

The Life-Cycle and Character of Crypto-Assets: A Framework for Regulation and Investor Protection

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Crypto-assets have the potential for advancing financial exchange, storage of value, venture capital, and contracting, but lack clarity of form, governance, and disclosure for investor decision making. This article reviews the nature of crypto-assets from an investment perspective, clarifying their evolving ecosystem, and making recommendations for classification in order to provide policy makers a framework for elevating investor protection. The review includes advantages and disadvantages of these assets, an evaluation of crypto-investment indicators, governance and regulatory environment. Crypto-assets may change classification over time, and many crypto-assets appear to be more centralized than common belief among market-participants.

INTRODUCTION

The Director of the Securities and Exchange Commission (SEC) Division of Corporate Finance, William Hinman, recently addressed the uncertain nature of assets in the crypto-space, indicating that some may possess the essential determinants of a security (Hinman, 2018). Not all crypto market-participants, however, agree on how and when to treat a crypto-asset as a security or any other classification with certainty. This dissention continues to hinder widespread acceptance of the crypto-asset market. Divergence of crypto classifications, world-wide regulation, and availability of information are most crippling to its success; for instance, there are 2034 cryptocurrencies, but many of these *coins* are not currency at all (www.coinmarketcap.com). Each coin listing has a finite number of units available, which in certain instances can be *mined* into circulation like commodities, but only code is backing up each unit, not tangible objects. The Internal Revenue Service (IRS) refers to these units as *virtual currency*, which is taxable as property (IRS, 2014). The SEC has referred to these units as *digital assets*, focusing heavily on digital asset transactions, which are the catalyst for recent fraudulent activities (Hinman, 2018). To further the confusion, each country around the world takes a different stance on the continuum of crypto classification and regulation (Reese, 2018). For the remainder of this paper, the units will be collectively termed, *crypto-assets*, to reflect their property-like character in the hands of owners, and to distinguish them from other digital and virtual forms of payment, like PayPal or credit cards.

Through all this confusion and inconsistency, crypto-enthusiasts participate in unit purchases or trading without the information available to make optimal decisions or without adequate protection to make those decisions in a safe space (Brummer, 2018). Investor protection is crucial in the development of financial systems and healthy economies (Shleifer et al., 2000). In the absence of a central system, consumers are vulnerable to risks because they lack protection (Maliuzhenko, 2015). Crypto-assets are

designed without a central system, however, and this decentralized characteristic accounts for much of the allure of participants and market followers. Consequently, the decentralized nature of crypto-assets is the incessant catch-22 for investors and the reputation of the crypto-market. Investors want the decentralized properties of crypto-assets, but this is the very feature that warrants investor protection. Regulators are monitoring the space on a case-by-case basis, providing warning notices and education, but not to the extent that investors or would-be-investors can determine with certainty how a particular crypto-asset may be treated.

In December of 2017, SEC Chairman, Jay Clayton, stated that Initial Coin Offerings (ICOs), one type of crypto-asset, are an opportunity for fraud and manipulation because there is less investor protection in this market than in the stock market (Clayton, 2017). He urges investors to ask questions about an ICO's business plan, location, investor rights, financial statements, use of investor money, and selling restrictions. Hinman (2018) explains that just because a transaction occurs through an initial coin offering or is called a *utility token*, does not preclude it from U.S. security regulations. The token or coin by itself is not a security; however, it may possess essential determinants of a security by how it is sold and the expectations of the purchasers. Yet, investors have little information to go on because many crypto-assets, including ICOs, lack disclosure for investor decision making (Brummer, 2018). Disclosures are necessary for consumer protection and understanding (Böhme et al., 2015). Andrianto and Diputra (2018) find that more research is needed to provide crypto-investors with information and strategies for investing.

Crypto-assets are a novel design with potential for exchange, storage of value, venture capital, and contracting; yet, investor rights are vague and ill-defined. Regulators are more reactive than proactive and promoters of crypto-assets lack the accountability and governance to provide investors the adequate information needed. What are the key indicators of crypto-asset classification to further guide development of the policy gaps affecting investor protection and information? To explore this question, the remainder of the paper progresses as follows: section 1 is a review of the literature on the crypto-asset ecosystem, including cryptocurrency and ICOs, advantages and disadvantages of these assets, and financial intermediaries; section 2 will review the investment evaluation indicators of crypto-assets; section 3 will review the literature on conflicts and accountability in crypto-investing, including governance, disclosure, and investor protection; section 4 will review the current regulatory environment of the crypto market; section 5 provides a framework for investor protection and information, including the life-cycle and taxonomy of crypto-assets; and Section 6 concludes.

