

GARY GENSLER
Senior Lecturer, MIT Sloan School of Management
Senior Advisor to the Director, MIT Media Lab

Cryptocurrencies: Oversight of New Assets in the Digital Age

Committee on Agriculture
United States House of Representatives
July 18, 2018

Good morning Chairman Conaway, Ranking member Peterson and members of the committee. I thank you for inviting me to testify regarding the world of crypto finance birthed by blockchain technology. As is often the case when innovations in finance occur, this Committee's oversight of commodities and derivatives markets is implicated.

On a personal note, it is good to be with you once again.

I'm honored to be testifying in my new role at Massachusetts Institute of Technology (MIT), where I am engaged with a talented team researching, writing and teaching about digital currency, blockchain technology, and the ethics and governance of artificial intelligence. As Senior Advisor to the Director, MIT Media Lab and Senior Lecturer, MIT Sloan School of Management, I have spoken at numerous regulatory, research, or investor conferences related to blockchain technology and will be teaching a graduate course this fall entitled 'Blockchain & Money.' I co-authored of an upcoming Center for Economic Policy Research-Geneva Report entitled 'The impact of blockchain technology on finance: a catalyst for change' (Casey, Crane, Gensler, Johnson, and Narula, 2018)

I also am honored to be Chairman of the Maryland Financial Consumer Protection Commission which reports to the General Assembly, Governor and Congressional delegation of Maryland about matters related to financial consumer protection. We held a public hearing in Annapolis last month on cryptocurrencies, initial coin offerings, crypto exchanges and other blockchain technologies.¹

With the benefit of this experience, I would like to share some thoughts about blockchain technology and more particularly the public policy issues raised by the burgeoning markets for the trading of cryptocurrencies, initial coin offerings and other related crypto tokens.²

Executive Summary

Blockchain technology has real potential to transform the world of finance. Though there are many technical and commercial challenges yet to overcome, I'm an optimist and want to see this new technology succeed. It could lower costs, risks and economic rents in the financial system.

To reach this potential and for public confidence, blockchain technology and the world of crypto finance it has birthed has to come within the norms of long-established public policy frameworks.

As with other aspects of finance or other emerging technologies, we must guard against illicit activities, such as tax evasion, money laundering, terrorism finance and avoiding sanctions regimes. We must continue to ensure financial stability. And we must ensure investors and consumers are protected.

As things currently are, though, there is significant non-compliance with respect to many initial coin offerings (ICOs), other crypto assets and crypto exchanges.

The question then is how do the crypto finance markets, this new technology, Congress and regulators go forward? While many U.S. agencies are engaged, and current laws clearly cover much of this new activity, there may be gaps to consider.

To date, crypto exchanges and digital wallet providers generally have not been registering as banks, exchanges, broker dealers or futures commission merchants. This leaves the only regulatory safeguards – to guard against illicit activity and protect investors – to State-administered money transmission regulations. This approach – regulating exchanges' duties in the same manner that Western Union and MoneyGram are regulated – is not satisfactory. Illicit activity is hard to track, billions of dollars have been lost to hacks, and manipulative behavior is unchecked.

Crypto activities are more complex, inherently harder to monitor and less traceable than straightforward money transfers. Crypto exchanges and digital wallet providers lack the same natural connections to the regulated banking system that money transmission companies have when transferring fiat currencies. Regulated banks help protect customers funds by compliance with the bank secrecy act. As crypto exchanges lack intermediated access, tax compliance is also compromised as there are not brokers to regularly report crypto transactions through form 1099-Bs.

Furthermore, though both the Securities and Exchange Commission (SEC) and Commodity Futures Trading Commission (CFTC) have released numerous public advisories, notices and enforcement actions, most crypto exchanges remain unregistered and operate with limited investors protections. Thousands of ICOs have occurred, most being investment contracts under the securities laws, but only a fraction have recently started complying. Studies repeatedly report that the ICO market and crypto exchanges are rife with scams, frauds and manipulative practices.

The current patchwork approach to addressing these issues – to guard against illicit activities, protect investors & their funds, and promote market integrity – would be better accomplished through application of commodities and securities laws. As outlined below, while issuer based crypto is slowly being brought under securities laws and crypto derivatives are clearly under the CFTC and commodities laws, there may be a gap Congress considers filling related to cryptocurrencies not subject to securities laws, such as Bitcoin, herein called ‘crypto cash commodities.’

While the CFTC has general anti-fraud and anti-manipulation authorities with regard to spot transactions in crypto cash commodities, such as Bitcoin or Ether, the agency does not currently have express registration or plenary rule writing authorities with regard to cash commodities. Furthermore, as the CFTC staff recently said in an advisory letter, “virtual currencies are unlike any commodity that the CFTC has dealt with in the past.”³

Congress may wish to consider providing the CFTC – or another agency - with general authorities to write rules for these markets, including possibly requiring registration for trading on crypto exchanges solely dealing in cryptocurrencies, aka crypto cash commodities. Doing so may best protect investors, limit illicit activity and enhance underlying reference markets for crypto derivatives and exchange traded funds (ETF). It also is critical that the CFTC, SEC and other agencies have sufficient budgetary resources to adequately oversee crypto markets, especially as these markets have continued to grow.

Clear rules of the road also would allow firms - both incumbents and start-ups - to more fully explore investing in blockchain technology or crypto assets. Start-ups have had an advantage over incumbents as they generally differ on how they evaluate taking reputational and regulatory risks regarding uncertain regulatory treatment.

Bringing the crypto world within the long-established public policy frameworks, though, will promote greater innovation and competition, allowing blockchain technologies to be explored to their fullest potential.

Comprehensive Review

Blockchain Technology Potential

Blockchain technology and cryptocurrencies are an innovative tool for creating and moving value on the Internet (digital assets) using blockchains, distributed consensus algorithms, cryptography, and peer to peer networking. Regardless of whether Bitcoin and other cryptocurrencies adequately exhibit the three classic characteristics of money – a store of value, a medium of exchange and a unit of account – they do provide a means to move value and run computer code on the Internet without relying upon a central intermediary such as a bank.

That ties blockchain technology and cryptocurrencies directly to the essential plumbing of the financial sector, which at its core performs the role of efficiently moving and allocating money and risk within the economy.

Though there are many technical and commercial challenges yet to overcome, blockchain technology has the potential to transform the world of finance by creating open protocols to which everyone has access, but nobody has control – to do for finance what the web did for information.

The technology could reduce the “cost of trust” – the costs borne by transacting parties because they have to rely on their counterparties or a trusted intermediary to honestly record completion of the transaction. These costs range widely – from those associated with vault doors, cybersecurity, settlement procedures, user identification, compliance teams, security guards, and anti-fraud regimes, to the excess amounts that centralized institutions can charge customers.

Potential use cases include cross-border payments, clearing and settlement for financial transactions, digital identities, trade finance and supply chain management. Open permissionless blockchain applications such as Bitcoin have also inspired permissioned or private blockchains. The term “distributed ledger technology,” or DLT, is often used to describe this field in broader, generic terms.

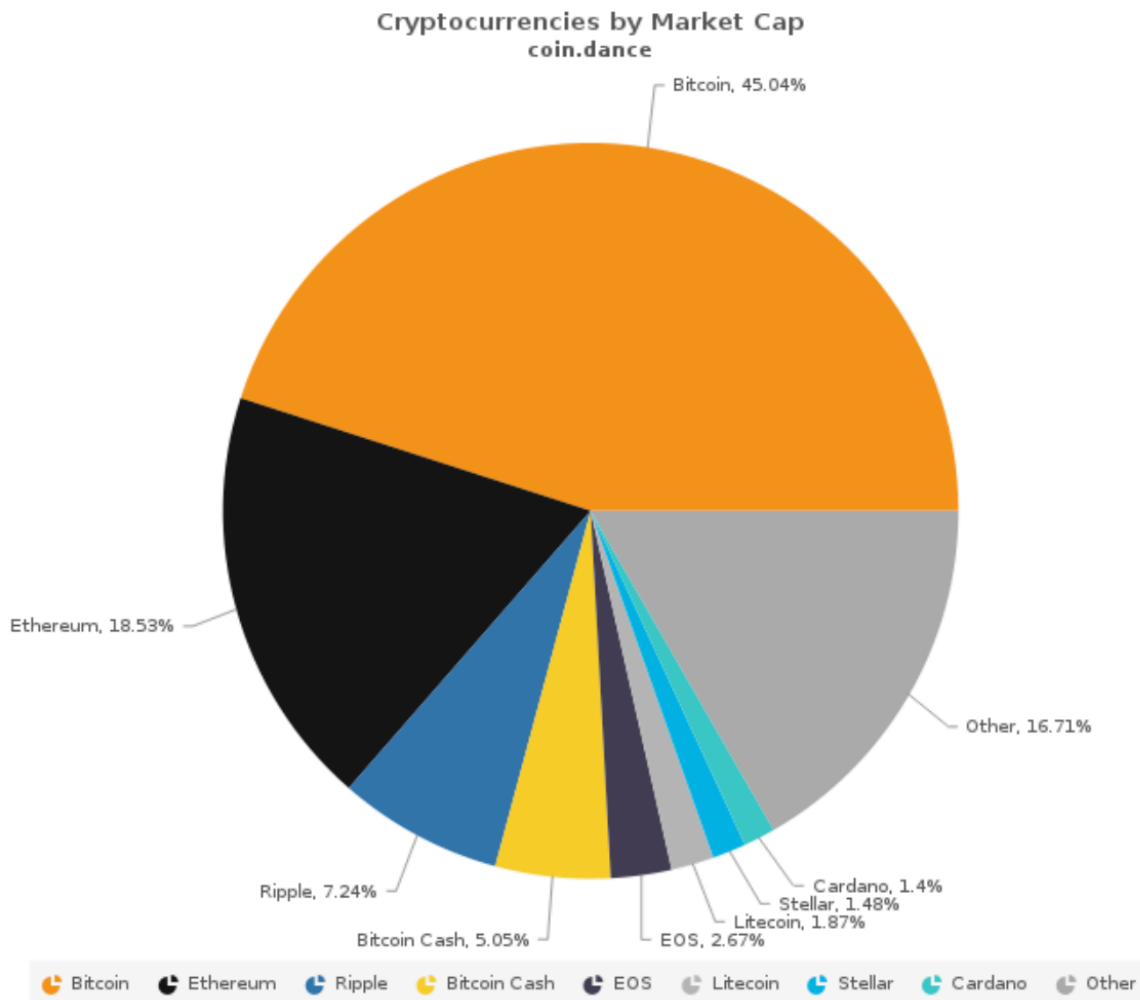
With increased competition and innovation in the financial system, DLT – both permissionless and permissioned - offers a catalyst for change by incumbents or as an opportunity for entrepreneurial start-ups, potentially lowering costs, risks and economic rents in the financial sector which represents 7.5% of the U.S. economy.⁴

