

Shaen Corbet (Ed.)

Understanding Cryptocurrency Fraud

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Jonathan A. Batten, Shaen Corbet and Brian M. Lucey

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Understanding Cryptocurrency Fraud

The challenges and headwinds to regulate digital
currencies

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Shaen Corbet

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Shaen Corbet

Introduction: The growth and development of cryptocurrency regulatory research

There now exist two distinct schools of thought when considering the future trajectory of cryptocurrencies as a financial product. Some consider the price of Bitcoin, above \$50,000 in early 2021, to represent continued under-valuation. Some believe the fundamental value of Bitcoin, along with several other cryptocurrencies to be zero, citing that there exist far too many issues, even considering the relative youth of digital currencies and grounds for improvement, but that this platform is predominantly utilised for illegal purposes. It is often dismissed by many proponents, the fact that some of these assets are backed, quite simply, by nothing. For some, this is enough to render current prices to represent the peak of a tremendous bubble. To date, there exists viable evidence to support both sides of the argument, however, there are far more examples and facts to specifically support the argument against the validity of cryptocurrencies in their current format. Some of these confidence-damaging events have become more frequent and far more sophisticated in recent years, particularly surrounding the financing of illicit behaviour (Foley et al., 2019; Albrecht et al., 2019); hacking (Shanaev et al., 2020); the potential for terrorist financing (Fletcher et al., 2021); fraud within initial coin offerings (ICOs) (Felix and von Eije, 2019); price interactions (Griffin and Shams, 2020); bubbles (Corbet et al., 2018); price manipulation (Gandal et al., 2018; Li et al., 2020; Akyildirim et al., 2020b; Corbet et al., 2020b, 2021; Hamrick et al., 2021; Mirtaheiri et al., 2021; Cioroianu et al., 2021); exchange fraud (Pieters and Vivanco, 2017; Dyhrberg et al., 2018); and other types of simplistic and complex criminality (Barone and Masciandaro, 2019; Corbet et al., 2020a; Akyildirim et al., 2020a; Hendrickson and Luther, 2021; Grobys, 2021). In effect, until these issues are mitigated, broad cryptocurrencies cannot take a central role as a viable, stable, reputable, major asset class within international financial markets.

This book, as part of a series based on alternative investments, attempts to specifically examine some of these reputationally damaging events, particularly those surrounding illicit behaviour. We attempt to identify as to whether some of these events can be mitigated by improved, or at least, coordinated international regulation. We begin with a chapter written by Professor Timothy Massad, Harvard University, and previous chairman of the Commodity Futures Trading Commission (CFTC), serving under President Barack Obama. Professor Massad's incredible experience, acting as a lawyer and government official, provide not only unique, but unequalled experience

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when dealing with the direct effects, and aftermath, of the 2008 financial crisis. In this book, Professor Massad presents his views in a chapter titled: ‘Regulation and Innovation: The Challenge of Crypto-Assets.’

We next focus on the legalities of smart contracts, written by Professor John Goodell from the University of Akron, before presenting several examples of significant cases of illicit, questionable, and broadly unethical events over the past number of years. One of the most significantly damaging forms of illicit behaviour was sourced within some fake initial coin offerings (ICOs), which greatly diminished confidence in digital assets. This chapter is presented by authors with a substantial, and excellent publication record surrounding cryptocurrency market dynamics, namely Dr Thomas Conlon and Dr Richard McGee, both from University College Dublin. In the next chapter, we focus on cryptocurrency hacking, with particular focus on the 2019 Kraken flash crash presented by Dr Erdinc Akyildirim and Dr Ahmet Sensoy, while Dr Greg Hou and Dr Yang Hu from the University of Waikato next explain a range of money laundering and exit scams that have taken place in recent years, with additional focus on the hacking of mining power provided later in the book by the authors. The famous Mt Gox collapse is analysed by Dr Sandeep Rao from Dublin City University. Cryptocurrency Ponzi schemes are analysed by Sandeep Muckherjee from the University of Bath. Examples of wire fraud and phishing and the creation of fake cryptocurrencies are next presented by Dr Charles Larkin, from the University of Bath and Johns Hopkins University, and Dr Fergal O’Connor, University of Cork, respectively.