THE CRYPTO-ASSET ECOSYSTEM

Crypto as a Currency

Bitcoin, a medium of exchange, was born post-subprime mortgage crisis in 2008 out of consumer frustration with government control of fiat currency (Hughes & Middlebrook, 2015) and on reliance of financial institutions to process payments (Nakamoto, 2008). Bitcoin operates on a decentralized database that records every transaction on a series of blocks called a blockchain. These transactions are time stamped and verified through a mining process (Nakamoto, 2008). The blockchain is like a "digital bookkeeping system" (Andrianto & Diputra, 2018, p. 229) and has become the core of many other cryptocurrencies, like Litecoin and Dash. Blockchain's most valuable utility is as an exchange medium for transfers of digital assets (Andrianto & Diputra, 2018). Blockchain technology allows transactions to occur in a trustless environment, without third party verification or supervision (Kiviat, 2015) and is not dependent on a sovereign jurisdiction (Marian, 2013). Ownership of a unit of cryptocurrency is verified using cryptography, and both parties must consent to an exchange (Hughes & Middlebrook, 2015). Cryptocurrency is a subset of virtual currency, which is a substitute for legal tender. Virtual currency can be a medium for exchange, an account or storage of value (Pilkington, 2018).

Cryptocurrency has many advantages, particularly the decentralized and open-source nature of the technology, where no central controller exists (Marian, 2015). Consumers can transact directly with peers, eliminating the need for a financial intermediary to validate transactions. Rather, transactions are validated with unique protocols, using a peer-to-peer system; a private key allows for the ability to

maintain anonymity (Marian, 2015). This reduces transaction costs, is faster, borderless, and has potential for innovative applications, and accessibility for financial markets in developing countries (Kiviat, 2015; Marian, 2015).

Crypto-Intermediaries

Despite the disintermediation goal of crypto-assets, many transactions actually happen off the blockchain through intermediaries instead of transacting directly on the blockchain (Hughes & Middlebrook, 2015). Crypto-intermediaries are involved in crypto-asset transactions as custodians, and examples include online wallets and exchanges (Hughes & Middlebrook, 2015). “Intermediaries are market-created, not government-created” and they “add value to financial markets” (Marian, 2015, p. 58). Crypto-assets are traded in pairs, similar to foreign currency trading, and on a platform similar to foreign currency exchanges like FOREX.

Initial Coin Offerings

An initial coin offering is a device to raise capital for a specific project by accepting fiat currency or crypto-assets in exchange for tokens. Tokens confer some right to receive a benefit, perform a specified function, power applications, store value, or some other utility rewarded once the application is developed (Johan & Pant, 2018; Pilkington, 2018). ICOs raise capital, both privately and publically, to fund the development of an idea; however, equity ownership is not typically extended through an ICO (Johan & Pant, 2018). This is contrary to an initial public offering (IPO) where shares are sold in exchange for ownership in a company (Chohan, 2017). ICO tokens are similar to crowdfunding, except the investment assets are very different. Tokens are more like a pre-order for a system not yet built (Johan & Pant, 2018).

Disadvantages of Investing in Crypto-Assets

Though anonymity is an important advantage to many crypto-holders, it makes for difficult tracking by taxing authorities or identification of dishonest use (Marian, 2015). To mitigate offshore tax evasion and tax-haven banks, financial institutions have become tax intermediaries, responsible for collecting relevant tax information and submitting to tax authorities (Marian, 2013). Employers are similarly responsible for withholding and submission of taxes. Crypto-assets are uniquely postured for evasion of taxes, as they exhibit two characteristics of a traditional tax haven: lack of jurisdiction to tax at the source and account anonymity. The Internal Revenue Service (IRS) is unable to track income from crypto-assets unless it is voluntarily reported (Marian, 2013). Taxpayers may have difficulty reporting income from crypto-assets, as tracking basis of crypto trading for tax purposes is a difficult task (Hughes & Middlebrook, 2015).