To reach its potential, though, blockchain technology and the world of crypto finance, must come fully within long established public policy frameworks.

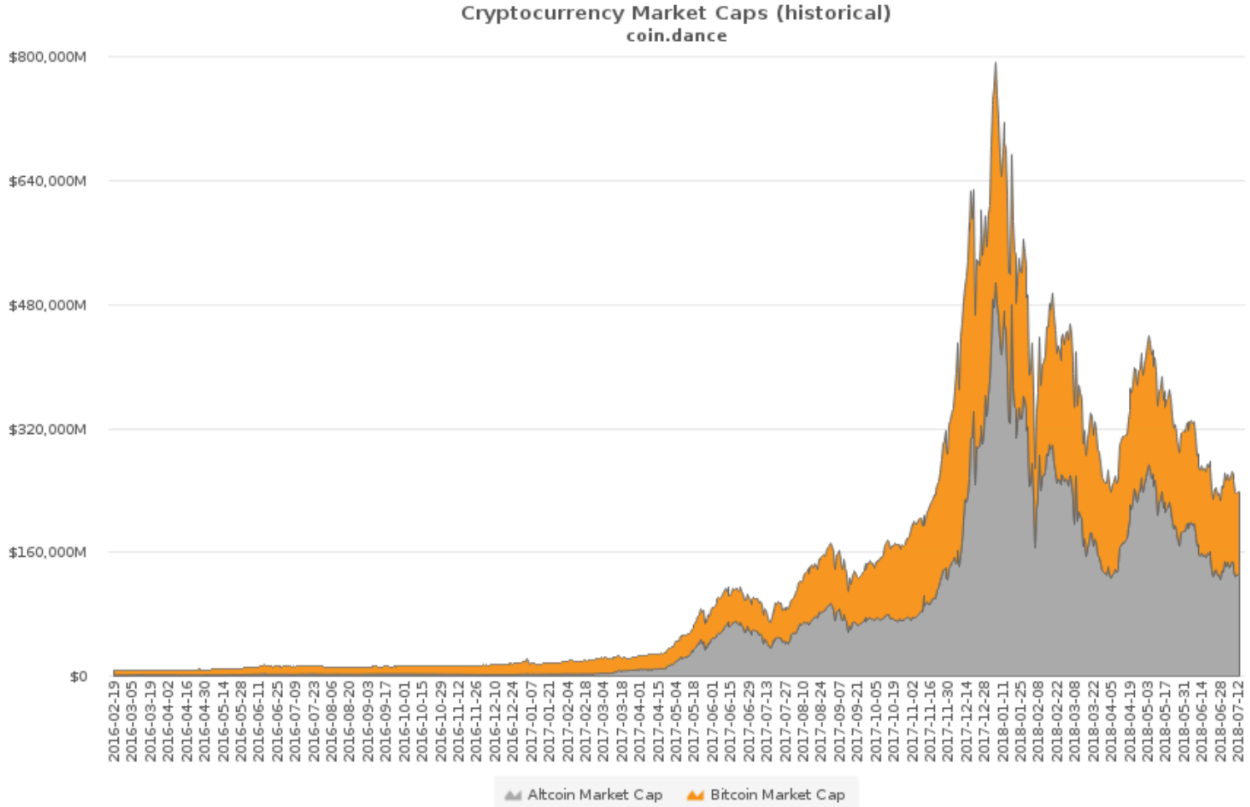
Crypto Finance

Blockchain technology has given rise to the latest addition to an ever-evolving global financial system. The world of crypto finance - with total market capitalization of \$250 billion⁵, its innovative forms of crowdfunding and trading on crypto exchanges - has so far operated largely outside established investor protection frameworks.

To date, 3800 ICOs have launched⁶ and 200 crypto exchanges are operating⁷ with tens of millions of customers worldwide. About 55 percent of the crypto market value is now in tokens other than Bitcoin.⁸



The market is volatile but has grown significantly over the years as shown in the following figure of historical market capitalization.



Tokens and Initial Coin Offerings

Burgeoning investor interest in crypto assets along with the potential for token-based economies, has led to a new means of raising capital for blockchain-based projects: initial coin offerings (ICOs) and similar token sales.

By their very nature and design, ICOs and similar token offerings mix economic attributes of both investment and potential consumption. Marketing documents describe utility-like qualities for the token's stated purpose on a decentralized network, but there is almost always a strong investment component to token sales as they fund development of underlying software and a network. Thus, ICOs are quite different from tokens for a neighborhood laundromat, tickets to the theatre or donation-based crowdfunding platforms such as Kickstarter or GoFundMe.

ICO investors bear economic risk related to the success or failure of the network in which the token is to potentially circulate. Investors lose if the network isn't completed or falls short of hoped for public adoption, but they may gain if the network widely succeeds. ICOs are typically marketed online with the release of a whitepaper prior to the launch of a new blockchain-based decentralized application.

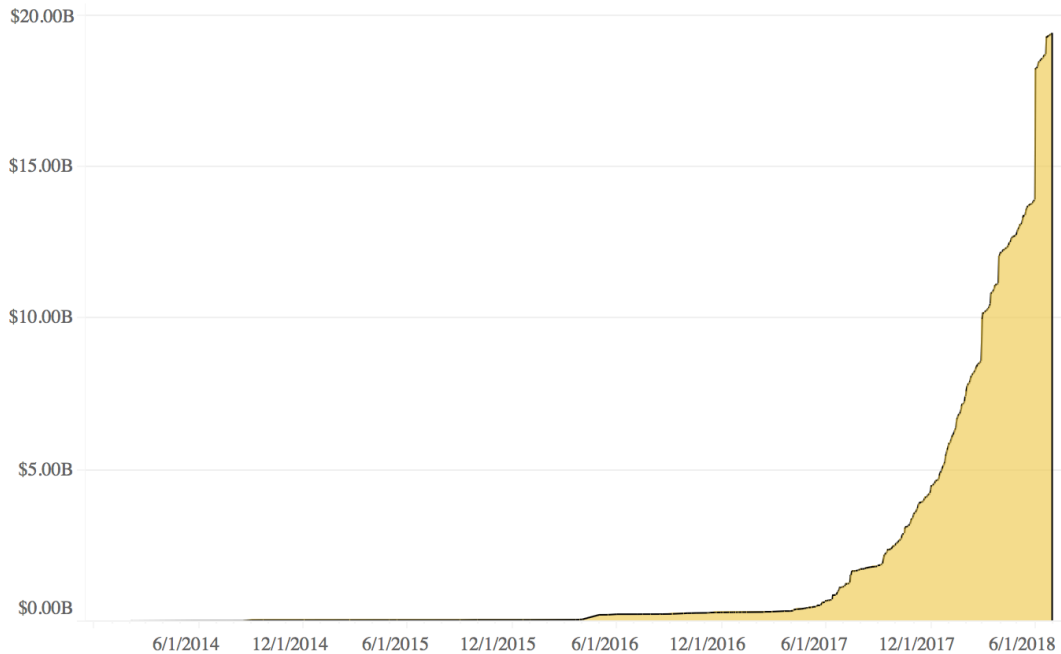
ICO tokens are structured with attributes to promote marketability and potential appreciation. They usually include a so-called 'monetary policy' which is encoded in the software, defining the future supply of tokens and introducing an element of scarcity. They are fungible or interchangeable which enhances liquidity. They are often listed on crypto exchanges, boosting marketability and transferability.

Development and support of the network, though often open-sourced, tends to be largely concentrated around the issuing company or foundation and other closely aligned developers. The selling company, related foundation and founders usually retain a meaningful portion of pre-issued tokens and are motivated to increase the value of the tokens.

Nearly every ICO token's economic realities – its risks, expectation of profits, monetary policies, manner of marketing, and capital formation - are attributes of investment schemes.

Issuance has ballooned in the last 12 months, with Coindesk reporting total ICO issuance of nearly \$20 billion through June 30. There are no authoritative data sources, however, and most data aggregators are relying on ICO issuers to self-report the amount they raised. EOS raised \$4.2 billion through a year-long ICO and Telegram Group raised \$1.7 billion in two private offerings. CoinDesk reports \$14 billion raised so far in 2018 versus just over \$5 billion in all of 2017.⁹

All-Time Cumulative ICO Funding



Many start-ups are turning to this market to raise capital as there are significant valuation differences versus traditional venture capital funding. The valuation disparity may be due, amongst other things, to the public’s speculative interest, the potential to share in the network effects of token economies, the token’s greater liquidity, reduced transactions costs or regulatory arbitrage.

