used to purchase goods or services, and as Shavers stated, used to pay for individual living expenses. The only limitation of Bitcoin is that it is limited to those places that accept it as currency. However, it can also be exchanged for conventional currencies, such as the U.S. dollar, Euro, Yen, and Yuan. Therefore, Bitcoin is a currency or form of money, and investors wishing to invest in BTCST provided an investment of money.[47]

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42. United States v. Ulbricht, 31 F. Supp. 3d 540 (S.D.N.Y. 2014).

43. Functioning primarily as an online black market, darknet markets sell or broker transactions involving illegal drugs, unlicensed pharmaceuticals, and stolen credit card details, among other products.

44. While all Bitcoin transactions are recorded in the blockchain, if users avoided linking their true identities to their online wallets, transactions can be conducted with considerable anonymity.

45. Ulbricht's *Superseding Indictment* filed August 21, 2014, at 2, ¶ 2.

46. Sec. & Exch. Comm'n v. Shavers, No. 4:13–CV–416, 2013 WL 4028182 (E.D. Tex. Aug. 6, 2013). The court found that it had subject matter jurisdiction pursuant to Sections 20 and 22 of the Securities Act of 1933 (15 U.S.C. §§ 77t and 77v) and Sections 21 and 27 of the Exchange Act of 1934 (15 U.S.C. §§ 78u and 78aa). In addition to this finding, because the court found that the BTCST investments are "investment contracts" (and thus "securities"), the court did not consider whether the BTCST investments were also "notes."

47. For other cases involving SEC's regulatory authority, ICOs, and virtual currency as "securities," *see* Baker v. Dynamic Ledger Solutions, Inc., No. 3:17-cv-06850 (N.D. Cal. Nov. 2017); Okusko v. Dynamic Ledger Solutions, Inc., No. 3:17-cv-06829 (N.D. Cal. Nov. 2017); GGCC, LLC v. Dynamic Ledger Solutions, Inc., No. 3:17-cv-06779 (N.D. Cal. Nov. 2017); Gaviria v. Dynamic Ledger Solutions, Inc., No. 6:17-cv-01959 (M.D. Fla. Nov. 2017); *see also* MacDonald v. Dynamic Ledger Solutions, Inc., No. 3:17-cv-07095 (N.D. Cal. Dec. 2017) (asserting claims for violations of California state securities law); Leidel v. Project Investors, Inc., No. 9:16-cv-80060 (S.D. Fla. Jan. 2017); Rensel v. Centra Tech, Inc., No. 1:17-cv-24500 (S.D. Fla. Dec. 2017).

US v. Murgio.[48] In September 2016, a memorandum and order was filed in the Southern District of New York in response to pretrial motions to dismiss the case US v. Murgio. The government had levied charges against Anthony R. Murgio for violation of 18 U.S.C §§ 1960 and 1956, among other charges, alleging that Murgio operated a Bitcoin-related money transmitting business without proper licensing and registration.[49] Murgio contended that Bitcoins were not "funds" as prescribed in the statute and as such, the charges were not applicable. U.S. District Judge Alison Nathan denied the motion. Judge Nathan concluded that virtual currency qualified as "funds" under 18 U.S.C. § 1960(b)(2).[50] The key term was **funds** in the argument and so Judge Nathan referred to a definition given by Merriam-Webster's dictionary to assess the meaning of funds. Judge Nathan concluded that "[d]ictionaries, courts, and the statute's legislative history all point to the same conclusion: Bitcoins are funds." The court also rejected the context of prior guidance from federal agencies (meaning the FinCEN, SEC, IRS, CFTC) because the agencies failed to define the term funds.[51]

State of Florida v. Espinoza.[52] In 2016, a decision by Judge Teresa Mary Pooler, from the Eleventh Judicial Circuit Court of Florida, raised concerns over how federal and state courts consider the unregulated cryptocurrency, Bitcoin. In February 2014, the state of Florida charged Michel Abner Espinoza with violating state money transmission regulation (meaning that he unlawfully operated a money services business) and money laundering laws.[53] Judge Pooler opined that "[t]he court is not an expert in economics; however, it is very clear, even to someone with limited knowledge in the area, the Bitcoin has a long way to go before it is the equivalent of money."[54] Judge Pooler's decision contradicts the position held by FinCEN in that the direct purchase and sale of Bitcoin qualifies as money transmission under the Bank Secrecy Act as well as *Faiella*, *Shavers*, and *Murgio*.

US v. Petix. In the Western District of New York, the government accused defendant Richard Petix of running an unlicensed money transmitting business through the transmission of Bitcoin in violation of 18 U.S.C. § 1960. Petix argued that Bitcoin is not money, but rather private property like precious metals, while the government argued

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48. U.S. v. Murgio, No. 15-CR-00769, 209 F. Supp. 3d 698 (S.D.N.Y., 2016).

49. A Bitcoin exchange called "Coin.mx."

50. *Murgio* defined "funds" under 18 U.S.C. § 1960 as "pecuniary resources, which are generally accepted as a medium of exchange or a means of payment" (*id.* at 3). Judge Nathan cited Merriam-Webster's dictionary, stating that its dictionary definition of funds include "available pecuniary resources" (*id.* at 5, ¶ 4). Judge Nathan further defined the term pecuniary as "taking the form of or consisting of money" (*id.*). Judge Nathan also stated that Merriam-Webster's dictionary defines money as "something generally accepted as a medium of exchange" (*id.*).

51. *See also* United States v. Budovsky, (S.D.N.Y. Sept. 23, 2015).

52. Order Granting Defendant's Motion to Dismiss the Information, State of Florida v. Espinoza, No. F14–2923 (Fla. Cir. Ct. dismissed July 22, 2016).