In the final phase of the book, we investigate the external use of cryptocurrency for unethical, and often illicit reasons. First, a discussion of the corporate misuse of cryptocurrency is presented by Prof Shaen Corbet, specifically focusing on the potential for illicit behaviour by corporations when signalling their intention to develop blockchain and cryptocurrency projects to experience share price appreciation, however, in some well-known cases, these projects subsequently fail to materialise. Next, Prof Corbet, along with Prof Les Oxley, Dr Greg Hou and Dr Yang Hu, present a detailed explanation and analysis of several well-known pump-and-dumps that have occurred within cryptocurrencies.

In the final chapter, Professor Gerald Dwyer from Clemson University, concludes this book with an overview of the development of cryptocurrency regulation, focusing specifically on Know-Your-Customer and Anti-Money-Laundering-Regulation, ICOs and Crowdfunding, and Derivatives Contracts on Cryptocurrencies. Professor Dwyer was one of the first to be published in an internationally recognised journal with a publication based on the economics of Bitcoin (Dwyer, 2015). It seems fitting that his views on the development and growth of Bitcoin conclude this book, particularly due to his role when spear-heading such research almost a decade ago.

Overall, this book is positioned to help develop international cryptocurrency regulation through the presentation of a broad variety of expert viewpoints. In a following, brief analysis, we present the growth of regulatory research, in terms of scale and

scope when positioned and compared to other key areas within cryptocurrency research.

1 The current evolution of cryptocurrency research

Corbet et al. (2020c) first presented a broad overview of the growth of cryptocurrency research. In this chapter, developing on the same methodology, we focus on the growth of research focusing on regulation. Core bibliometric approaches involve surfacing the linkages between papers or articles. Here we use, unless otherwise indicated, the number of articles to weight collaboration and linkage. These linkages lend themselves nicely to graphical presentation, being in essence network models. Graphic models rely on nodes and edges (see Kosnik, 2018) where the nodes here are determined by the individual units of analysis (authors, countries etc) and the edges the linkages between them. In all cases, we apply fractional counting, whereby authorship or nationality among other characteristics are scaled to the number of occurrences. Therefore, an author appearing in a paper with five others has their linkages weighted $\frac{1}{6}$. The package VosViewer was used for this analysis, supplemented by Gephi¹ and the R package Bibliometrix² (Aria and Cuccurullo, 2017). For the analysis in this paper, all data are sourced from Scopus, as this captures the widest range of papers with complete reference sets and author/institution metadata in a consistent form. We selected 1990 as a starting point for the research as the further back in any bibliometric database one goes the sparser becomes the coverage. This issue is discussed in Michels and Schmoch (2012) and in Harzing and Alakangas (2016). As per Corbet et al. (2020c), we estimate the applicability of Lotka's Law³ (Chung and Cox, 1990) to the dataset. We used the R package Bibliometrix (Aria and Cuccurullo, 2017) for this analysis. The search strategy used for the broad-based analysis was:

```
(TITLE-ABS-KEY(cryptocurrency OR cryptocurrencies...)  
(TITLE-ABS-KEY(...OR digital currency OR digital currencies)  
AND PUBYEAR >2010  
AND(LIMIT-TO(DOCTYPE,"ar"))(where used)
```

(1.1)

¹ For analysis of centrality measures and checking of the consistency of the graphs generated from Vosviewer.

² For preliminary data analysis and measures of author and country dominance.

³ Lotka's Law is formulated as $A = K/X^n$, where K and n are constants. Usually, $n = 2$ is the number of authors publishing n papers and X represents the number publishing one paper. This implies that the number of authors publishing X number of articles is a fixed ratio, 2 , to the number of authors publishing a single article.

Table 1.1: Summary statistics relating to regulation-focused topics within solely cryptocurrency-based research.

Explicitly the term 'regulation'			All terms relating to 'regulation'		
Year	Journal	All	Year	Journal	All
2015	0	0	2015	0	0
2016	0	0	2016	0	0
2017	0	0	2017	0	0
2018	14	27	2018	29	35
2019	39	55	2019	52	102
2020	36	60	2020	54	105
2021	8	8	2021	8	8
ALL	110	164	ALL	233	274

Note: The table presents the summary statistics relating to the explicit use of the word 'regulation'. The above data was compiled as of February 2021.