There is a high failure rate for ICOs. One study in February of 2018 found that 59% of a sample of 2017 ICOs had already failed or semi-failed.¹⁰ There also is a considerable amount of fraud and scams in this field, with numerous ICOs targeting retail investors, using celebrity endorsers, and promising short-term gains. Estimates vary considerably with 25 percent¹¹ to 81 percent as scams.¹² A recent Wall Street Journal analysis of over 1400 ICOs found “rampant plagiarism, identity theft and promises of improbable returns.”¹³

As cheap money, though, will always displace expensive money (from an entrepreneur’s perspective), if valuation disparities continue, it is possible that ICO funding will grow further to displace a significant portion of the \$160 billion venture capital raised annually around the globe.¹⁴ This changing venture funding landscape highlights the need for investor protection to keep pace with market developments.

Crypto Exchanges

Once Bitcoin developed as the first cryptocurrency, it was only natural that secondary markets and exchange trading would develop.

In aggregate, crypto exchanges now have tens of millions of customers. Coinbase, alone, has over 20 million accounts, almost as many as Fidelity Investments, more than twice brokerage firm Charles Schwab and nearly as many as Vanguard has investors.¹⁵

Trading appears to be significant, with over \$12 billion in daily volume reported last week.¹⁶ There are now approximately 200 crypto exchanges and many others have failed. By 2015, one list already had at least 36 failures.¹⁷ In 2018, after the Japanese Financial Services Agency (JFSA) conducted business reviews of exchanges, at least nine suspended their operations.¹⁸

In reviewing exchange volume figures, some caution is in order as market data from crypto exchanges generally is not audited or regulated. Furthermore, exchanges may use wash sales (i.e., trading involving no change in beneficial ownership that is intended to produce the false appearance of trading) to inflate their volume statistics in an effort to report greater market share. One recent study suggests up to 95% of OKex's reported volume may be nonexistent and 82% of Huobi's may be as well.¹⁹

These exchanges also have some significant differences from traditional securities, derivatives and retail fiat currency exchanges. Crypto exchanges offer direct access to customers rather than access through regulated intermediaries, such as broker dealers or future commission merchants. Centralized crypto exchanges also take custody of customers crypto and some fiat funds. For instance, Coinbase reports to have custody of over \$20 billion in customer crypto funds.²⁰

Crypto exchanges have had significant problems protecting customers' funds held in custody, usually in digital wallets rather than at a bank, broker dealer, or future commission merchants. Numerous hacks have led to significant stolen customer funds. Mt. Gox lost \$473 million in Bitcoin in 2014.²¹ Coincheck lost \$530 million in NEM tokens in 2018.²² A South Korean exchange, Coinrail, was hacked in June of 2018, losing \$40 million, or fully 30% of customer tokens held in custody.²³

Also acting as counterparties to their customers, crypto exchanges currently have limited guardrails against front running, fraud, or other manipulative practices. For instance, there are no assurances that order book or sales price information posted

on these exchanges are current or accurate or that the cryptocurrency held by exchanges in custodial wallets is fully backed with coins on the relevant blockchain.

There are no rules for best execution or order routing amongst crypto exchanges. There are no rules limiting conflicts of interest or for fair and orderly markets. There are no standards for price transparency – either pre-trade or post-trade. There are no cops on the beat to protect against manipulative practices. In summary, investors have little basis for confidence in crypto exchanges’ order books or price discovery function.

There have been repeated reports of manipulative behavior on these exchanges. A study last year reviewed how a trader using two trading bots on the Mt. Gox exchange may have manipulated the price of Bitcoin up 8-fold in 2013.²⁴ In January of 2018, there were reports of an investigation into whether Bitcoin might have been manipulated on the Bitfinex exchange in a scheme using the token Tether.²⁵

The Futures Industry Association (FIA) expressed its apprehension about the reference markets for Bitcoin futures. As it stated: “We remain apprehensive with the lack of transparency and regulation of the underlying reference products on which these futures contracts are based and whether exchanges have the proper oversight to ensure the reference products are not susceptible to manipulation, fraud, and operational risk.”²⁶

The volumes, millions of customers, repeated hacks and ample potential for manipulative behavior, suggest that oversight is worthy by securities, commodities and derivatives regulators around the globe. To date, however, this trading activity has largely taken place outside of investor protection and market integrity regimes.

Public Policy Frameworks

As with the emergence of new technologies in the past, from railroads in the 19th century to the internet in the late 20th century, there have been debates on how blockchain technology and crypto finance might best fit within existing public policy and legal frameworks.

Operating within policy frameworks, though, has helped foster traditional capital markets for decades and are just as important for crypto finance, even if the details for achieving the goals may be adapted to accommodate new technologies.

The public broadly benefits when we:

- Ensure tax compliance.
- Guard against money laundering or terrorism financing.
- Enforce sanctions regimes.
- Promote financial stability.
- Protect investors and consumers.
- Promote market integrity and efficient capital markets.
- Foster economic inclusion and growth.

Achieving these broad public policy goals fosters economic growth and is consistent with promoting innovation.

When investing in any form of financing, whether initial coin offerings, other crypto assets, or in traditional forms, such as stocks or bonds, the public benefits from full and fair disclosure from issuers.

The investing and hedging public benefits from prohibitions against fraud and deceptive sales practices.

Investors, hedgers, and issuers all benefit from secondary market trading that promote transparency and prohibit manipulative practices such as price manipulation, front running, wash sales, and spoofing (i.e., bidding or offering with the intent to cancel the bid or offer before execution.)

The investing and hedging public benefits when conflicts of interest are disclosed and minimized.

Such core principals of investor protection and market integrity are embodied in U.S. securities and commodities laws regardless of the form of investment. Such common-sense rules of the road bolster confidence in markets and enhances our economy.

Securities Laws, Howey Test & Duck Test

Despite issuers' claims that the intended utility function of their tokens should place them in a different category from securities, there's no getting away from ICOs' investment contract attributes which means they should be subject to securities laws.

In essence, as Indiana poet James Whitcomb Riley wrote over 100 years ago: "When I see a bird that walks like a duck and swims like a duck and quacks like a duck, I call that bird a duck."

An important early test of securities laws' statutory construct related to the Florida orange groves of William Howey, whose company sold land with an option to lease the land to an affiliated service company and participate in the profits of the crop. Even though not stocks or bonds, the U.S. Supreme Court in 1946 ruled that Howey's land sale agreements satisfied the definition of 'investment contracts' under the 1933 Securities Act and thus should be regulated as securities.

The so-called 'Howey Test' from this case states that: "an investment contract for purposes of the Securities Act means a contract, transaction or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or a third party." *SEC v. W. J. Howey Co.*, [328 U.S. 293](#), 299 (1946).

The Securities and Exchange Commission (SEC) has now repeatedly spoken out about the application of securities laws to initial coin offerings and crypto exchanges offering ICOs for sale. Sounding like poet Riley, SEC Chairman Clayton stated in February that "I believe every ICO I've seen is a security... You can call it a coin but if it functions as a security, it is a security."

At a Congressional hearing on April 26, 2018, Chair Clayton divided crypto-assets into two areas, those which represent "a pure medium of exchange" and "tokens, which are used to finance projects." He said that a "pure medium of exchange ... as a replacement for currency" such as Bitcoin would not be regulated as a security.

As for tokens, Chair Clayton said: "Then there are tokens, which are used to finance projects. I've been on the record saying there are very few, there's none that I've seen, tokens that aren't securities." He added "To the extent something is a security, we should regulate it as a security, and our securities regulations are disclosure-based, and people should follow those and provide the information that we require."²⁷

Commodities Laws & Crypto Derivatives

The CFTC has exclusive jurisdiction over the trading of crypto derivatives on exchanges, i.e., “designated contract markets” (DCMs) and “swap execution facilities” (SEFs) for both futures contracts and swaps as well as the trading of over-the-counter crypto swaps. The CFTC also has general anti-fraud and manipulation authority for spot transactions in commodities traded in interstate commerce.

Thus, the CFTC has direct jurisdiction for crypto derivatives. If an exchange offers derivatives on cryptocurrencies, then that exchange must register with the CFTC. Crypto exchanges that offer to U.S. persons ‘retail commodity transactions’ as defined in statute, could also be subject to the authority of the CFTC.

The CME Group and CBOE Global Markets started trading Bitcoin futures in December 2017. Nasdaq²⁸ and Intercontinental Exchange²⁹ have both said that they are investigating offering cryptocurrency or crypto derivative trading. Overseas, Germany’s largest exchange, Deutsche Börse, has said it is considering offering Bitcoin futures on its Eurex derivatives exchange.³⁰ A U.K. start-up, Crypto Facilities, launched an Ether futures contract in May 2018.³¹

The CFTC in its “Coinflip Order” determined that Bitcoin and other virtual currencies are commodities under the CEA in 2015.³² A U.S. District court subsequently concurred with a latter similar determination.³³ Accordingly, the CFTC has general anti-fraud and anti-manipulation authority for spot transactions in the underlying reference cryptocurrencies, whether traded on exchanges or over the counter. The CFTC has brought a number of actions under this authority, one related to the trading of Bitcoin and Litecoin³⁴ and another with regards to the trading of My Big Coin.³⁵ My Big Coin, though, is challenging the jurisdiction of the CFTC contending that their token is not a commodity.³⁶

The Path Forward

How do the markets, this new technology, Congress and regulators move forward?