53. Fla. Stat. 896.101, also known as "Florida's Anti-Money Laundering Statute."

54. Order Granting Defendant's Motion to Dismiss the Information, State of Florida v. Espinoza, No. F14–2923 (Fla. Cir. Ct. dismissed July 22, 2016), at 7.

that Bitcoin is a "medium of exchange" and therefore falls under § 1960. After an oral argument on Petix's motion to dismiss, Magistrate Judge Hugh B. Scott granted Petix's motion. But before the magistrate's recommendation could be accepted or rejected by a district court, Petix accepted a plea deal. Moreover, its reasoning has been rejected by at least one other district court.

CFTC v. McDonnell. Since 2015, the CFTC has taken the position that Bitcoin and other virtual currencies should be defined as commodities and thus subject to agency regulation. The issue has not been resolved by any court until March 2018. The United States District Court for the Eastern District of New York recently deemed cryptocurrencies "commodities" subject to oversight by the CFTC.[55] Judge Jack Weinstein cataloged the myriad range of options for regulation of cryptocurrency based on existing frameworks—from no government regulation whatsoever to partial regulation through criminal law prosecutions of Ponzi-like schemes, to regulation by private exchanges,[56] to regulation by the CFTC, the SEC, the IRS,[57] DOJ, and the Treasury Department,[58] as well as a range of state agencies.[59]

Cryptocurrency case law demonstrates the complicated nature of classifying an emerging technology within an existing legal framework. It seems that everyone has an opinion as to the legal status of cryptocurrency. Early law enforcement activity focused on concerns over cryptocurrency use and criminal activity. Meanwhile, regulatory guidance differs from agency to agency: FinCEN sees cryptocurrencies as money; the SEC considers them securities; the CFTC considers them commodities; the IRS taxes them as property. Add this complicated background to the fact that judges have not offered definitive regulatory clarity. At the very least, lawmakers tackling this subject will face a number of challenging issues.

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55. CFTC v. McDonnell, 287 F. Supp. 3d 213 (E.D.N.Y. 2018) at 228. Note that this ruling was highlight fact–dependent. The question of what cryptocurrency is will always depend on the specific underlying facts and circumstances.

56. Regulation by private exchanges. See Asian Review, "Japan Tries Light Touch in Bringing Cryptocurrencies out of Regulatory Limbo," *NIKKEI* (September 30, 2017). ("[T]here is a growing need for exchange operators to self-police to protect investors from taking on too much risk and other dangers.")

57. See also Jeff John Roberts, "The SEC's New Cyber Unit Just Filed Its First Charges Over an ICO Scam," *Fortune* (December 4, 2017); Robert J. Anello, "New-Wave Legal Challenges for Bitcoin and Other CryptoCurrencies," *Law Journal Newsletters* (November 2017) ("Over the last few months the SEC has demonstrated that it intends to pursue enforcement of securities law on certain cryptocurrency transactions, especially increasingly popular [Initial Coin Offerings], in response to concerns about fraud and manipulation") (at 20); Tara Siegel Bernard, "When Trading in Bitcoin, Keep the Tax Man in Mind," *New York Times* (January 18, 2018), https://www.nytimes.com/2018/01/18/your-money/bitcoin-irs-taxes.html. ("In late 2016, the I.R.S. made it clear that it was searching for cryptocurrency tax evaders: The agency sent a broad request to Coinbase, the largest Bitcoin exchange in the United States, requesting records for all customers who bought digital currency from the company from 2013 to 2015")

58. Regulation by the Treasury Department's FinCEN Network.

59. For example: New York. See Press Release, "DFS Grants Virtual Currency License to Coinbase, Inc.," N.Y. Department of Financial Services, Jan. 17, 2017. ("DFS has approved six firms for virtual currency charters or licenses, while denying those applications that did not meet DFS's standards. In addition to bitFlyer USA, DFS has granted licenses to Coinbase Inc., XRP II and Circle Internet Financial, and charters to Gemini Trust Company and itBit Trust Company.")

State regulatory activity

Thus far, Congress has not exercised its constitutional power under the commerce clause to regulate cryptocurrencies and blockchain technology to the exclusion of the states.[60] This means that the states remain free to enforce their own legislation.

On Cryptocurrency. Sixteen states—Arizona, Alabama, California, Connecticut, Georgia, Kentucky, Maryland, New Hampshire, New York, North Carolina, Oregon, Pennsylvania, Tennessee, Vermont, Washington, and Wyoming—have enacted legislation related to virtual currency, ICOs, or cryptocurrency. There has been a wide range of bills introduced in the current legislative session pertaining to the regulation of cryptocurrency; some bills aim to strengthen regulation of cryptocurrencies, some bills aim to loosen regulations by exempting cryptocurrencies from existing regulatory statutes, and other bills pertain to different topics altogether.

Some lawmakers have proposed a uniform regulatory framework for virtual currency businesses in their respective states. Bills in Connecticut (CT HB 5496), Hawaii (HI SB 2129), and Nebraska (NE LB 987) would adopt a model bill proposed by the Uniform Law Commission called the Regulation of Virtual Currency Businesses Act. These bills would regulate the virtual currency business and provide for registration for virtual currency businesses that handle more than $5,000 per year, with tiers of registration depending on business volume.

Several states have considered or passed similar or identical cryptocurrency bills. One common bill defines cryptocurrency as a security and subjects it to regulation under various states' Money Transmitter Acts.[61] Several bills pertain to taxation of cryptocurrencies, with a few bills approving the use of cryptocurrency to pay fees or taxes, some bills taxing cryptocurrency transactions, and at least one exempting cryptocurrency from property taxes. Another common topic among states pertains to the establishment and regulation of so-called cryptocurrency businesses, which typically require licensure to operate. Several states have bills that amend their Unclaimed Property Acts to include cryptocurrency as "property." One interesting bill to note is New Jersey's A.B. 1906, the "Digital Currency Jobs Creation Act," which is unique since it is the only bill currently being considered that provides incentives in the form of tax credits to cryptocurrency businesses.