CRYPTO-INVESTMENT EVALUATION

Market Price

Andrianto & Diputra (2018) found that Bitcoin investors use counterstrategy and poorly supported data to make investment decisions; for instance, online comments. Prices of crypto-assets are less indicative of economic or financial factors; rather, prices are affected by a positive relationship with available information (Asplund & Ivarsson, 2018), momentum (Liu & Tsyvinski, 2018), adoption (Kalla, 2017), online attention, news and Google searches (Asplund & Ivarsson, 2018; Liu & Tsyvinski, 2018). Burniske (2017) suggests that crypto-asset targets cannot be based on rational market pricing like stocks. The market is in its infancy and crypto prices are largely speculative, but the speculative nature of crypto will subside with time (Kalla, 2017). Pricing is also affected by supply and demand of each crypto-asset, like commodities; thus a higher demand or lower supply increases the price (Asplund & Ivarsson, 2018).

Portfolio Allocation

Andrianto and Diputra (2018, p. 230) use modern portfolio theory to determine an optimal “risky” portfolio to see how cryptocurrency effects optimal asset allocation; they find the investment justifiable.

Asplund and Ivarsson (2018) suggest investments in crypto-assets are more optimal when made monthly rather than semi-annually or annually, when they remain small (5%), and stay invested for a longer holding period (Asplund & Ivarsson, 2018). Investors should not invest more than they are willing to lose (Carroll, 2018). Chuen et al. (2017) found Bitcoin and Litecoin to be effective investments for hedging; whereas, Ripple fits well into a portfolio for diversification. Asplund and Ivarsson (2018) maintain crypto-assets are not good mediums of exchange or stock substitutes.

Risk

Crypto-investors are bearing both systematic and unsystematic risk, and there is no risk free rate for crypto-assets (Kalla, 2017). Systematic risks could include hard forks, security attacks, or dependency on other projects, like Ethereum (Kalla, 2017). Asplund and Ivarsson (2018) found no correlation between crypto-assets and fiat currency; However, Chuen et al. (2017) found Bitcoin and Litecoin to be negatively correlated with stocks, bonds and gold. Much of the research in this area is limited to a few crypto-assets due to a lack of data (Chuen et al., 2017).

Crypto-assets are volatile (Böhme et al., 2015; Carroll, 2018), as crypto-investors are largely speculative and rely heavily on rumors to make investment decisions (Andrianto & Diputra, 2018; Asplund & Ivarsson, 2018). Some investors seem to be playing by rules of a game rather than investing (Böhme et al., 2015). Fluctuating exchange rates between crypto-assets is also a risk, not only due to changes in market prices over short periods of time, but also between exchanges (Böhme et al., 2015). Prices and transaction fees are different between exchange intermediaries.

The technology can also be challenging to operate; thus operational risk is a widespread issue with crypto-investing (Andrianto & Diputra, 2018; Böhme et al., 2015; Carroll, 2018; Pilkington, 2018). Transactions are irreversible and permanent, so if an investor sends crypto-assets to the wrong address, or to a wallet that is not a compatible protocol, investments are lost. Similarly, if an investor loses a pin number or a hardware wallet, investments cannot be recovered. Losses may be significantly larger than if an individual misplaced a wallet of cash; substantial amounts of value can be held on a hardware wallet.

Hardware wallets are a way to protect crypto investments from security risk, though security varies depending on the wallet (Carroll, 2018). Crypto-exchanges also have different levels of security, and if crypto-assets are held on an exchange platform, investments are susceptible to hacking (Johan & Pant, 2018). If an exchange is not appropriately registered with authorities in applicable jurisdictions, crypto-assets are vulnerable; for instance, in 2014, the Department of Homeland Security seized assets of a Japanese Bitcoin exchange, Mt. Gox and its Iowa subsidiary, for engaging in money transfers without registering with the Federal Crimes Enforcement Network (FinCEN) (Hughes & Middlebrook, 2015). Crypto-investors can easily set up accounts in crypto-exchanges internationally, which evokes a cross border risk (Böhme et al., 2015), and susceptibility to rules and regulations in other countries, even banning of a crypto-asset.