I will review some considerations organized around the three broad public policy goals of: 1) guarding against illicit activity; 2) ensuring for financial stability and 3) protecting the investing public.

Guarding Against Illicit Activity

On balance, though, blockchain technology and cryptocurrencies have given the official sector new challenges in guarding against illicit activities. The crimes aren't generally new. The means and methods, though, particularly of payment, may be.

The pseudonymous nature of blockchain-based records obscures the identity of actors, raising concerns for law enforcement authorities tasked with guarding against illicit activities. At the same time, the private sector has had legitimate concerns about the privacy of data shared on Bitcoin and other open permissionless blockchain applications.

Interestingly, Bitcoin and other blockchain applications while often referred to as anonymous, are more accurately what security experts would call pseudonymous. Bitcoin transactions do not include names of individuals or companies, but they do provide Bitcoin addresses, which if found to be linked to any personal data, such as your e-mail or ISP address, may allow for some transparency. Thus, blockchain technology allows some information about participants to be gleaned from patterns in the transaction records, balances in the unspent transactions outstanding and blockchain forensics.³⁷

Given the pseudonymous nature of Bitcoin, it was only a matter of time and technological innovation before a number of cryptocurrencies would be developed promoting more anonymity. These anonymity-focused-crypto assets have specific designs that make their transactions harder to track on their underlying blockchains. Monero, Dash and Zcash are the three with the largest market capitalization, totaling about \$5 billion, but many more exist and are marketed to the public.³⁸ It has been reported that Japan this spring has been encouraging crypto exchanges to halt listings of trading anonymity-focused-crypto assets.³⁹ On the otherhand, it has been recently reported that Coinbase is considering listing Zcash for the first time.⁴⁰

Dark Markets

One of the most harmful activities has been on so-called dark markets. These markets operate with anonymous communications through the Tor network, a free and open network which provides users anonymous and censorship resistant means of communicating on the Internet.⁴¹ Dark markets have generally used Bitcoin for escrowed payments. They list for sale illegal drugs, weapons, stolen credit card details, and forged documents offered by hundreds or sometimes thousands of vendors.

U.S. and international enforcement authorities have successfully taken down a number of dark markets trafficking in illegal activities, but other markets keep popping up in their place. When the U.S. Department of Justice shut down AlphaBay in July of 2017, it was estimated to be 10 times larger than the notorious Silk Road web site which was shut down in 2013. Dutch authorities, working along with U.S. authorities successfully shut down another large dark market, Hansa, just two weeks later.⁴²

Beyond use on the darknet, there are those around the globe who seek to use these new technologies to thwart government oversight of money laundering, tax evasion, terrorism financing, or evading sanctions regimes.

State Actors

Two high profile uses of cryptocurrencies in efforts to thwart U.S. policy were by foreign government actors. In January of 2018, Venezuela announced a \$5 billion oil-backed ICO called Petro. In response, augmenting previously established sanctions, the President signed an Executive Order in March prohibiting U.S. persons from purchasing or dealing in any digital currency, coin or token of the Government of Venezuela.⁴³

On July 13, 2018, the U.S. charged 12 Russian military intelligence officers with conspiracy to interfere with the 2016 elections. Amongst the charges, count ten alleges conspiracy to launder money. It reads, in part: “the defendants conspired to launder the equivalent of more than \$95,000 through a web of transactions structured to capitalize on the perceived anonymity of cryptocurrencies such as bitcoin.” It is alleged that: “they principally used bitcoin when purchasing servers, registering domains, and otherwise making payments in furtherance of hacking activity.” The indictment states that: “The use of bitcoin allowed the Conspirators to avoid direct relationships with traditional financial institutions, allowing them to evade greater scrutiny of their identities and sources of funds.”⁴⁴

Tax Compliance

The U.S. Internal Revenue Service issued guidance in 2014 on the use of what they called ‘virtual currencies’, such as Bitcoin and other crypto assets. In determining that all virtual currencies are treated as property for U.S. tax purposes, the IRS said that general tax principals applicable to property transactions apply to virtual currencies. Taxpayers receiving virtual currencies for payment of goods and services must include their fair market value in their reported gross income.

Taxpayers also are required to include in income any gains or losses upon a sale or exchange of virtual currencies.⁴⁵

One open question that investors and tax practitioners had had was the appropriate treatment under the tax laws of crypto to crypto exchanges. The law was clear that tax could be deferred by treating these trades as so-called ‘like kind exchanges’ under IRS section 1031. If that was even possible prior to 2018, it no longer is now, with amendments to Section 1031 included in the Tax Cut and Jobs Act to make like-kind exchanges only applicable to real estate transactions.⁴⁶

One challenge for tax compliance is that crypto exchanges have not yet been sending form 1099-B, reporting on transactions, to their customers and the IRS. The IRS requires brokers to do so with regard to all broker or barter exchange transactions.⁴⁷ As discussed elsewhere, though, the current model for crypto exchanges does not generally include brokers, leaving a significant gap in tax reporting. The U.S. Internal Revenue Service had to win in federal court before the crypto exchange Coinbase was willing to share information on their most active customer accounts - approximately 13,000 accounts - with the IRS.⁴⁸

The IRS, if need be working with Congress, should close this gap and require crypto exchanges lacking intermediated brokered access to provide customers and the IRS with form 1099-B for their crypto and other property transactions. In addition, the IRS should close gaps with regard to requirements for taxpayers with offshore crypto accounts on filing a report of foreign bank and financial accounts (FBAR).⁴⁹ This has been a gray area which could undermine tax compliance.⁵⁰

First Line of Defense – Money Transmission Laws

There is a widely held view amongst most policy officials globally that we must guard against such threats – whether by state actors or private sector actors - though how best to do so has been up for debate.

The first line of defense has been through money transmission laws and bank secrecy laws requiring compliance with anti-money laundering (AML), combatting financing of terrorism (CFT), and know your customer (KYC) laws. The U.S. Treasury’s Financial Crime Enforcement Network (FinCEN) put out guidance on this regard starting in 2013⁵¹ and most recently in a letter to Congress.⁵²

More could be done, though, directly overseeing the crypto ecosystem and at the intersections of the traditional financial sectors, e.g., banking and payments

networks, to perform KYC and to minimize the risk of the illicit use of blockchain networks.

Crypto Exchanges and Wallets – Critical Gateways

Crypto exchanges and digital wallet companies, if properly regulated, may provide one of the most critical gateways to protect against such illicit transmissions of value. Both crypto exchanges and digital wallets provide customers the ability to store crypto assets and transact electronically. (Many provide fiat currency services as well.)

This gateway to effect public policy is particularly important as crypto exchanges allow for direct public access. In contrast, traditional securities and derivatives exchanges are accessed through intermediaries such as banks, broker-dealers or futures commission merchants (FCM), giving authorities important gateways to monitor and enforce the law. Thus, in the crypto world, tax authorities and financial crimes enforcement will have to look to exchanges, custodians, investors or blockchain forensics companies, for reporting on crypto transactions, taxable gains or losses, and any illicit activity.

In the U.S., in the absence of federal registration, crypto exchanges are required to comply with money transmission laws and to register in each state according to those individual state laws. This is a cumbersome and inconsistent process even for those well-meaning companies seeking to comply. Few exchanges have done so in all jurisdictions, raising questions of possible noncompliance. New York State, through its BitLicense, has acted to bring exchanges within enhanced money transmission laws.⁵³ Federal registration and oversight – through commodities and securities laws – would be a better public policy solution than this current patchwork approach.

Japan moved in 2017 to regulate crypto exchanges primarily for money transmission and their custodial duties. Korean authorities banned exchanges from trading for anonymous accounts⁵⁴ and subsequently began investigating numerous exchanges for fraud and other misconduct.

As many jurisdictions around the globe, however, do not yet have specific regulatory regimes governing crypto exchanges it puts an even greater burden on U.S. authorities, financial sector and laws. “There are significant challenges to investigating foreign virtual currency businesses, because most jurisdictions do not regulate and supervise virtual currency businesses,” a Treasury official wrote in the letter FinCEN sent to Congress in February 2018.

Decentralized Crypto Exchanges – Challenges Ahead

Decentralized crypto exchanges, still only a modest portion of the crypto markets, may present even greater challenges. These exchanges provide for peer-to-peer trading based upon open-source algorithms with no centralized platform and no custody of funds. Thus, decentralized exchange protocols, might help provide a solution for the security of customer funds, if they truly don't hold those digital assets. On the other hand, though, they may pose additional challenges to authorities trying to guard against illicit activities, particularly for crypto-to-crypto trading.

If decentralized exchanges facilitate trading of fiat currency vs. cryptocurrency, regulators might be able to implement policy by restricting regulated intermediaries or their customers in transacting with such platforms.

Ensuring for Financial Stability

It is important to ensure that blockchain technology, cryptocurrencies and crypto exchanges do not undermine financial stability, in normal times or in stressful economic times.

Financial Stability Board – Initial Assessment

The Financial Stability Board (FSB), an international group that makes recommendations about the global financial system, stated in its open letter in March 2018 to the G-20 heads of state, that “The FSB’s initial assessment is that crypto-assets do not pose risks to global financial stability at this time.”⁵⁵ They noted that even at their peak earlier this year, the overall market value was less than 1 % of global GDP.