New York was the first state to enact regulation regarding digital currency. In 2015, New York created a BitLicense Regulatory Framework in which certain cryptocurrency market participants were required to obtain a license to transact business within New

60. U.S. Const. art. 1, § 8, cl. 3, commonly referred to as the commerce clause. To the extent that cryptocurrency is treated as currency, one of the seven money clauses of the U.S. Constitution could also come into play, for example art. 1, § 8, cl. 5: "Congress shall have Power…To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures[.]"

61. In Wisconsin, Chapter 217, known as the "Sellers of Checks" law, regulates "sellers of checks" (Wis. Stats. ch. 217). The check seller must hold a license from the Department of Financial Institutions. Chapter 217 does not currently give DFI the authority to regulate virtual currency.

York.[62] In 2018, a proposed bill (NY AB 9899) creates even more regulation, requiring regular audits of "any person, corporation, partnership or other entity that conducts cryptocurrency business activity." Another proposed bill (NY AB 8793) reviews the possibility of using blockchain technology for state record keeping, information storage, and service delivery.

As of the publication of this report, only five states—Arizona, Kentucky, Maryland, Vermont, and Wyoming—have passed legislation on the regulation of cryptocurrency in 2018.[63]

On Blockchain Technologies. Nine states—Arizona, Colorado, Connecticut, Delaware, Illinois, Nevada, Tennessee, Vermont, and Wyoming—have enacted or adopted laws that reference blockchain technology. Vermont became the first to address blockchain technology in legislation, which was passed in 2015. A year later, Vermont created evidentiary standards to determine the authenticity of records using blockchain technology within the state's rules of evidence. In the spring of this year, Vermont passed legislation enabling the creation and regulation of personal information protection companies as well as blockchain-based limited liability companies. The act also created two studies for expanding the use and promotion of blockchain technology and for the potential use of blockchain technology in government records.

Cryptocurrency regulation around the world

The United States is not the only government struggling with the legal challenges that cryptocurrencies present. Countries around the world have responded by taking increasingly explicit stances on how, or even if, cryptocurrencies can be regulated. Unlike most issues, there is almost no international law or cooperative international agreements about how cryptocurrencies are to be regulated, so countries have taken divergent approaches. The end result is a patchwork of government attitudes towards cryptocurrencies.

Among the most permissive in terms of acceptance and use of cryptocurrency are Japan and Australia. Japan became the first country to declare Bitcoin as legal tender in April 2017. Australia quickly followed. Both the Japanese government and the Australian government also eliminated the possibility of double taxation on the trading of Bitcoins.[64]

Many countries in the European Union are calling for greater cryptocurrency regulations to prevent the use of cryptocurrencies in money laundering and terrorism financing. Currently, EU institutions are focusing on research and support of blockchain inno-

62. *See also* Chino v. New York Dept. of Fin. Servs., Slip Op. 32700(U) (N.Y. Sup. Ct., 2017).

63. See the appendix at the end of this report for the complete review of proposed legislation in 2018 by state.

64. Global Legal Research Center, "Regulation of Cryptocurrency in Selected Jurisdictions," The Law Library of Congress, 47 (June 2018): 5-16 (Australia) and 53-8 (Japan). Herein after GLRC, "Regulation." (http://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf.)

vation. Most recently, the EU has launched the EU Blockchain Observatory and Forum, which monitors key blockchain initiatives in Europe and beyond. In the meantime, at the national level, some member countries (Belgium, Lithuania) are waiting to declare policy as the regulatory landscape evolves in Europe, while others have issued guidance in terms of taxes (Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Portugal, Spain, the United Kingdom). Still others (Cyprus, Hungary, Latvia) have issued warnings about the use of virtual currencies as dangerous given that there is no regulatory system in place. In 2017 the EU banned Estonia (and any other member state) from creating its own cryptocurrency.[65] Most recently, the EU has argued for stricter supervision on crypto-financial derivatives.[66]

Malta, the country with the most cryptocurrency exchanges in the world, explicitly notes that its regulations are intended to "provide the necessary legal certainty to allow this industry to flourish."[67] This clarity is particularly valuable in the cryptocurrency industry where innovation is extremely rapid and where there are very few applicable laws and rules already in place.

Russia's President Vladimir Putin set the date for bringing regulation of cryptocurrencies and ICOs into effect as of July 1, 2018.[68] Russia's main legislative body, the State Duma, prepared legislation that echoed US requirements for cryptocurrency exchanges in that the new regulations would require the verification of customer accounts for anti-money laundering and counter-terrorism financing purposes.

South Korea has among the most stringent cryptocurrency exchange regulations, involving government registration and other measures overseen by the Financial Supervisory Service, South Korea's supervisory authority that oversees the country's entire financial sector. South Korea also imposed tighter reporting obligations on banks with accounts held by cryptoexchanges.[69]

At the other end of the spectrum of responses to cryptocurrency regulation are China and India, among many other countries around the world. China had been the largest trading country in the world via domestic trading alone until late 2017 when the People's Bank of China banned participation in that market, making it illegal for Chinese citizens to trade or mine, and for Chinese banking institutions and employees from engaging,

65. Reuters, "ECB's Draghi Rejects Estonia's Virtual Currency Idea," September 7, 2017.

66. In March 2018, the European Securities and Markets Authority strengthened requirements for "Contracts for Differences" (CFDs), which are arrangements in a futures contract whereby differences in settlement are made in cash payments, rather than by the delivery of physical goods or securities, in cryptocurrencies.

67. Simon Goldstein, "Malta publishes three laws, creates cryptocurrency regulation framework," *Finance Magnates* (May 23, 2018).