AND(LIMIT-TO (SUBJAREA,"ECON" OR "FIN"))

AND(EXCLUDE(PREFNAMEAUID,"UndefinedUndefined"))

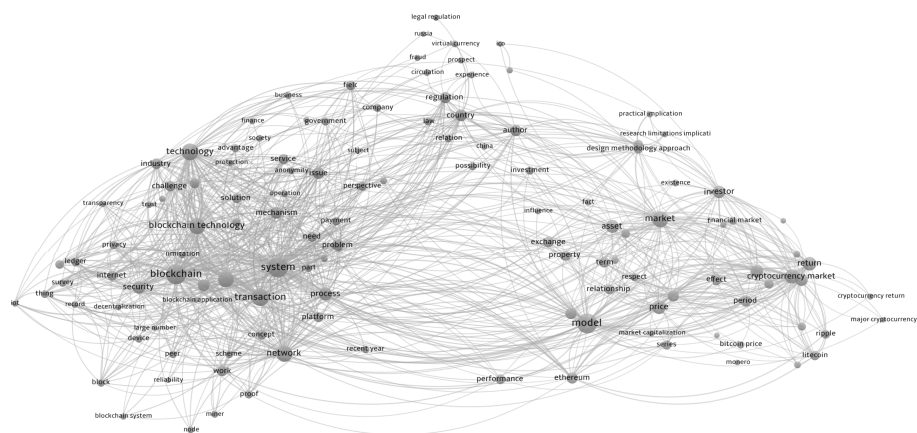
All data were downloaded as both CSV and as plaintext. This allows for the analysis of inward and outward citations, abstracts and of a wide variety of other bibliometric areas. The following table presents a brief example of the number

When focusing on the results of this brief analysis,⁴ there is no evidence of substantial regulatory interlinkages in research between 2015 and 2017 as presented within the data in Table 1.1. Research directly relating all cryptocurrency topics is presented in Figure 1.1, while that relating to regulation within the cryptocurrency network from 2018, is presented in Figure 1.2, we can see through both considered analyses based on journal articles, and all articles inclusive of chapters and conference papers, regulation takes a westward position, far more closely aligned to cryptocurrency markets as a key parent node, than that of blockchain research in the east of the network, and both technological-based research in the south-east, and structurally-based research in the north-east.

However, in 2019, where such network analysis is presented in Figure 1.2, where we observe regulation as a research topic taking a central role as measured almost halfway between cryptocurrency and blockchain in the north of the network. It is immediately evident that many concise journal pieces were released in 2019, focusing explicitly on several distinct episodes of criminality and damaging negative events in cryptocurrency markets were released. In Figure 1.3, representing research for the year 2020, we observe that regulation research has shifted eastwards from its central posi-

⁴ Network analyses for other years are omitted from this chapter for the brevity of presentation but are available from the author upon request.

(a) Journal articles only



(b) All articles, including books and conference papers

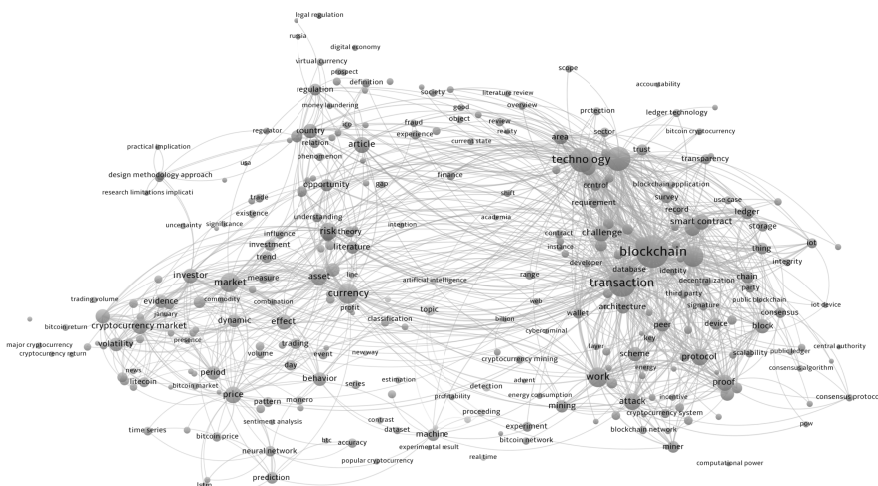
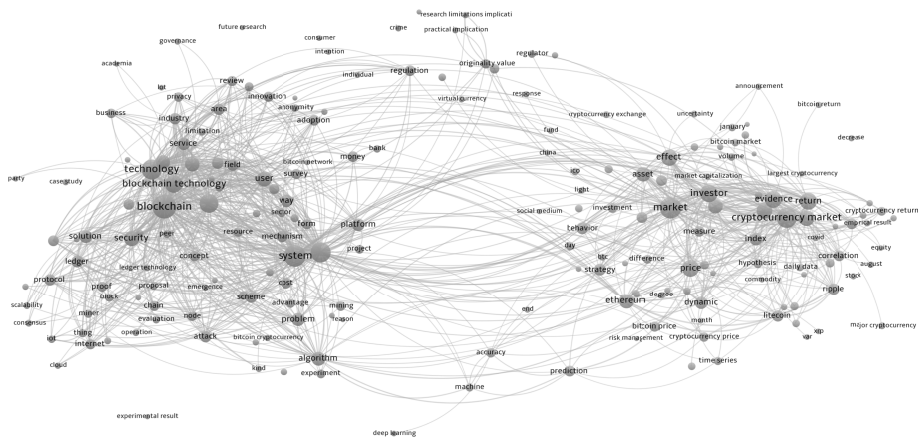