The current market value of all crypto assets is approximately \$250 billion relative to global equity markets of approximately \$80 trillion as of 2017 year-end⁵⁶ and global debt outstanding as of March 31, 2018 of approximately \$250 trillion.⁵⁷ The world’s 190,000 tons of gold⁵⁸ are worth about \$7 trillion in aggregate at recent market prices of \$1,243 per ounce.

The FSB noted, however, that their assessment could change if crypto finance became more interconnected with the core of the regulated financial sector. In that regard, it is worthwhile to consider three areas worthy of monitoring: 1) leverage in

crypto markets; 2) market infrastructure blockchain initiatives & 3) central bank digital currencies.

Leverage in Crypto Markets

Given the high volatility of crypto assets, significant leverage could add to instability and stress, particularly during down markets. While Bitcoin futures listed at CME and CBOE require nearly 50% margin, most crypto exchanges allow for much lower margin (and thus higher leverage) when trading Bitcoin and many other crypto assets. BitMEX provides 100:1 leverage (only 1% margin) for Bitcoin trading. Many other exchanges allow offer leverage above 10:1.⁵⁹ Furthermore, given that many exchanges lack transparency and remain unregulated, it may be challenging for central banks and others responsible for financial stability to influence the amount of leverage in crypto markets or get an accurate window into these markets.

Market Infrastructure - Blockchain Initiatives

Blockchain technology and other forms of distributed ledger technology raise the possibility of replacing various centralized market infrastructures. This could lower costs, limit counterparty risks, promote innovation and economic inclusion. It may also lower the systemic risks associated with centralized market infrastructures for payments, clearing, settlement and other shared functions. Though Bitcoin is now nearly ten years old, these technologies are still untested in any economy-wide (or even enterprise-wide) production. Any widescale use of blockchain technology within the financial sector will need to be considered in light of their potential resilience to various risk vectors – economic, cyber, operating and otherwise.

Possibly most relevant to this committee's work, there are efforts underway to use blockchain smart contracts to help automate post trade event management for uncleared swaps. The International Swaps and Derivatives Association (ISDA) is working with Regnosys to produce a digital version of ISDA's Common Domain Model for numerous swap transaction and life cycle processes. The goal is to provide the market with a standard set of digital definitions and smart contracts to reduce costs and counterparty risk.⁶⁰

There are other clearing and settlement use cases of note, though as stated, none are live at this time. The Depository Trust and Clearing Corporation's (DTCC) has delayed its initiative, working with IBM, to implement a permissioned blockchain for credit default swap clearing and record keeping at its Trade Information Warehouse.⁶¹ Nasdaq, partnering with blockchain startup Chain, is experimenting

with a number of blockchain applications, including for clearing and settlement for private securities transactions for non-listed companies.⁶² Overseas, the most noted initiative is that of the Australian Stock Exchange which announced last year that it would replace its entire clearing and settlement infrastructure with a permissioned distributed ledger-based solution developed by Digital Asset Holdings.⁶³

Central Bank Digital Currencies

Lastly, Bitcoin and cryptocurrencies has led to healthy debates within the central banking and economics communities on the pros and cons of central banks issuing retail central bank digital currencies (CBDC) and if so, the effects that might have on payment systems and the commercial banking system.⁶⁴ Central banks already issue digital currency, but only to commercial banks, in the form of bank reserves. The public -merchants and consumers alike - can only access paper currency or bank deposits. In the U.S. that is in the paper form is Federal Reserve Notes.

The debate is whether to utilize blockchain technology to give greater access to either central bank payment systems and/or reserves to merchants or the wider public. In part this is being considered by central banks in an effort to stay abreast of rapid changes in payment methods and means of commerce, such as mobile payments, digital wallets and in some countries, the decline in the use of paper notes. In addition, central banks may find that they will be reacting to private sector initiatives to issue so-called ‘stable value’ tokens designed to have stable prices or values and tied to or backed by fiat currency. Though stable value tokens to date, such as Tether, have had many challenges, some observers think that such an effort has potential.⁶⁵

Thus, the question CBDC raises for financial stability is with direct access to central bank digital currencies what portion of consumer deposits would move away from commercial banks and what effects would such migration have on lending and the overall economy? Furthermore, in times of stress or financial uncertainty, the public might move a significant portion of their money away from commercial banks to the central bank, potentially aggravating instability in the financial sector.

Protecting the Investing Public

As noted above, the \$250 billion crypto markets currently operate largely outside of traditional investor protection norms. This is in spite of the SEC repeatedly publishing advisories and making public statements that most ICOs and the crypto exchanges trading in such tokens must comply with U.S. securities laws.

Thus, it is not surprising that the crypto markets are now known for high levels of fraud, scams and manipulative behavior. I will now review the need for investor protection in each of the three segments of the crypto markets: 1) crypto tokens – ICOs or issuer or based, 2) crypto derivatives and 3) cryptocurrencies (aka crypto cash commodities). Following this, I will touch upon the critical need to address crypto custodial functions.

Crypto Tokens – ICOs or Issuer-Based

The burgeoning market and the economic realities of ICOs or issuer-based tokens has led to robust debates around the globe over the appropriate regulations to apply to their issuance and trading. The International Organization of Securities Commissions (IOSCO) board expressed its concerns in a statement stating that: “ICOs are highly speculative investments in which investors are putting their entire invested capital at risk. ... the increased targeting of ICOs to retail investors through online distribution channels ... -- raises investor protection concerns. There have also been instances of fraud, and as a result, investors are reminded to be very careful in deciding whether to invest in ICOs.”⁶⁶

Individual countries’ securities regulators have also been active in releasing statements regarding ICOs, cryptocurrencies, and exchanges. IOSCO lists statements from 40 countries regarding ICOs.⁶⁷

In the U.S., it is now the case that most ICO related tokens, and the crypto exchanges that list them must comply with securities laws. Unfortunately, though, most are not yet doing so. The SEC’s effort to date has yet to bring this market into compliance.

We’ve already seen high levels of fraud and loss of funds in these markets. Currently, a growing and potentially significant portion of the capital markets – crypto finance - is not benefiting from basic investor protections.

When determining what is an investment contract under their securities laws, Canada has a similar approach to that of the U.S. Howey Test.⁶⁸ Provincial regulators from Canada joined with State regulators in the U.S. in May 2018, in a coordinated action against ICOs named “Operation Cryptosweep” with nearly 70 open investigations and 35 enforcement actions.⁶⁹

The SEC to date has used public advisory statements, speeches, testimony and enforcement actions against some of the most obvious offenders but has a great deal of work ahead of them to bring the issuer-based crypto market into compliance.

The SEC's Director of the Division of Corporate Finance, William Hinman, sought to give additional direction in a speech on June 14, 2018. He noted that "a digital asset transaction may no longer represent a security offering [where] the network on which the token or coin is to function is sufficiently decentralized – where purchasers would no longer reasonably expect a person or group to carry out essential managerial or entrepreneurial efforts." In explaining that decentralization may reduce information asymmetries, he said: "[W]hen the efforts of the third party are no longer a key factor for determining the enterprise's success, material information asymmetries recede." Moreover, "[a]s a network becomes truly decentralized, the ability to identify an issuer or promoter to make the requisite disclosures becomes difficult, and less meaningful."⁷⁰

While the number of ICOs being sold under exempt securities offerings (ie, Reg D filings) is increasing, many ICOs are still sidestepping these requirements. Furthermore, while there are reports that a number of crypto exchanges are in discussions with the SEC about registering as broker dealers and complying with Reg ATS, none have yet fully done so. That means that these exchanges are currently likely operating in the breach.

To bring greater clarity to these markets, the SEC must also determine how best to bring into compliance the over 1000 ICOs and numerous crypto exchanges still in operation in the U.S. What remediation and possible penalties are appropriate? One petitioner recommended retroactive registration along with investor rescission rights. Some requirements, such as satisfying requirements to track beneficial ownership may be difficult for these past ICOs.

Another challenge is that though SEC Chair Clayton has been clear that nearly all of the ICO market need comply with securities laws, until more enforcement actions are brought, potentially litigated and upheld in court, many issuers and exchanges will possibly continue to skirt their obligations. As the SEC stated in its Munchee Order, it will take more than semantics and more than a token being functional on a network to be exempt from securities regulation.⁷¹

The crypto markets have gotten some clarity with the SEC stating that the two largest coins, Bitcoin and Ether are not currently securities. There are strong cases to be made, though, that a number of the other large market cap tokens are noncompliant

securities. If large market cap tokens, such as XRP (sold by Ripple) or EOS (sold by Block.one), are concluded to be non-compliant securities - there are strong arguments that they pass the Howey Test and are - exchanges offering trading in these tokens will need to comply with SEC regulatory requirements or cease offering these products.

Also, the SEC will need to decide if they might issue rules and interpretations specific to the crypto space. To date, they have chosen not to do so, but with the advent of the Internet and electronic trading in the 1990's, the SEC issued a number of new regulations for those novel market developments. A similar approach could be adopted here.

Crypto Derivatives

If an exchange offers derivatives on cryptocurrencies, then that exchange must register with the CFTC either as a DCM or as a SEF. Exchanges that offer leverage or margin for the purchase of cryptocurrencies may come under the definition of offering 'retail commodity transactions' and thus also be required to register.

The CFTC has yet to finalize a proposed interpretation that may help determine the breadth of crypto exchanges that will need to register.⁷² Under the CEA, the CFTC has jurisdiction over any retail commodity transaction entered into on a leveraged or margined basis that does not result in actual delivery of the underlying commodity within 28 days. Under a proposed CFTC interpretation, "actual delivery" occurs if within 28 days of execution, only if a full transfer of the cryptocurrency is transferred between the seller and buyer as recorded on the relevant blockchain (not merely on the exchange's data base or wallet), whether it is reflected on the recipient's private wallet and whether the recipient has control of the private key.