68. Wolfie Zhao, "Russia eyes summer deadline for new cryptocurrency laws" *Coindesk* (March 1, 2018). The news article references the report from Russia's Parliament Newspaper, the official publication of the state's legislative body, which made the official announcement on March 1, 2018.

69. Bloomberg News, "Making sense of the world's cryptocurrency rules" (March 19, 2018).

servicing, or doing business with the cryptocurrency industry.[70] The Reserve Bank of India banned banks and any regulated financial institutions from dealing with or settling virtual currencies. Similarly, Colombia, Iran, and Taiwan, (among others) have also banned financial institutions from participating in cryptocurrency holding and trading. Several countries, including Bahrain, Bangladesh, Indonesia, Egypt, and Iraq, have enacted complete bans, explicitly making any participation in cryptocurrency markets illegal, including by individuals.[71]

Only one country has a fully issued and functional national cryptocurrency. Venezuela issued the "Petro," a cryptocurrency that has the same fixed value in bolivars as a barrel of Venezuelan oil, although the two are not directly exchangeable. The government reported that Venezuela made $735 million during its presale, but has not offered any evidence for that number.[72] Because of it's backing by the Venezuelan government and Venezuelan oil, American investment in Petro is likely a violation of US sanctions under Executive Orders 13808 and 13835.[73, 74] The difficulty in tracking cryptocurrency may be one of the appeals of the Petro, if it helps circumvent those sanctions.

Conclusion

The use of cryptocurrency and blockchain technology has increased since their development in 2008. Businesses have shown interest in integrating blockchain technology into their operations as well as providing new services within the cryptocurrency market. As with adopting any type of new and evolving technology, state legislatures face questions that do not have clear answers. The regulations and tools available to US lawmakers align with some constructs of federal law, but case law demonstrates the need for legislation specific to digital currency (generally) and cryptocurrency (specifically). This report has also illustrated that there are various approaches and opinions across the globe in respect to the regulation of cryptocurrencies. From the above examples, it is clear that the cryptocurrency market is entering a time of increased regulation. This is likely just the beginning of an emerging field of public policy as there appears to be a growing appetite for digital currencies. How states deal with digital currency businesses will be subject to policy debates for the next few years. As novel uses of cryptocurrency continue to devel-

70. James Faucette, Betsy Graseck, Joseph Moore, Sheena Shah, and Charlie Chan, "Bitcoin Decrypted: A Brief Teach-in and Implications," *Morgan Stanley Research*, 7. Authors noted that it was a dramatic change for a country whose currency accounted for 95 percent of all cryptocurrency to real currency exchanges as recently as December 2016.

71. Thomson Reuters, "Cryptocurrency by country," *Dividends Magazine* (October 25, 2017).

72. Corrina Pons and Girish Gupta, "Venezuela says launch of 'petro' cryptocurrency raised $735 million," *Reuters* (February 2018).

73. "Executive Order 13835 of May 21, 2018, Prohibiting Certain Additional Transactions with Respect to Venezuela," *CFR*, Title 3 (2017): 24001–24002.

74. "Executive Order 13808 of August 24, 2017, Imposing Additional Sanctions with Respect to the Situation in Venezuela," *CFR*, Title 3 (2017): 41155–41156.

op and a regulatory framework begins to take shape, one thing becomes clear: litigation, regulation, and enforcement of cryptocurrency remains in a state of flux. ■

Table 1. **Virtual currency, ICOs, or cryptocurrency 2018 legislation**

State	Bill/law	Summary
Alabama	H.B. 215 S.B. 173 Act 389	Provides for regulation of money transmissions by the Alabama Securities Commission, includes virtual currency; requires any person engaging in the business of monetary transmissions to obtain a license from the commission and specifies requirements for licensing and exceptions; requires a licensee to maintain records and specifies the commission would periodically examine each licensee; specifies the powers of the commission with regard to enforcement; provides an aggrieved person with an opportunity for a hearing; allows the commission to promulgate rules; provides criminal penalties for violations; and in connection therewith would have as its purpose or effect the requirement of a new or increased expenditure of local funds within the meaning of Amendment 621 of the Constitution of Alabama of 1901, now appearing as §111.05 of the Official Recompilation of the Constitution of Alabama of 1901, as amended.
Alaska	H.B. 180	Relates to money transmission and currency exchange businesses; relates to transmitting value that substitutes for money; relates to licensing requirements and registration through the Nationwide Multistate Licensing System and Registry; relates to surety bonding requirements; authorizes certain licensees to contract to use subdelegates for reloading funds on certain stored-value cards; relates to record retention, reporting requirements, and enforcement provisions; relates to exemptions; relates to money services Internet activities; relates to transmitting value and currency.
	H.B. 271 S.B. 152	Relates to a money services business; relates to transmitting value that substitutes for money; relates to licensing requirements and registration through the Nationwide Multistate Licensing System and Registry; relates to surety bonding requirements; authorizes certain licensees to contract to use subdelegates for reloading funds onto stored-value cards; relates to record retention, reporting requirements, and enforcement provisions; relates to exemptions; relates to money services Internet activities; and relates to definitions regarding the transmitting value, currency, and money transmission business activities.
Arizona	H.B. 2601 Chapter 207	Rewrites the statutory exemption pertaining to securities transaction, including crowdfunding and virtual coin offering; establishes residency for any entity created before January 1, 2018, or that invests up to 95 percent of its investment assets in offerings; increases the aggregate limit an issuer is allowed to raise to $5 million in a 12-month period; modifies the necessary requirements for filing notice with the director; allows all proceeds to be deposited into any depository institution, whether physical or virtual, that is authorized to do business in the state; requires the issuer to file an amendment in writing to the director within 30 days if any information on the notice is inaccurate; asserts that a purchaser compliant with the exemption is not considered an underwriter unless a purchaser purchases more than half of securities or virtual coins offered for sale; specifies any claim relating to an offering shall be resolved by private arbitration between the parties; allows the director to solicit offers with federal, state, and foreign regulators; specifies that a person who facilitates the exchange of a virtual coin is not the dealer; defines crowdfunding as raising small sums of money from a large group of people to fund a project; confirms that security with reference to a virtual coin should not be more broadly construed than either securities act or pertinent federal regulation; applies the statutory provisions against fraud to transactions involving virtual coins; defines "virtual coin" as a "value represented digitally that can be traded digitally and functions as a means of exchange, a unit of account and value"; prescribes a virtual coin offering as an offer for sale of a security or transaction pertaining to an intrastate offering or crowdfunding as outlined and further stipulates exclusions.