Legal and regulatory policies differ across countries and platforms, and these rules continue to evolve as the crypto-market becomes more familiar (Böhme et al., 2015). Lack of regulations and laws, or the changing thereof, makes tax planning for crypto-investing complex. Many jurisdictions lack adequate regulations in the crypto investment space, particularly among ICOs which are prone to fraud (Pilkington, 2018). Unlike fraudulent credit card transactions which can generally be reversed, crypto-transactions are permanent (Carroll, 2018). Due to lack of information and documentation available to access crypto-assets for investment, there is a risk that many projects funded through ICOs will never be completed. Fraud and money laundering are also budding issues in the crypto market (Pilkington, 2018), as some crypto-assets may be fake or traded on a manipulated exchange (Johan & Pant, 2018).

Intrinsic Value

In an effort for investment managers to justify crypto prices or appreciation potential, a valuation model and metrics for crypto-assets would be beneficial for investors. No model is yet a reliable indicator of Bitcoin value (Kalla, 2017) or any other crypto-asset. Without cash flow or profits to predict, a traditional discount of cash flows model (DCF) is not appropriate for many crypto-assets (Burniske,

2017). Some crypto-assets, however, are economic entities, or provide investors with dividend-like returns, and in these instances, traditional models may be appropriate (Kalla, 2017). Burniske (2017) uses a total addressable market (TAM), percentage market penetration, velocity, and units outstanding to estimate the average supply of money in circulation in a particular economy. The model is an equation of exchange, $MV = PQ$, where M is the asset base, V is the velocity of the asset, P is the substitute or comparable price of the digital resource and Q is the quantity of the digital resource (Burniske, 2017). Burniske's approach is analogous to a market comparability approach, but is likely most appropriate for platform and utility-type crypto-assets.

The market capitalization of a crypto-asset is measured by current market price times the current circulating supply of a particular crypto-asset. Total market capitalization of all crypto-assets is a little more than \$200 Billion at the time of this writing (www.coinmarketcap.com), or about the size of the publically traded stock, Boeing Company. However, market capitalization for crypto-assets is not the same as stocks. Stock market capitalization is calculated by multiplying the outstanding shares of stock by the market price. Crypto market capitalization can be misleading and manipulated, however, by off market trades or by creating a coin with a large supply, even if the price and number of transactions are low (Lielacher, 2018). Ripple is a good example of a coin that has an extremely large supply circulating and is currently third in market capitalization rankings (www.coinmarketcap.com). The market capitalization measure can be useful in determining the relative size of a crypto-asset to others, but is not an accurate indicator of value.

CONFLICT AND ACCOUNTABILITY

Governance

The same fundamental agency conflict impeding the firm (Jensen & Meckling, 1976) also pertains to the crypto-asset, particularly in the separation of self-interests between owners and those in control. The decentralized structure of crypto-assets seems to remove the element of control from the conflict; however, crypto-investing still necessitates reliance on relationships, networks of trust, and players with some aspect of control over the technology (Nagarajan, 2018) or custody (Hughes & Middlebrook, 2015). Decentralized governance distributes control (Nagarajan, 2018).

The firm-agency relationship is contractual, where a principal delegates the performance of some decision making authority to an agent (Jensen & Meckling, 1976). The contracting is between sophisticated players, who recognize risks, and regulations are unnecessary when contracts are enforced (Shleifer et al., 2000). When markets have policies to protect investors, jurisdictions have "better developed capital markets" (Shleifer et al., 2000, p. 7).

In the context of crypto-assets, the players are a) holders of crypto-assets who transact over the blockchain b) miners who verify transactions and mine new coins, c) developers who create and update the technology, and d) external stakeholders, like crypto-foundations, wallets, and exchanges. The contractual nature of crypto transactions involves a "structure of consensus mechanisms" (Berg et al., 2018, p 2), ownership of a unit of crypto is verified using cryptography, and both parties must consent to an exchange (Hughes & Middlebrook, 2015).

Governance is a system of accountability, which augments owner value and protection, and "rules that manage the actions of any type of entity" (Nagarajan, 2018, p. 14; Shleifer, et al., 2000). Governance seeks to incentivize good behavior and mitigate negative behaviors, and non-technical governance, in particular, is imperative for the technology to be effective (Nagarajan, 2018). Some measures should be taken to discourage misuse and criminal activity (Marian, 2015). Crypto-asset governance has not been eliminated, but rather, redefined (Nagarajan, 2018).