Given how crypto exchanges' transactions are currently being conducted for levered or margined cryptocurrency, many exchanges may be holding cryptocurrencies for retail customers that do not satisfy the "actual delivery" exemption. These crypto exchanges therefore might be offering trading of a form of a retail commodity transaction subject to CFTC regulations.

Thus, the CFTC's final interpretation with regard to the definition of 'actual delivery' will be important. At one end - nearly all of the crypto exchanges offering margin to the retail public would need register with the CFTC. At the other end for the final interpretation - gaps in crypto exchange market integrity and custodial duties oversight will persist.

The CFTC issued an advisory in May 2018 with respect to crypto derivatives listings. The CFTC staff expressed guidance on enhanced procedures for exchanges and clearinghouses listing derivatives contracts on virtual currency. These enhancements include an expectation that exchanges, and clearinghouses enter into information sharing arrangements with the underlying crypto spot market(s).⁷³

Another challenge for regulators is that blockchain technology provides for new algorithmic means to structure binary options and contracts for differences, all of which are derivatives under the jurisdiction of the CFTC. The bitcoin scripting language and smart contracts used on other networks provide ways to structure peer-to-peer derivatives which execute and settle automatically based upon pre-arranged conditions. These blockchain based derivatives could reference any commodity – agricultural, metals, energy or financial. The CFTC and other regulators will want to ensure that this new technology does not presage a new and growing unregulated or dark swaps market.

Cryptocurrencies (aka Crypto Cash Commodities)

Gaps in investor protection also have developed for crypto exchanges solely trading cash cryptocurrencies. As previously discussed, crypto exchanges currently have limited guardrails against front running, fraud, or other manipulative practices. There have been repeated reports of manipulative behavior on these exchanges. There have been repeated reports of stolen customer funds through cyber hacks. As mentioned, the FIA expressed its apprehension about the lack of transparency and regulation of the crypto cash commodities markets underlying Bitcoin futures.

Currently nearly 70% of the crypto markets' \$250 billion total capitalization is represented by the five cryptocurrencies which have either been designated by the SEC as not securities (Bitcoin and Ether)⁷⁴ or were forks off of Bitcoin or Ether (Bitcoin Cash in 2017, Litecoin in 2011, Ethereum Classic in 2016).

The CFTC has general anti-fraud and anti-manipulation authorities with regard to spot transactions in these crypto cash commodities, such as Bitcoin or Ether. This authority is critical for cryptocurrencies referenced in the derivatives markets but may be increasingly important as well for retail investors in crypto cash commodities. The agency, though, does not currently have express registration or plenary rule writing authorities with regard to cash commodities.

One troubling recent development highlights the need for such authorities. The CME was unable to get underlying transaction data from the four crypto exchanges

upon which they rely for the Bitcoin index referenced by their Bitcoin futures contract. It's been reported that these four exchanges (Bitstamp, Coinbase, Itbit, and Kraken) refused to provide the data until the CFTC stepped in with subpoenas.⁷⁵ It is critical to the functioning of any crypto derivatives markets that both self-regulatory organizations and government regulators have ready access to trading data for the underlying referenced crypto cash commodities.

The SEC is grabbling with similar issues with regard to its review of possible crypto related ETFs and crypto investing by mutual funds. The SEC has rejected a number of filings for Bitcoin ETFs, starting with the Winklevoss Bitcoin Trust (COIN ETF) in March 2017. The SEC stated two requirements that the exchanges had not must satisfied in order to list a Bitcoin ETF: “the exchange must have surveillance-sharing agreements with significant markets for trading the underlying commodity or derivatives on that commodity. And second, those markets must be regulated.” It further cited “concerns about the potential for fraudulent or manipulative acts and practices in this market.”⁷⁶

In a subsequent staff letter published in January 2018, the SEC raised a series of questions regarding, amongst other things, appropriate valuation methods available for crypto assets, liquidity of crypto markets, custody of crypto funds and potential manipulation in these markets.⁷⁷

Failing to better oversee the crypto cash commodities markets also leaves investors vulnerable, illicit activity hard to control and custodial responsibilities to vagaries of State enforcement of money transmitter laws. The volumes, millions of customers, repeated hacks and reports of manipulative behavior, suggest that oversight of crypto exchanges trading solely in crypto cash commodities is worthy of consideration.

Furthermore, as the CFTC staff discussed in their recent advisory, there are differences between crypto cash commodities and other commodities. They said:

“To date, virtual currencies have gained prominence as they are bought and sold for investment, speculative, or financial purposes. Those transactions greatly predominate over commercial uses of virtual currency – such as to purchase goods and services – which are still developing. Thus, virtual currencies differ from commodities like oil and gold where commercial uses predominate or at least provide points of comparison. At the same time, virtual currencies differ from financial indices and other commodities for which robustly-regulated

markets facilitate price verification and provide insight into the reasons for price changes.”⁷⁸

Gemini Trust Company (Gemini), the crypto exchange founded by Cameron and Tyler Winklevoss, recently proposed setting up a self-regulatory-organization (SRO) for crypto exchanges dealing in crypto cash commodities or what they call ‘virtual commodities.’ In the medium post calling for the SRO, Cameron and Tyler Winklevoss articulate a view that virtual commodities should have an additional layer of oversight beyond that which other cash commodities have stating: “Cash markets for virtual commodities, however, are unique inasmuch as: (a) the commercial use-cases for virtual commodities are still developing, (b) there is strong speculative interest, (c) these marketplaces involve a large number of individual participants, and (d) technology makes individual transaction costs exceptionally low (on a relative basis) as compared to other physical commodity spot markets.”⁷⁹

It is a logic for additional oversight of crypto cash commodities somewhat consistent with the recent CFTC staff advisory discussion. Though the logic is directional sound, I believe that a federal oversight regime is appropriate if we are to achieve the public policy goals for crypto exchanges of guarding against illicit activity, ensuring stability, protecting investors and promoting market integrity, with SROs playing an important supportive role as they do in securities and derivatives markets.

Given frauds and other concerns in the retail foreign exchange markets, Congress, in the 2008 Farm bill, included provisions for the first time for CFTC registration and regulation of retail foreign exchange dealers (RFEDs). Similarly, the CFTC and Congress might wish to consider allowing retail cryptocurrency exchanges to register as RFEDs, though cryptocurrencies are not foreign currency, and while ensuring that cryptocurrencies remain distinct from fiat currencies for other parts of the commodities law.

Or Congress may wish to consider if it would be more appropriate to provide the CFTC – or another agency - with general authorities to write rules for crypto cash commodities markets, including possibly requiring registration for trading on crypto exchanges solely dealing in cryptocurrencies, aka crypto cash commodities.

Custodial Functions

The Wall Street Journal reported this week: “Regulatory gaps and insufficient levels of defense have made some exchanges simple to breach.”⁸⁰ Seven hacks to date in 2018 have led to \$800 million in customer funds being stolen from crypto exchanges. Over \$1.6 billion has been stolen in 56 reported hacks since 2011. No doubt, more has been lost to unreported thefts and cyber-attacks.

Though Bitcoin and many blockchains themselves have been generally resistant to hacks, with the integrity of their ledgers preserved, there are significant weaknesses in other areas and layers within the crypto ecosystem.

Unlike traditional exchanges, crypto exchanges hold significant customer funds in digital wallets - a state of affairs that directly contradicts the principles of decentralized user-based control of digital assets upon which Bitcoin was initially built. The aggregate of these customer crypto-assets is then represented on a particular token’s blockchain associated with the public keys of the exchange, not the individual customers. As mentioned previously, Coinbase reports to have custody of over \$20 billion in customer crypto funds.

In contrast, customers trading on traditional securities exchanges with intermediated access have their securities recorded at a transfer agent, and held by a broker or dealer, not the exchange. Customers trading on derivatives platforms, have their trades recorded and margin posted at regulated clearing houses and FCMs.

Exchanges are exploring whether new approaches, such as multi-signature wallets, might aid in protecting the security of customer funds.⁸¹ But for now, the existing system is operating with a glaring gap in investor protection. With well over 90 % of daily trading volume in Bitcoin occurring through crypto exchanges rather than being recorded as a transaction directly within the blockchain, and with the public accessing these exchanges without the benefit of regulated intermediaries, it is critical to put in place federal requirements for the custody of crypto assets.

In the U.S. to date, the only regulatory safeguards have been through State-administered money transmission regulations. This approach – regulating exchanges’ custodial duties in the same manner that Western Union and MoneyGram are regulated – is not satisfactory.

In some countries, particularly Japan, authorities have required crypto exchanges to register and meet certain custodial duties to protect customer funds stored in an exchange's digital wallets.

The public policy goals should be the same, whether the asset is crypto in nature or a more traditional security or derivative. Exchanges should fully segregate customer funds and ensure that they not lose those funds and not use those funds.

When considering existing custodial rules, the specifics of blockchain technology, public keys and cryptography will need to be considered. New technologies, such as multi-signature controls might protect customers or fulfill certain custodial responsibilities. Added safeguards, need be considered for the private keys associated with exchanges', asset managers', banks' or regulated intermediaries' public keys. Additional cyber-security and other safeguards might be appropriate, particularly given the numerous losses and hacks that have occurred in the past.

Conclusion

In conclusion, blockchain technology has a real potential to transform the world of finance. Though there are many technical and commercial challenges yet to overcome, I'm an optimist and want to see this new technology succeed. It could lower costs, risks and economic rents in the financial system.