Table 1. **Virtual currency, ICOs, or cryptocurrency 2018 legislation**, continued

State	Bill/law	Summary
Arizona (cont.)	S.B. 1091 Vetoed by governor 5/16/18	Requires the Department of Revenue to study each of the following: (a) whether a taxpayer may pay his or her income tax liability using a payment gateway that uses peer-to-peer systems; (b) the conversion of cryptocurrency payments to US dollars at the prevailing rate after receipt; and (c) the process of crediting the taxpayer's account with the converted dollar amount received, less any fees or costs incurred for conversion.
	S.B. 1145 No Action	Amends statutes relating to income tax to add "virtual currency" to adjusted gross income. The added text states that starting on December 31, 2018, any "net capital loss" that results from exchanging virtual currency for another type of currency is to be included in gross income. The bill defines a virtual currency as meeting at least one of three functions: "a medium of exchange," "a unit of account," or "a store of value."
California	A.B. 1123 Failed 2/1/18 due to Art. IV, Section 10 (c) of the CA Constitution	Known as the Virtual Currency Act, this bill prohibits an individual from partaking in any virtual currency business unless licensed by the Commissioner of Business Oversight. The bill specifies the stipulations for obtaining licensure and subjects licenses to annual renewal. The bill also repeals the statute stating that individuals, associations, or corporations can issue only money and allows these entities to issue virtual currency if licensed to do so. The bill also defines virtual currency and details which entities are exempt from licensure.
Colorado	H.B. 18-1220	Subjects individuals who exchange, buy, or sell cryptocurrency, or who offer cryptocurrency wallets, or both, to regulation under the Money Transmitters Act. The bill defines an "open blockchain token" and states that an open blockchain token that is used for consumption with no expectation of profit is not considered an investment contract.
	H.B. 18-1426	Defines an "open blockchain token," which is another term for virtual currency, and exempts virtual currency transmissions from being regulated under the Colorado Money Transmitters Act. The bill exempts "open blockchain tokens" from being defined as a security if it is not marketed as an investment, can be exchanged for goods/services, and is not in a repurchase agreement.
Connecticut	H.B. 5001	Establishes a fee to any transfer or trading of a virtual currency in the state.
	H.B. 5496	Known as the Uniform Regulation of Virtual-Currency, defines virtual currency business activities and mandates a license for participating in cryptocurrency business transactions. The bill explains licensure processes and requirements including what entities are required to obtain a license.
	S.B. 513	Requires the attorney general or someone he/she designates to study digital currency use and regulation.
Georgia	S.B. 464	Amends the fees and tax payment statutes to require the state revenue commissioner to accept cryptocurrencies as a form of payment for taxes and license fees. The bill also directs the commissioner to convert cryptocurrency payments into US dollars at the existing exchange rate within 24 hours of receiving the payment.

Table 1. **Virtual currency, ICOs, or cryptocurrency 2018 legislation**, continued

State	Bill/law	Summary
Hawaii	H.B. 2234 S.B. 2871	As the main purpose, instills an excise tax on remote (online) sellers and "marketplace facilitators." Regarding cryptocurrency, the bill amends the statute to expand the definition of a "marketplace facilitator" to include a person who provides a virtual currency for use by buyers to purchase goods.
	H.B. 2257 S.B. 3082	Amends the money transmitters act to include "virtual currency" and defines it. The bill adds virtual currency as a "permissible investment" and applies the money transmitter licensee rules to virtual currency. The bill also requires all licensed money transmitters that transfer/store virtual currency to provide a third-party security audit of electronic information and systems. The bill also requires money transmitters to issue a notice and get permission from a customer for transactions involving virtual currency.
Idaho	S.B. 1325	Amends Idaho's Unclaimed Property Act to include virtual currency as a "property" and defines virtual currency.
Illinois	H.B. 5335	Adds a section about cryptocurrency payments to the Department of Revenue Law of the Civil Administrative Code. The bill authorizes the payment of taxes with cryptocurrency and requires that the Department of Revenue convert any such payments within 24 hours after receiving payment.
Kentucky	H.B. 394	Almost identical to Idaho's law, defines and adds virtual currency to the state's "Revised Uniform Unclaimed Property Act of 2016."
Maryland	H.B. 1634 S.B. 1068	Known as the Financial Consumer Protection Act of 2018, expands the research responsibility of the Maryland Financial Consumer Protection Commission beyond cryptocurrencies to include "initial coin offerings" and "cryptocurrency exchanges."
Michigan	H.B. 6253 H.B. 6254 H.B. 6258	Add cryptocurrency to be included in different sections of the penal code including the embezzlement section, money laundering section, and credit section.
Nebraska	L.B. 691	Known as the Uniform Regulation of Virtual-Currency Businesses Act, defines virtual currency, virtual currency business activity, and which entities and individuals are subject to the bill's rules. The bill requires the defined entities to obtain a license to engage in virtual currency business activity in the state and details the licensing process and requirements. The bill allows individuals who are licensed to conduct virtual currency business activity in other states to practice in Nebraska without obtaining a new Nebraska license and details the protocols for doing so. The bill also specifies licensee reporting requirements and penalties for individuals who do not comply with the proposed laws.
New Jersey	A.B. 1906	Known as the Digital Currency Jobs Creation Act, defines digital currency and other relevant terms pertaining to engaging in digital currency business transactions. The bill prohibits municipalities from regulating digital currency outside the scope of the bill, including taxation. The bill requires individuals engaging in "digital currency custodial activity" to register and sets stipulations on what registrants are able and required to do, including maintaining a cybersecurity program and compliance policies. Additionally, the bill includes incentives to attract digital currency businesses, particularly a sales and use tax exemption and tax credits for job creation and retention.