Nagarajan (2018) examines the governance structures of two crypto-assets, Bitcoin and Ethereum, and suggests four areas of governance needed in the crypto-market. First, forks on the underlying blockchain technology result from a disparity in user belief of the technical characteristics of a crypto-asset. A fork creates a new infrastructure. Soft forks are temporary, apply previous transactions, and adopted by the majority and mining continues on the new chain. Hard forks are a permanent break from

an original chain and represent conflicts in the system. They require adoption of the new system, or two systems remain (Nagarajan, 2018). Secondly, since the blockchain is open source, the public can essentially trace multiple transactions to the same individual even though the identity of the individual is anonymous (Nagarajan, 2018). Next, the SEC implies the security nature of crypto-assets and imposes regulations on crypto-exchanges; however, they have yet to classify crypto-assets as securities. Concerns about privacy and regulation merit further development of crypto internal governance (Nagarajan, 2018). Lastly, external governance policies are inconsistent (Nagarajan, 2018).

Disclosure

Due to lack of available information, crypto investors turn to online resources, like Wikipedia, for information (Asplund & Ivarsson, 2018). Most crypto-assets have a website operated by a non-profit foundation or group of contributors who support a particular crypto-asset. In this regard, crypto-assets have groups of followers who support the project, platform or goal of a coin. However, much of this following is fueled by online comments and attention (Asplund & Ivarsson, 2018; Liu & Tsyvinski, 2018), rather than disclosure of material information relevant to a crypto-asset's goals, projects and promises made to followers, financial accountability, and performance potential.

When a crypto-asset first debuts as an ICO, the founders release a "white paper," which typically outlines the goals and timeline of the project behind the coin. An ICO used to raise capital for a business or a project may relay different rights and interests to the holder of a coin (Clayton, 2017). Purchasers are interested in ICOs for appreciation and profit from reselling, rather than what the token was intended for, like some right or privilege. The structure of many ICOs warrants the involvement of federal securities laws, registration and protection for investors (Clayton, 2017). However, crypto-assets are not securities, are not regulated by the SEC (Clayton, 2017), and have no disclosure, registration or reporting requirements (Johan & Pant, 2018). There is widespread confusion about what is backing crypto-assets (Johan & Pant, 2018).

Chris Brummer, a research professor of law at Georgetown University Law Center, expresses the importance of disclosure in a written testimony before the U.S. House of Representatives Committee on the Financial Services Subcommittee on Capital Markets, Securities and Investments, expressing that no information over the history of the U.S. securities laws is more important than financial statements (Brummer, 2018). The primary focus of the testimony was the disclosures in ICO white papers. He indicates six opportunities for disclosure improvement within the white paper. First, 32% of the issuing entities of ICOs are not identified. White papers should include promoters' location and contact information for key management. This will allow potential investors the ability to report fraud, identify rules and legal protections available. Secondly, since there are no financial statements, perhaps a "technology audit" is warranted, to hold the project accountable to solving the technology solution proposed in the white paper (Brummer, 2018).

Third, a description of the ICO's token should include: the intended use, quantity to be distributed, founders reserve holdings, rights or economic features of the token holder (Brummer, 2018). Next, the white paper should include a description of blockchain governance, including how the infrastructure operates, how decisions will be made and the consensus mechanism. Additionally, disclosures should indicate the qualifications of the technical team, including experience of officers and directors, and key engineering experience. Lastly, industry risk factors should be included in the white paper, including vulnerability to hacking, data loss or disruption, privacy or portability (Brummer, 2018).

Investor Protection

Leading foreign currency exchange, FOREX, indicates seven areas of company focus specific to investor protection: a) continuity of the business, b) management of risks, c) supervision of trading platforms, d) security of information, e) rules against money laundering, f) outlet for customer complaints, and g) reporting (FOREX, 2018). FOREX is a successful global exchange, which is owned by a U.S. publicly traded company, Gain Capital Holdings, Inc., and may provide a framework for crypto-exchanges and other crypto-intermediaries who have essentially the same business model as FOREX.

“Investor protection encourages the development of financial markets,” influences economic growth by enhancing savings, channels savings to investments, and promotes capital accumulation (Shleifer et al., 2000, p.15). Investor protection is one of the roles of the Public Company Oversight Board (PCAOB), an organization established after Enron under the Sarbanes-Oxley Act of 2002. Prior to the PCAOB’s existence, the accounting profession was self-regulated. The PCAOB is responsible for standard-setting, and have particularly focused on internal controls of public companies, documentation, enforcement and inspections (Hanson, 2012).