For broad adoption – both as a technology solution and as part of the capital markets – the technology and its various applications need to come within existing public policy frameworks. Basic norms and principles to guard against illicit activity, ensure for financial stability, and protect investors and market integrity, while promoting innovation, should consistently guide public policy.

Clear rules of the road also will allow firms - both incumbents and start-ups - to more fully explore investing in crypto assets or blockchain technology. Today, start-ups have an advantage as incumbents do not take the same reputational and regulatory risks that startups generally are willing to take. Startups, so to speak, are more willing to beg for forgiveness while incumbents more often need ask for permission.

Bringing clarity and compliance will have its challenges. There are numerous crypto exchanges and thousands of ICO launched tokens in significant non-compliance. Congress and this committee have a role to play as well, monitoring developments, overseeing compliance, and, when appropriate, updating laws. It also will be critical that sufficient resources be provided the CFTC, SEC and other agencies to

adequately oversee crypto markets, especially as these markets have continued to grow.

Market participants, the investing public, entrepreneurs, technology developers, regulators and Congress all will play a role. In particular, crypto exchanges and ICOs should now seek to comply with the law to fullest extent possible.

The public, blockchain technology, and the financial system will all reap the benefits.

Thank you again for inviting me today, and I look forward to your questions.

Endnotes

- ¹ Maryland Financial Consumer Protection Commission; <http://dls.maryland.gov/policy-areas/maryland-financial-consumer-protection-commission#!>
- ² Though the research herein builds upon joint work with colleagues, the views expressed are mine alone, and do not represent the views of any of my academic colleagues or fellow MD Commissioners. I have no financial interest in any digital currency, or any blockchain related business.
- ³ CFTC Staff Advisory No. 18-14 (May 21, 2018) https://www.cftc.gov/sites/default/files/idc/groups/public/%40rlettergeneral/documents/letter/2018-05/18-14_0.pdf
- ⁴ Value added by private industries: Finance, insurance, real estate, rental, and leasing: Finance and insurance as a percentage of GDP; Federal Reserve Bank of St. Louis (reviewed on July 15, 2018) <https://fred.stlouisfed.org/series/VAPGDPI>
- ⁵ CoinMarketCap (as of July 14, 2018) <https://coinmarketcap.com>
- ⁶ Stats and Facts; ICO Bench (as of July 13, 2018) <https://icobench.com/stats>
- ⁷ 24 Hour Volume Rankings (Exchange); CoinMarketCap (as of July 13, 2018) <https://coinmarketcap.com/exchanges/volume/24-hour/>
- ⁸ Market Cap by Cryptocurrency (as of July 13, 2018); Coin Dance; <https://coin.dance/stats>
- ⁹ All-Time Cumulative ICO Funding; Coindesk (as of July 13, 2018) <https://www.coindesk.com/ico-tracker/>
- ¹⁰ Nearly Half of 2017 Cryptocurrency ‘ICO’ Projects Have Already Died; Forbes (February 25, 2018) <http://fortune.com/2018/02/25/cryptocurrency-ico-collapse/>
- ¹¹ Initial Coin Offerings: Can Regulators Curb the Risks? How Many ICOs Are Scams?; ValueWalk (March 30, 2018) <https://www.valuewalk.com/2018/03/initial-coin-offerings-regulators-curb-risks/>
- ¹² ICO Quality: Development & Trading; Sherwin Dowlatabadi & Michael Hodapp of Satis Group (March 21, 2018) <https://medium.com/satis-group/ico-quality-development-trading-e4fef28df04f>
- ¹³ Hundreds of Bitcoin Wannabes Show Hallmarks of Fraud; Wall Street Journal (May 17, 2018) <https://www.wsj.com/articles/buyer-beware-hundreds-of-bitcoin-wannabes-show-hallmarks-of-fraud-1526573115>
- ¹⁴ Venture Capital Funding Report 2017; CB Insights <https://www.cbinsights.com/research/report/venture-capital-q4-2017/>
- ¹⁵ Move deliberately, fix things: How Coinbase is building a cryptocurrency empire; Washington Post (May 17, 2018) https://www.washingtonpost.com/business/economy/move-deliberately-fix-things-how-coinbase-is-building-a-cryptocurrency-empire/2018/05/17/623d950c-587c-11e8-858f-12becb4d6067_story.html?utm_term=.a18c45536e2b
- ¹⁶ 24 Hour Volume Rankings (Exchange); CoinMarketCap (as of July 13, 2018) <https://coinmarketcap.com/exchanges/volume/24-hour/>
- ¹⁷ 36 bitcoin exchanges that are no longer with us, Brave New Coin (October 23, 2015) <https://bravenewcoin.com/news/36-bitcoin-exchanges-that-are-no-longer-with-us/>
- ¹⁸ Nine Japanese Crypto Exchanges Have Suspended Operations So Far, Bitcoin.com (April 13, 2018) <https://news.bitcoin.com/nine-japanese-crypto-exchanges-have-suspended-operations-so-far/>
- ¹⁹ Chasing fake volume: a crypto-plague; Sylvain Ribes (March 10, 2018) <https://medium.com/@sylvainartplayribes/chasing-fake-volume-a-crypto-plague-ea1a3c1e0b5e>

-
- ²⁰ Announcing the Coinbase Suite of Institutional Products; The Coinbase Blog (May 15, 2018) <https://blog.coinbase.com/coinbase-institutional-deea317d23af>
- ²¹ 12 Biggest Cryptocurrency Hacks In History, Benzinga (November 24, 2017) <https://www.benzinga.com/fintech/17/11/10824764/12-biggest-cryptocurrency-hacks-in-history>
- ²² Coincheck: NEM Foundation Stops Tracing Stolen Coins, Hackers' Account At Zero, CoinTelegraph (March 23, 2018) <https://cointelegraph.com/news/coincheck-nem-foundation-stops-tracing-stolen-coins-hackers-account-at-zero>
- ²³ South Korean Exchange Coinrail Hacked, \$40 Million in Crypto Reported Stolen; Bitcoin Magazine (June 11, 2018) <https://bitcoinmagazine.com/articles/south-korean-exchange-coinrail-hacked-40-million-crypto-reported-stolen/>
- ²⁴ Price Manipulation in the Bitcoin Ecosystem; Neil Gandal, JT Hamrick, Tyler Moore, and Tali Oberman (June 22, 2017) <https://tylermoore.utulsa.edu/jme17.pdf>
- ²⁵ Worries Grow That the Price of Bitcoin Is Being Propped Up; New York Times (January 31, 2018) <https://www.nytimes.com/2018/01/31/technology/bitfinex-bitcoin-price.html?dlbk>
- ²⁶ Open letter to CFTC chairman Giancarlo regarding the listing of cryptocurrency derivatives; Futures Industry Association (December 7, 2017) <https://fia.org/articles/open-letter-cftc-chairman-giancarlo-regarding-listing-cryptocurrency-derivatives>
- ²⁷ Bitcoin is Not a Security SEC Chairman; BlockExplorer News (April 27, 2018) <https://blockexplorer.com/news/bitcoin-is-not-a-security-sec-chairman/>
- ²⁸ After Nasdaq CEO Blesses Cryptocurrency, Investors See Bigger Future for Bitcoin, Others; Forbes (April 25, 2018) <https://www.forbes.com/sites/kenrapoza/2018/04/25/nasdaq-ceo-bitcoin-trading-cryptocurrency/#556c526613f4>
- ²⁹ Bitcoin Sees Wall Street Warm to Trading Virtual Currency; New York Times (May 7, 2018) <https://www.nytimes.com/2018/05/07/technology/bitcoin-new-york-stock-exchange.html>
- ³⁰ German market weighs Bitcoin futures, Handelsblatt Global (December 13, 2017) <https://global.handelsblatt.com/finance/german-market-weighs-bitcoin-futures-865045>
- ³¹ Ethereum Futures Go Live on UK Trading Platform; Coindesk (May 11, 2018) <https://www.coindesk.com/ethereum-futures-go-live-uk-trading-platform/>
- ³² In the Matter of Coinflip, Inc., d/b/a Derivabit, and Francisco Riordan; (Sept. 17, 2015), <https://www.cftc.gov/sites/default/files/idc/groups/public/@lrenforcementactions/documents/legalpleading/enfcoinfliporder09172015.pdf>
- ³³ Bitcoin and Cryptocurrencies Are Commodities, Federal Court Rules, Bitcoin.com (March 7, 2018) <https://news.bitcoin.com/bitcoin-cryptocurrencies-commodities-federal-court-rules/>
- ³⁴ Federal Court in NY Enters Preliminary Injunction Order Against Patrick K McDonnell and his Company CabbageTech, Corp. d/b/a Coin Drop Markets in Connection with Fraudulent Virtual Currency Scheme; CFTC (March 6, 2018) <https://www.cftc.gov/PressRoom/PressReleases/pr7702-18>
- ³⁵ CFTC Sues Obscure Crypto Scheme for Fraud; CoinDesk (January 24, 2018) <https://www.coindesk.com/cftc-sues-crypto-scheme-big-coin-fraud/>
- ³⁶ My Big Coin Tells Court Tokens aren't Regulated by CFTC Because they are Not Commodities; Crowdfund Insider (April 5, 2018) <https://www.crowdfundinsider.com/2018/04/131518-my-big-coin-tells-court-tokens-arent-regulated-by-cftc-because-they-are-not-commodities/>
- ³⁷ Stealing bitcoins with badges: How Silk Road's dirty cops got caught; arsTechnica (August 17, 2016) <https://arstechnica.com/tech-policy/2016/08/stealing-bitcoins-with-badges-how-silk-roads-dirty-cops-got-caught/>. Also see: A Fistful of Bitcoins: Characterizing Payments Among