Table 1. **Virtual currency, ICOs, or cryptocurrency 2018 legislation**, continued

State	Bill/law	Summary
New York	A.B. 8783 S.B. 9013	Creates a digital currency task force to provide information on the impact of cryptocurrencies. The bill requires the task force to submit a report by December 2020 on specific questions pertaining to cryptocurrencies.
	A.B. 9685 S.B. 7725	Establishes a task force to study the effect of a state-issued cryptocurrency. In particular, the task force would assess the process of releasing a cryptocurrency in compliance with federal agencies, the impact on taxation and monetary policy, and other regulatory measures being taken by other entities.
	A.B. 9782	Authorizes state agencies to accept cryptocurrencies as a form of payment for fines, taxes, and other financial obligations.
	A.B. 9862	Creates a task force to study the ability to develop economic empowerment zones for the purpose of mining cryptocurrencies.
	A.B. 9899	Creates a "regulatory sandbox program" that allows for the testing of financial technology products, including cryptocurrency, for a temporary period on a limited basis without licensure and exempt from state laws. The bill stipulates the requirements for applying and participating in the program. Additionally, the bill amends the banking law to include a section on auditing of financial technology products, including cryptocurrency.
Vermont	S.B. 269 Act 205	Adds a subchapter to the Vermont statutes defining blockchain-based limited liability companies (BBLLC) and virtual currency. The act stipulates the requirements to be a BBLLC and subjects BBLLCs to regulation under the Vermont Limited Liability Company Act. The act also requires several state agencies to research and provide recommendations on using blockchain technology for managing public records.
	H.B. 765	Defines a digital currency limited liability company and specifies the requirements of becoming a digital currency limited liability company. The bill requires these entities to maintain a physical presence in the state and subjects them to a transaction tax.
Virginia	S.B. 864	Asks the State Corporation Commission to study the effect of cryptocurrencies and recommend whether the state legislature should create a system for protecting residents.
Washington	H.B. 2468	Amends the state's Unclaimed Property Act to include virtual currency as a "property" and defines "virtual currency." This is similar to Idaho's act.
	H.B. 5264	Amends the statutes pertaining to Washington's recreational marijuana laws to prevent the use of virtual currency in marijuana product transactions.

Table 1. **Virtual currency, ICOs, or cryptocurrency 2018 legislation**, continued

State	Bill/law	Summary
Wyoming	H.B. 19 Chapter 3	Defines virtual currency and exempts it from the Money Transmitter Act.
	H.B. 70 Chapter 44	States that developers and sellers of "open blockchain tokens" are not issuers of a security and are therefore exempt from laws pertaining to securities upon meeting specific stipulations.
	S.B. 111 Chapter 45	Exempts virtual currencies from property taxation.

Table 2. **Blockchain technology legislation**

State	Bill/Law	Summary
Arizona	H.B. 2602 Chapter 208	Defines running a node on blockchain technology as delivering the computerized processing power to confirm or encrypt transactions in the blockchain. The bill declares that regulating the act of running a node on blockchain technology in a person's residence is of statewide concern and prohibits further regulation by any city, town, or county. The bill prohibits a city, town, or county from impeding a person running a node on blockchain technology in a residence.
	H.B. 2603 Chapter 122	States that the terms written or any writing within Title 10 (Corporations and Associations) sections of law apply to blockchain technology. The bill establishes that blockchain technology applies to electronic transactions within Title 10 (Corporations and Associations).
	H.B. 2216 Chapter 165	Codifies the prohibition on unlawfully requiring a person to use or subject themselves to electronic firearm tracking technology. The bill defines electronic firearm tracking technology as a platform, system, or device, or a group of systems or devices, that uses a shared ledger, distributed ledger, or block chain technology, or any other similar form of technology or electronic database, for the purpose of storing information in a decentralized or centralized way.
	H.B. 2417 Chapter 97	Establishes guidelines for blockchain technology regarding electronic signatures and records. The bill stipulates rights of ownership or use and applies provisions to the Uniform Commercial Code (UCC) for sales, leases, and documents of title. The bill classifies a signature, record, or contract secured through blockchain technology as an electronic form of signature or record respectively. The bill recognizes smart contracts in commerce and establishes that a contract may not be denied legal standing, validity, or enforceability solely because it contains a smart contract term. The bill maintains a person's rights of ownership or use of information prior to using blockchain technology to secure information for interstate or foreign commerce. The bill excludes ownership rights as outlined when the terms of the transaction expressly transfer ownership or use of information secured using blockchain technology. The bill limits the outlined provisions to UCC transactions pertaining to sales, leases, and documents of title. The bill defines blockchain technology as distributed ledger technology that uses a distributed, decentralized, shared, and replicated ledger, which may be public or private, permissioned or permissionless, or driven by tokenized cryptoeconomics or tokenless. The data on the ledger is protected with cryptography, is immutable, and auditable and provides an uncensored truth. The bill defines smart contract as an event-driven program that runs on a distributed, decentralized, shared, and replicated ledger and that can take custody over and instruct transfer of assets on that ledger.