In the shareholder-investor context, investors have rights and powers enforced through regulation and laws; rights include disclosure and accounting rules (Shleifer et al., 2000). Shareholders have a right to receive their pro rata share of dividends, voting, and participation in meetings. Regulation of stock exchanges and implementation of accounting standards protect investors. If these rights were not enforceable, there would be little motivation to repay creditors or distribute profits. All outside investors should have the ability to get their money back (Shleifer et al., 2000). Shleifer et al. (2000) define three measures of investor protection: a) ownership protection, b) creditor protection, and c) enforcement. Enforcement, in particular, relies on the efficiency of the judicial system, mitigating corruption, and a standard set of accounting rules.

CRYPTO REGULATORY ENVIRONMENT

An important issue of crypto-investors is the information asymmetry between promoters of crypto-assets market, purchasers of crypto-assets, and regulators, where the latter two may have trouble monitoring information (Andrianto & Diputra, 2018). U.S. regulating bodies are using the *sand-box* approach to wait and see how the market responds to crypto-assets (Corbet et al., 2018), stepping in on a case-by-case basis, particularly focusing on fraud, yet still allowing the innovative technology to take shape. The motivation behind the Securities Act is to “remove the information asymmetry between promoters and investors” (Hinman, 2018, p.1). Federal Reserve Chairman, Jerome Powell, says crypto-assets are not a priority because the market is not big enough yet (Glazer, 2018c). Important components of regulating new technology are user protection and utility preservation, while fostering innovation (Hughes & Middlebrook, 2015). Regulation of new technology can be problematic, because the implementation of regulation too early or inappropriately, could stunt the growth of emerging technologies. Implementing too much regulation could create an arbitrage situation. If regulation is too slow, this may cause a slowdown in the adoption of crypto-assets (Hughes & Middlebrook, 2015). The SEC has spearheaded efforts to protect and educate investors on crypto-assets, along with influential rules or insight from the Commodity Futures Trading Commission (CFTC), Financial Crimes Enforcement Network (FinCEN), the Federal Reserve, and the New York State Department of Financial Services. From a global perspective, the U.S. is on the heavier side of regulation, but not to the extent of banning crypto-assets entirely, like China, Bolivia, and Pakistan (Reese, 2018). In addition to U.S. federal rules, regulations vary by state.

The SEC is responsible for regulating the securities industry, including stock exchanges and electronic securities markets. Material information about a company, such as management and uses of the proceeds, is prescribed through the disclosure system of the Securities Act of 1933; this information is filed with the SEC (Brummer, 2018). The SEC has imposed regulations on crypto-exchanges, but has yet to classify crypto-assets as a security; rather, they have emphasized the characterization of a security, and how to apply the *Howey* test (Hinman, 2018). Promoters of crypto-assets, particularly ICOs, should be aware and apply for proper registrations (Hinman, 2018). Evidently, ICO’s are supposed to be registered and licensed with the SEC if traded as a security and should apply anti-money laundering and *know your customer policies* (Reese, 2018). Unregistered crypto-exchanges and broker-dealers facilitating transactions of securities are in violation of the Securities Exchange Act of 1934. Coinbase, a crypto-asset wallet and exchange, is working on becoming a licensed brokerage firm and electronic trading venue, which will allow them to offer assets that the SEC deems securities (Glazer, 2018a).

FinCEN applies to *money transmitters* and *money service businesses*, excluding users who are purchasing goods and services and not transacting with exchangers or administrators (Kiviat, 2015). Miners who are users are also excluded as long as they are using for personal use, and exchangers are brokers or dealers (Kiviat, 2015). Two specific exemptions include the businesses that are accepting Bitcoin for goods or services, but not money transmitters (they are called payment processors) or entities that operate only through a clearing house admitting financial institutions (Kiviat, 2015). The CFTC regulates commodities, and supervised the first Bitcoin swap execution facility (SEF). They have anti-manipulation authority; thus, to the extent the spot-market affects the derivatives market, the CFTC could intervene (Kiviat, 2015). New York State Department of Financial Services requires a license and registration of crypto financial service providers called a Bitlicense. The Bitlicense framework for virtual currency businesses are for those virtual currencies that are decentralized and involve New York customers (Marian, 2015).