Figure 1.2: Network analysis of cryptocurrency research, 2019.

tion in 2019, and appears to focus more on cryptocurrency market effects rather than that primarily of blockchain when compared to previous years.

Figure 1.4 presents a concise network analysis of the entire analysed period, we again observe evidence of the clear division of research based on that of blockchain and cryptocurrency, however, it is evident in the north of both network analyses that regulation has generated another key sector of research that is developing upon the law, frameworks, legal status, jurisdictional issues, education, taxation, and broad coverage of criminal activity and rights of the investor. It is also of interest to note that research based on frameworks within the United States, Russia, India, China,

(a) Journal articles only



(b) All articles, including books and conference papers

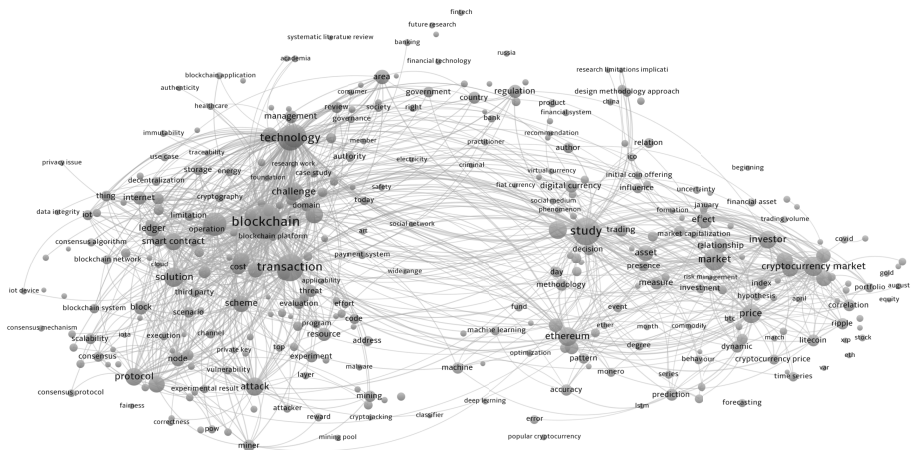
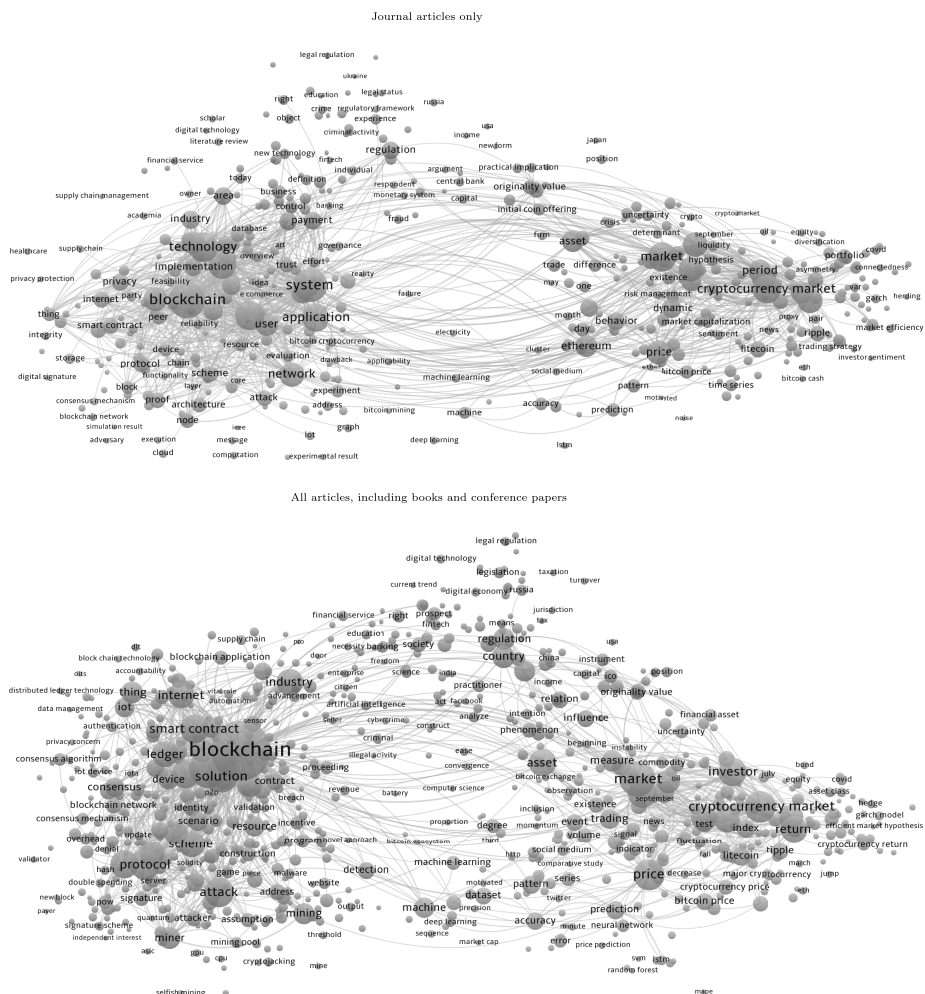