Table 2. **Blockchain technology legislation**, continued

State	Bill/Law	Summary
California	A.B. 2658	Existing law, the Uniform Electronic Transactions Act, specifies that a record or signature may not be denied legal effect or enforceability solely because it is in electronic form and that a contract may not be denied legal effect or enforceability solely because an electronic record was used in its formation. Among other things, the bill provides that if a law requires a record to be in writing, or if a law requires a signature, an electronic record or signature satisfies the law. Existing law specifies that there is, in the Government Operations Agency, the Department of General Services, which shall develop and enforce policy and procedures and institute or cause the institution of those investigations and proceedings as it deems proper to assure effective operation of all functions performed by the department and to conserve the rights and interests of the state. This bill, until January 1, 2022, requires the secretary of the Government Operations Agency to appoint a blockchain working group on or before July 1, 2019. The bill defines blockchain and requires the working group to report to the legislature on the potential uses, risks, and benefits of the use of blockchain technology by state government and California-based businesses, on or before July 1, 2020, as specified.
	S.B. 838	Authorizes a corporation or a social purpose corporation that does not have outstanding securities listed on specified securities exchanges to adopt provisions within its articles of incorporation authorizing records administered by or on behalf of the corporation in which the names of all of the corporation's stockholders of record, the address and number of shares registered in the name of each of those stockholders, and all issuances and transfers of stock of the corporation to be recorded and kept on or by means of blockchain technology, as specified.
Colorado	S.B. 86 Chapter 319	Concerns the use of cyber coding cryptology for state records. The department of state is required to consider research, development, and implementation for encryption and data integrity techniques, including distributed ledger technologies such as blockchains. The department of state is required to consider using distributed ledger technologies when accepting business licensing records and when distributing department of state data to other departments and agencies. The executive director of the department of regulatory agencies or the director's designee is required to consider secure encryption methods, including distributed ledger technologies, to protect against falsification, create visibility to identify external hacking threats, and to improve internal data security. In addition, the bill specifies that institutions of higher education may include distributed ledger technologies within their curricula and research and development activities.
	S.B. 279	Allows the Institute of Cannabis Research at Colorado State University–Pueblo to develop marijuana certification technology. The technology must include an agent that is applied to a marijuana plant or marijuana product and then scanned by a device, traceable using distributed ledger technology.
Connecticut	S.B. 443 Special Act 18-8	Establishes the Connecticut blockchain working group; develops a master plan for fostering the expansion and growth of the blockchain industry in the state; and recommends policies and state investments to make Connecticut the world leader in blockchain technology.
	S.B. 513	Studies the impact that digital currency, blockchain, and smart contracts have on state law and businesses.

Table 2. **Blockchain technology legislation**, continued

State	Bill/Law	Summary
Delaware	S.B. 182	Updates the Delaware Revised Uniform Limited Partnership Act to provide specific statutory authority for Delaware limited partnerships to use networks of electronic databases (examples of which are described currently as "distributed ledgers" or a "blockchain") for the creation and maintenance of limited partnership records and for certain "electronic transmissions."
	S.B. 183	Updates the Delaware Limited Liability Company Act to provide specific statutory authority for domestic limited liability companies to use networks of electronic databases (examples of which are described currently as "distributed ledgers" or a "blockchain") for the creation and maintenance of limited liability company records and for certain "electronic transmissions."
	S.B. 194	Updates the Delaware Statutory Trust Act to further the state of Delaware's initiative to implement policies enhancing the state's position as a leader in the adoption of distributive electronic network and database technologies (including what is commonly referred to as "blockchain" or "distributed ledger technology") by providing that the registration of a beneficial interest in a statutory trust may be evidenced electronically, including by means of an electronic database or network, including distributed electronic networks or databases.
	S.B. 69 Chapter 86	Provides specific statutory authority for Delaware corporations to use networks of electronic databases for the creation and maintenance of corporate records, including the corporation's stock ledger. The bill provides specific statutory authority for Delaware corporations to use networks of electronic databases (examples of which are described currently as "distributed ledgers" or a "blockchain") for the creation and maintenance of corporate records, including the corporation's stock ledger.
Florida	H.B. 1357	Provides that a contract may not be denied legal effect or enforceability solely because it includes a smart contract term and provides that rights of ownership or use of certain information are not affected by the use of blockchain technology to secure such information.
Hawaii	H.B. 1481	Establishes a working group to study the uses of and determine best practices regarding blockchain technology.
Illinois	H.B. 5553	Creates the Blockchain Technology Act. The bill provides for the permitted uses of blockchain technology in transactions and proceedings and provides limitations to the use of blockchain technology. The bill prohibits units of local government from implementing specified restrictions on the use of blockchain technology; preempts home rule; and defines terms.
	H.J.R. 25	Creates the Illinois Legislative Blockchain and Distributed Ledger Task Force to study how and if the state of Illinois, county governments, and municipal governments can benefit from a transition to a blockchain-based system for record keeping and service delivery.
	H.R. 120	Creates the Illinois Legislative Blockchain and Distributed Ledger Task Force to study how and if the state of Illinois, county governments, and municipal governments can benefit from a transition to a blockchain-based system for record keeping and service delivery.