Other regulation developments include several Bitcoin ETFs denied by the SEC in the last few months, and Crypto and blockchain topics are going to be on the CFA exam in 2019 (Glazer, 2018c). The SEC continues to make further efforts to prepare for more SEC attention to the crypto-space, recently naming a Senior Advisor for Digital Assets and Innovation. Additionally, the SEC created a fake ICO website called www.howeycoins.com to educate consumers (Glazer, 2018b). The North American Securities Administrators Association (NASAA) has an ongoing project, Operation Cryptosweep, in order to identify and eliminate bad ICOs (NASAA, 2018); in September of 2018, the NASSA had 200 active investigations of ICOs. Looking for ICOs that need to be registered (Glazer, 2018d). Gemini promoters, Cameron and Tyler Winklevoss, started a virtual commodity association, which is a self-regulating group for crypto-assets (Glazer, 2018d).

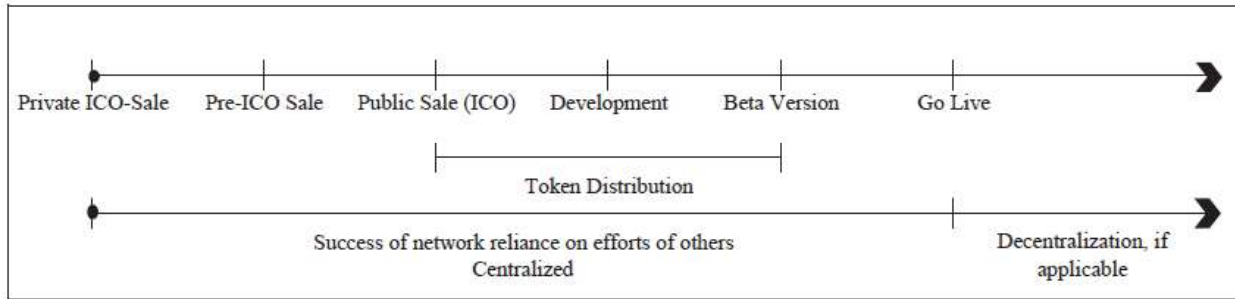
A FRAMEWORK FOR INVESTOR PROTECTION AND DISCLOSURE

Character Evolution of a Crypto-Asset

Contrary to common understanding, crypto-assets maintain various classifications. Classifications may evolve overtime, thus affecting regulation, valuation and governance (Hinman, 2018). During early stages of a crypto-asset, governance can be centralized, warranting more regulation and oversight (Hinman, 2018). A crypto-asset could evolve into a purely decentralized network, justifying a reduction of regulation. The following timeline in Figure 1 depicts a hypothetical progression of a crypto-asset from the initial announcement of an ICO to the purely decentralization of the network, if applicable. During the time of the project's development, the success of the project is heavily relying on the efforts of central actors. Per Hinman (2018), this would imply that all ICOs are securities during the development stage.

Investors in ICOs are not typically the eventual users of the network; rather, ICO-investors are looking to earn a return and sell in a secondary market after the network is developed (Hinman, 2018). ICO offerings are advertized as a useful asset with a potential to increase in value, like a security. A crypto-asset in substance is not a security; however, essential determinants of a security include how it's sold and the expectations of purchasers who are relying on profits generated by the efforts of others. Investors in ICOs are relying on the efforts of others to build the network. Figure 1 depicts the timing of this effort to be prior to the launch of the fully developed network, and prior to a network being "sufficiently decentralized" (Hinman, 2018, p.1).

FIGURE 1
LIFE-CYCLE OF A CRYPTO-ASSET



The securities act describes information necessary for investors to make an informed investment decision, and the promoter is held accountable for misstating the information (Hinman, 2018). Since profit is based on the efforts of others, information should be available about the others (Clayton, 2017; Hinman, 2018) and a regulatory framework should also require disclosures about the risks. Once a network no longer has a “central actor” like Bitcoin and Ethereum, security laws may no longer apply (Hinman, 2018, p.1).