Men with No Names; Meiklejohn, Pomarole, Jordon, Levchenko, McCoy, Voekler, & Savage (2013) <https://cseweb.ucsd.edu/~smeiklejohn/files/imc13.pdf>

³⁸ 9 Anonymous Cryptocurrencies You Should Know About; Coinsutra (February 2, 2018) <https://coinsutra.com/anonymous-cryptocurrencies/>

³⁹ Japan's Financial Regulator Is Pushing Crypto Exchanges To Drop 'Altcoins' Favored By Criminals; Forbes (April 30, 2018) <https://www.forbes.com/sites/adelsteinjake/2018/04/30/japans-financial-regulator-is-pushing-crypto-exchanges-to-drop-altcoins-favored-by-criminals/#22d47e3e1b8a>

⁴⁰ Coinbase Considering Cardano, Stellar Lumens, Zcash, 0x & BAT Token Listings; Bitcoin Exchange Guide News (July 13, 2018) <https://bitcoindexchange.com/coinbase-considering-cardano-stellar-lumens-zcash-0x-bat-token-listings/>

⁴¹ Tor <https://www.torproject.org>

⁴² Forget Silk Road, Cops Just Scored Their Biggest Victory Against The Dark Web Drug Trade; Forbes (July 20, 2017) <https://www.forbes.com/sites/thomasbrewster/2017/07/20/alphabay-hansa-dark-web-markets-taken-down-in-massive-drug-bust-operation/#72702fd15b4b>

⁴³ Executive Order on Taking Additional Steps to Address the Situation in Venezuela; White House (March 19, 2018) <https://www.whitehouse.gov/presidential-actions/executive-order-taking-additional-steps-address-situation-venezuela/>

⁴⁴ U.S. v. Netyksho, et al Indictment; Count ten, paragraph 57 (July 13, 2018) <https://assets.bwbx.io/documents/users/iqjWHBFdfxIU/rs96.XUFx2Gw/v0>

⁴⁵ IRS virtual currency guidance: Virtual currency is treated as property for U.S. Federal tax purposes; General rules for property transactions apply; IR-2014-36; IRS (March 25, 2014) <https://www.irs.gov/newsroom/irs-virtual-currency-guidance>

⁴⁶ The Truth About Cryptocurrency And Like-Kind Exchanges; Forbes (February 19, 2018) <https://www.forbes.com/sites/tysoncross/2018/02/19/the-truth-about-cryptocurrency-and-like-kind-exchanges/#33c7cdc26fd1>

⁴⁷ 2018 Instructions for form 1099-B; IRS <https://www.irs.gov/pub/irs-pdf/i1099b.pdf>

⁴⁸ Coinbase Notifies Customers That It Will Turn Over Court-Ordered Data; Forbes (February 28, 2018) <https://www.forbes.com/sites/kellyphillipsrb/2018/02/28/coinbase-notifies-customers-that-it-will-turn-over-court-ordered-data/#390113ca1431>

⁴⁹ Report of Foreign Bank and Financial Accounts (FBAR); IRS <https://www.irs.gov/businesses/small-businesses-self-employed/report-of-foreign-bank-and-financial-accounts-fbar>

⁵⁰ Bitcoin, FBAR, and the Offshore Voluntary Disclosure Program: A Primer for Expats; Greenback Expat Tax Services (March 22, 2018) <https://www.greenbacktaxservices.com/blog/expat-taxes-on-bitcoin-fbar/>

⁵¹ FIN-2013-G001; Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies; Department of Treasury (March 18, 2013) <https://www.fincen.gov/sites/default/files/shared/FIN-2013-G001.pdf>

⁵² Letter to Senator Ron Wyden, FinCEN (February 13, 2018) <https://coincenter.org/files/2018-03/fincen-ico-letter-march-2018-coin-center.pdf>

⁵³ Department of Financial Services BitLicense Regulatory Framework; New York State (June 24, 2015) https://www.dfs.ny.gov/legal/regulations/bitlicense_reg_framework.htm

⁵⁴ S Korea bans anonymous cryptocurrency trades; BBC News (January 23, 2018) <http://www.bbc.com/news/business-42784384>

-
- ⁵⁵ To G20 Finance Ministers and Central Bank Governors; Financial Stability Board (March 13, 2018) <http://www.fsb.org/wp-content/uploads/P180318.pdf>
- ⁵⁶ Market capitalization of listed domestic companies; The World Bank (as of December 31, 2017) <https://data.worldbank.org/indicator/CM.MKT.LCAP.CD>
- ⁵⁷ Global debt monitor; Institute of International Finance (July 9, 2018) <https://www.iif.com/publication/global-debt-monitor/global-debt-monitor-july-2018>
- ⁵⁸ World Gold Council (as of July 13, 2018) <https://www.gold.org/about-gold/gold-supply/gold-mining/how-much-gold-has-been-mined>
- ⁵⁹ The Best Bitcoin and Cryptocurrency Trading Platforms; BitReview (as of July 12, 2018) <https://bitreview.com/trade/bitmex/>
- ⁶⁰ ISDA Publishes Digital Iteration of the Common Domain Model; ISDA (June 5, 2018) <https://www.isda.org/2018/06/05/isda-publishes-digital-iteration-of-the-common-domain-model/>
- ⁶¹ Enterprises Building Blockchain Confront Early Tech Limitations; Coindesk (March 23, 2018) <https://www.coindesk.com/enterprises-building-blockchain-confront-tech-limitations/>
- ⁶² Nasdaq Exec: Exchange Is 'All-In' on Using Blockchain Technology; The Street (April 23, 2018) <https://www.thestreet.com/investing/nasdaq-all-in-on-blockchain-technology-14551134>
- ⁶³ CHESSE Replacement, ASX is replacing CHESSE with distributed ledger technology (DLT) developed by Digital Asset; ASX (December 2017) <https://www.asx.com.au/services/chess-replacement.htm>
- ⁶⁴ Central bank digital currencies; Bank for International Settlements, Committee on Payments and Market Infrastructures (March 2018) <https://www.bis.org/cpmi/publ/d174.pdf>
- ⁶⁵ Stable Coins Analysis: Is There A Viable Solution For The Future?; Cointelegraph (May 14, 2018) <https://cointelegraph.com/news/stable-coins-analysis-is-there-a-viable-solution-for-the-future>
- ⁶⁶ IOSCO Board Communication on Concerns Related to Initial Coin Offerings (ICOs); IOSCO (January 18, 2018) <http://www.iosco.org/news/pdf/IOSCONEWS485.pdf>
- ⁶⁷ Regulators' Statements on Initial Coin Offerings; IOSCO <https://www.iosco.org/publications/?subsection=ico-statements>
- ⁶⁸ CSA Staff Notice 46-307, Cryptocurrency Offerings; Ontario Securities Commission (August 27, 2017) http://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20170824_cryptocurrency-offerings.htm
- ⁶⁹ State and Provincial Regulators in U.S. and Canada Target Initial Coin Offerings; the Wall Street Journal (May 21, 2018) <https://www.wsj.com/articles/state-and-provincial-regulators-in-u-s-and-canada-target-initial-coin-offerings-1526918512>
- ⁷⁰ Digital Asset Transactions: When Howey Met Gary (Plastic); William Hinman, SEC (June 14, 2018) <https://www.sec.gov/news/speech/speech-hinman-061418>
- ⁷¹ Order Instituting Cease-and-desist Proceedings Pursuant to Section 8A of the Securities Act of 1933, making Findings, and Imposing a Cease-and-desist Order (Release No. 10445) (December 11, 2017) <https://www.sec.gov/litigation/admin/2017/33-10445.pdf>
- ⁷² Retail Commodity Transactions Involving Virtual Currency - 80 FR 60335
- ⁷³ CFTC Staff Advisory No. 18-14 (May 21, 2018)
- ⁷⁴ Digital Asset Transactions: When Howey Met Gary (Plastic); William Hinman, SEC (June 14, 2018) <https://www.sec.gov/news/speech/speech-hinman-061418>

⁷⁵ What Do We Know About the CFTC Price Manipulation Probe; Cointelegraph (June 15, 2018) <https://cointelegraph.com/news/what-do-we-know-about-the-cftc-price-manipulation-probe>

⁷⁶ SEC Release No. 34-80206; File No. SR-BatsBZX-2016-30; March 10, 2017 <https://www.sec.gov/rules/sro/batsbzx/2017/34-80206.pdf>

⁷⁷ Staff Letter: Engaging on Fund Innovation and Cryptocurrency-related Holdings; SEC (January 18, 2018) <https://www.sec.gov/divisions/investment/noaction/2018/cryptocurrency-011818.htm>

⁷⁸ CFTC Staff Advisory No. 18-14 (May 21, 2018)

⁷⁹ A Proposal for a Self-Regulatory Organization for the U.S. Virtual Currency Industry; Cameron Winklevoss (March 12, 2018) <https://medium.com/gemini/a-proposal-for-a-self-regulatory-organization-for-the-u-s-virtual-currency-industry-79e4d7891cfc>

⁸⁰ Cryptocurrency Exchanges Are Getting Hacked Because It's Easy; Wall Street Journal (July 16, 2018) <https://www.wsj.com/articles/why-cryptocurrency-exchange-hacks-keep-happening-1531656000>

⁸¹ The sad state of crypto custody; Techcrunch (February 1, 2018) <https://techcrunch.com/2018/02/01/the-sad-state-of-crypto-custody/>