Table 2. **Blockchain technology legislation**, continued

State	Bill/Law	Summary
Maine	L.D. 950	Establishes the Commission to Study Using Blockchain Technology in Conjunction with Paper Ballots in Maine Elections.
Maryland	H.B. 1100 S.B. 893	Authorizes certain records of a corporation to be maintained by means of any information storage device, method, or electronic network or database, including a distributed electronic network or database, under certain circumstances; requires a corporation to convert a record maintained in a certain manner into a clearly legible written form on the request of a certain person; authorizes certain communications, consents, and requests to be made by means of a certain electronic transmission.
Michigan	H.B. 6257	Relates to crimes involving forgery and counterfeiting; includes altering a record by use of distributed ledger technology.
	H.B. 6258	Relates to crimes involving credit cards; includes cryptocurrency and distributed ledger technology in definition section of credit chapter in penal code.
Missouri	H.B. 1256	Requires the use of electronic firearm tracking technology, with specified exceptions. The bill defines the term "electronic firearm tracking technology" as "a platform, system, or device (or a group of systems or devices) that uses a shared ledger, distributed ledger, or block chain technology (or any other similar form of technology or electronic database) for the purpose of storing information in a decentralized or centralized way." Any person violating these provisions is guilty of a class E felony.
Nebraska	L.B. 691	Adopts the Nebraska Virtual Currency Money Laundering Act and defines and redefines terms under the Nebraska Money Transmitters Act. Includes definition of distributed ledger technology.
	L.B. 694	Prohibits cities and villages and counties from taxing or otherwise regulating the use of distributed ledger technology.
	L.B. 695	Authorizes and defines smart contracts; authorizes use of distributed ledger technology in the Electronic Notary Public Act and the Uniform Electronic Transactions Act and for purposes of digital and electronic signatures.
New Jersey	A.B. 3613 S.B. 2297	Establishes NJ Blockchain Initiative Task Force.
	A.B. 3768 S.B. 2462	Permits corporations to use blockchain technology for certain record-keeping requirements.
Nevada	S.B. 398 Chapter 391	Recognizes blockchain technology as a type of electronic record for the purposes of the Uniform Electronic Transactions Act and prohibits a local government from taxing or imposing restrictions upon the use of a blockchain.
New York	A.B. 8780 S.B. 8858	Relates to allowing signatures, records, and contracts secured through blockchain technology to be considered in an electronic form and to be an electronic record and signature; allows smart contracts to exist in commerce.
	A.B. 8792	Directs the state board of elections to study and evaluate the use of blockchain technology to protect voter records and election results.

Table 2. **Blockchain technology legislation**, continued

State	Bill/Law	Summary
New York (cont.)	A.B. 8793	Relates to establishing a task force to study and report on the potential implementation of blockchain technology in state record keeping, information storage, and service delivery.
	A.B. 10854	Relates to the development and creation of distributed ledger technology, which is a mathematically secured, chronological, and decentralized consensus ledger or database, whether maintained via Internet interaction, peer-to-peer network, or otherwise used to authenticate, record, share, and synchronize transactions in their respective electronic ledgers or databases, and business entities that develop distributed ledger technology.
Ohio	S.B. 220	Provides a legal safe harbor to covered entities that implement a specified cybersecurity program, allows transactions recorded by blockchain technology under the Uniform Electronic Transactions Act, and alters the definition of "key employee" under the Casino Gaming Law.
	S.B. 300	Amends the Uniform Electronic Transactions Act to define records and contracts secured by blockchain technology as electronic records and allows the use of smart contract terms.
Tennessee	H.B. 1507 S.B. 1662 Public Chapter 591	Recognizes the legal authority to use blockchain technology and smart contracts in conducting electronic transactions; protects ownership rights of certain information secured by blockchain technology.
Vermont	H.B. 765	Proposes to implement strategies relating to blockchain, cryptocurrency, and financial technology in order to promote regulatory efficiency; enables business organizational and governance structures that may expand opportunities in financial technology; and promotes education and adoption of financial technology in the public and private sectors.
	S.B. 269 Act 205	Modifies the definition of "blockchain" and "blockchain technology"; enables the creation and regulation of personal information protection companies; creates studies for expanding the use and promotion of blockchain technology; enables the creation of blockchain-based limited liability companies; and creates a study for the potential use of blockchain technology in government records.
	H.B. 737	Proposes to address the validity and admissibility of, and presumptions relating to, records created with blockchain technology.
	H.B. 868 Act 157	Creates rebuttable statutory presumptions of authenticity for records using blockchain technology.
	S.B. 138 Act 51	Directs the attorney general, Department of Financial Regulation, and secretary of state to report to the general assembly on opportunities and risks of creating a presumption of validity for electronic facts and records that employ blockchain technology.

Table 2. **Blockchain technology legislation**, continued

State	Bill/Law	Summary
Virginia	H.J.R. 153	Establishes a one-year joint subcommittee consisting of seven legislative members and five non-legislative members to study the potential implementation of blockchain technology in state record keeping, information storage, and service delivery. In conducting the study, the joint subcommittee shall research, analyze, and consider (i) opportunities and risks associated with using blockchain technology in state record keeping, information storage, and service delivery; (ii) different types of blockchain technology and the feasibility of implementing each type; (iii) projects and use cases currently under development in other states and nations and how those cases could be applied in Virginia; (iv) how early adoption of blockchain technology may stimulate interest and growth in Virginia's information technology industry; and (v) how current laws in the Commonwealth can be modified to support blockchain technology.
Wyoming	H.B. 1 Chapter 134	Creates a blockchain task force to identify governance issues related to blockchain technology and develop appropriate legislation to be recommended to one or more appropriate legislative committees for consideration.
	H.B. 70 Chapter 44	Relating to securities, provides that a person who develops, sells, or facilitates the exchange of an open blockchain token is not subject to specified securities and money transmission laws.
	H.B. 101 Chapter 47	Relates to the Wyoming Business Corporations Act; authorizes corporations to use electronic networks or databases for the creation or maintenance of corporate records; authorizes the use of a network address to identify a corporation's shareholder; authorizes corporations to accept shareholder votes if signed by a network signature that corresponds to a network address; specifies requirements for use of electronic networks or databases; requires the secretary of state to review its rules for consistency with this act.