Figure 1.3: Network analysis of cryptocurrency research, 2020.

and Ukraine, each possess their own central nodes, indicative as to where regulatory frameworks are developing, and indeed, as to where they might be most necessary.

This book attempts to further develop upon areas that have been established in recent years relating to international regulation relating to cryptocurrency and broader digital technology, while also considering, through the use of well-known examples, why this research is paramount to the future development of this young sector. Cryptocurrencies will continue to be subjected to significant doubt and questions surrounding validity, asset safety and cross-jurisdictional recognition until questions surrounding global regulation are finally addressed.



Note: The above figure we see the keyword association of cryptocurrency research as analysed using clusters of the abstracts, titles and keywords represented by research in the field. The top panel represents all research based on journal-based publications. The lower panel represents all analysed research, inclusive of chapters, conference papers and other publication types. The above figure is prepared using VOSviewer which is a software tool for constructing and visualising bibliometric networks. The above data was compiled as of February 2021.

Figure 1.4: Network analysis of cryptocurrency research, 2015 through 2021.

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Timothy G. Massad

Regulation and innovation: The challenge of crypto-assets

1 Introduction

Ever since Satoshi Nakamoto launched the Bitcoin protocol in early 2009, regulators around the world have struggled with how to respond to crypto-assets. Although many crypto enthusiasts hoped governments would simply stay away, regulators could not turn a blind eye. While the sector was relatively small, incidents of fraud or failure were too egregious to ignore. Moreover, just as the coronavirus jumped from birds to humans and from continent to continent, many regulators have learned the hard way that seemingly discrete parts of the financial system can affect—or infect—other parts. Risk can travel through interconnections that are sometimes not apparent except in hindsight.

But how to respond in a way that does not stifle innovation? This is particularly difficult, and important, when the new product or activity is said to be potentially game-changing. Even if one was skeptical of the bold predictions that crypto-assets would revolutionize the financial system, it was apparent this novel technology could have significant applications.

Striking the right balance between protecting the public from potential harm, and encouraging, or at least not discouraging, innovation, is a constant challenge in financial sector regulation. The financial sector constantly innovates, and innovation often occurs on the edge of the regulatory framework because there may be greater freedom to experiment. Innovation is sometimes driven by a desire to avoid regulation, as opportunities for profit or competitive advantage lie outside of existing boundaries. New regulations themselves often provoke the search for ways to minimize their burdens. Whatever judgment one wishes to place on those motivations, they sometimes lead to innovations that have brought improvements—whether in the form of lower costs, higher efficiency, better service, greater access or otherwise.