Taxonomy of Crypto-Assets

Crypto-assets should be analyzed based on their use instead of viewed as a whole crypto market (Corbet et al., 2018). Table 1 differentiates centralized crypto-assets from those that are sufficiently decentralized. Further categorization in Table 1 provides for the different purposes of crypto-assets; for example, some crypto-assets cannot be converted into fiat currency and are labeled, non-convertible. Non-convertible crypto-assets have a clear, non-investment motive for purchasers (Hughes & Middlebrook, 2015). Projects supported by an ICO are similar to crowdfunding. There are three types of crowdfunding: donation-type, reward-type and equity-type (“What is Crowdfunding,” 2018). If a crowdfunding project is issuing equity, the intermediary must be registered with the SEC as a broker-dealer, and there are limitations on amounts and disclosure requirements. There are exemptions from registration if the investor is an accredited investor per the definition of the SEC (“Regulation Crowdfunding,” 2018). ICOs, however, may be issuing tokens in return for some reward or equity-type right, and are not directly required to register with the SEC. Small businesses publically traded, like penny stocks, are required to file financial reports when assets exceed \$10 million, and many ICOs have far exceeded this amount. Crypto-assets relying on the efforts of central actors are not decentralized, thus accountability measures should be a priority to provide to investors. Accountability measures should include audited financial statements and disclosures on the progress of project development. If an ICO has collected more than \$10 million is crypto-asset value, financial reports should be filed with the SEC and made available to investors.

Application-specific crypto-assets provide users with a platform or application with which to build on. These crypto-assets may be modeled as entities rather than currency, but if the crypto-asset is similar to a stock, then dividends, buybacks and price appreciation are important components of valuation (Kalla, 2017). Crypto-assets have unique underlying purposes and/or projects, and should be valued according to the crypto-asset type; one valuation measure will not suffice. Functional crypto-assets, sometimes called utility-tokens, provide some good or service and satisfy a particular purpose.

TABLE 1
TAXONOMY OF CRYPTO-ASSETS

		Governance	
		Centralized	Sufficiently Decentralized
Crypto-Asset Type	Non-convertible	The Units are unique to virtual community, but are not convertible into fiat currency <i>ex. V-Bucks (currency in video game, Fortnite)</i>	The units are not unique to one community, but useful in different communities, but are not convertible into fiat currency <i>ex. None known</i>
	Medium of exchange	The units are used as a substitute for legal tender, but functionality relies on the power and efforts of a specific group <i>ex. Ripple</i>	The units are used as a substitute for legal tender, but function without the power of one central actor, and the success of the network is not centered on the efforts of a specific group. <i>ex. Bitcoin</i>
	Application	The units function as a base for the development of other crypto-assets, but the functionality of the platform relies on the power and efforts of a specific group <i>ex. Waves</i>	The units function as a base for the development of other crypto-assets, function without the power of one central actor, and the success of the network is not centered on the efforts of a specific group <i>ex. Ethereum</i>
	Functional	The units serve a specific purpose and can be exchanged for a good or service. The functionality relies on the power and efforts of a specific group <i>ex. OmiseGO</i>	The units serve a specific purpose and can be exchanged for a good or service, but functions without the power of one central actor, and the success of the network is not centered on the efforts of a specific group <i>ex. None Known</i>

CONCLUSION

This paper has reviewed the nature of crypto-assets from an investment perspective, clarifying their evolving ecosystem, and making recommendations for classification in order to provide policy makers and investment decision makers with guidance on the diversity of crypto-assets and their governance. Crypto-assets may change classification over time, and many crypto-assets still rely on the efforts of central players, especially during development stages, which is possibly indicative of security treatment. Many crypto-assets appear to be more centralized than common belief among market-participants. Additionally, intermediaries are still playing primary roles, just not the traditional financial institutions. Governance is not eliminated in the crypto space, but redefined, as relationships and networks of trust are still necessary, and some players may maintain some control or custody. Improvements to disclosures available for crypto-assets may benefit potential investors. Important disclosures include financial

statements for centralized operations charged with developing networks that may one day be decentralized. Most ICOs are likely securities, considering the expectations of investors' profit motive in the early stages of development (similar to penny stocks) and the heavy reliance on others to see the project to completion. Further research is needed to provide a framework for ICO disclosure and financial statement preparation. Though many crypto-enthusiasts tout the trustless nature of crypto-assets and the disintermediation objective of payments systems, blockchain technology serves many purposes, not just payment systems. This innovative technology has the potential to change internal management systems, identity authentication, property ownership validation, moving and storing value, and recording of transactions; however, lack of regulation and information makes investment planning for crypto-assets complex and forbidding.

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