Regulators face asymmetrical incentives. Act too soon and you may stifle innovation. But wait too long and excessive risk may arise. A regulator is likely to face criti-

Note: Prof. Massad is a Research Fellow at the Harvard Kennedy School and an Adjunct Professor of Law at Georgetown University Law School. He was Chairman of the U. S. Commodity Futures Trading Commission from 2014 to 2017 and Assistant Secretary for Financial Stability at the U. S. Treasury Department from 2010 to 2014. Prior to his government service, he was a partner at the law firm of Cravath, Swaine & Moore LLP.

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cism for the latter if consumers or investors are harmed. There is less accountability for stifling innovation as there is no easy way to measure benefits that were delayed or did not happen.

The challenge to balance these interests has been especially great with crypto-assets because they do not fit into traditional regulatory categories. In addition, the sector has been marked by rapid growth rather than slow, incremental development, which has provided little time for the wheels of government to catch up.

How have regulators responded to crypto-assets? How does that response compare to what has happened in other periods of significant innovation? Can we draw any lessons from other periods of innovation? This paper first looks at the initial regulatory response to crypto-assets in the United States and other jurisdictions. In parts two and three, I consider two other periods of significant financial innovation: the first is the development of trust companies in the early part of the 20th century, and the second is the development of subprime mortgages and nonbank mortgage origination in the first decade of this century. In both those cases, innovation occurring outside of the existing regulatory framework brought significant benefits but ultimately contributed to financial crises. By choosing these periods, I am not suggesting crypto-assets will lead to a financial crisis. But these examples are helpful in thinking about how a regulatory system deals with innovation. In part four, I will offer some suggestions on how we move forward in the regulation of crypto-assets. This will include some thoughts on how the state interest in developing digital assets for sovereign use—that is, central bank digital currencies—makes the challenge even more interesting and complex, and how it echoes an earlier struggle in the United States over who would issue currency. I will conclude in part five with some thoughts on the implications for the design of regulatory systems.

2 Part I: The initial regulatory response to crypto-assets

The Mt. Gox failure in 2014 was an early warning signal. Hackers stole 850,000 Bitcoins—then worth over \$450 million—from what was then the most prominent Bitcoin exchange.¹ But while the failure was a great loss for investors, it wasn't significant enough to trigger a rapid regulatory response. Nevertheless, incidents like Mt. Gox, together with the rapid growth in Bitcoin trading and the development of other crypto products, put crypto-assets squarely on the regulatory radar screen.

¹ Dan Price, "The 8 Worst Cryptocurrency Hacks in History," *Blocks Decoded*, November 30, 2018. Retrieved from <https://blocksdecoded.com/cryptocurrency-hacks/>

The first challenge was, who was in a position to take action? Regulators in the United States and in many other jurisdictions had to figure out how to characterize crypto-assets in order to determine what rules would apply. Were they securities? Derivatives? Or some other financial instrument? The correct answer was yes. That is, they could be any of those. It depended on the particular facts and context. Crypto-assets did not neatly fit into the existing regulatory framework. It was not clear what rules applied, or which regulators had jurisdiction.

Shortly after I became chairman of the U. S. Commodity Futures Trading Commission in 2014, I began working with our staff to examine Bitcoin and other cryptocurrencies. This led to our declaration in 2015 that Bitcoin was a commodity.² Our action came well before the dramatic increases in price and trading volume in 2017 (when Bitcoin went from less than \$1,000 at the start of the year to almost \$15,000 by the end).³ It was prompted by the fact that market participants were developing Bitcoin swaps. Under United States law, essentially anything that is the subject of a derivative contract, such as a futures contract or a swap, can be classified as a commodity. We needed to take action—not to prohibit Bitcoin swaps, but to make sure the products and trading activities complied with rules generally applicable to derivative contracts. But although our decision gave us jurisdiction over derivatives using Bitcoin, it did not give us authority over the “cash” market except in very narrow circumstances. By cash market, I mean the buying and selling of Bitcoin for sovereign currency such as the U. S. dollar or the Euro, or for other crypto-assets. That was where most of the trading activity was taking place, not in futures or swaps. Under U. S. law, the CFTC can pursue cases of fraud as well as manipulation of commodities in the cash market and can bring actions pertaining to retail leveraged trades where there is a failure to deliver the commodity. But it does not have general authority over the cash market. It was similar to our authority regarding other commodities: while the agency can set certain standards for the trading of oil, gold or cattle futures and swaps, it cannot set standards as to how, when or where oil, gold or cattle should be traded.⁴

² See Timothy G. Massad, “It’s Time to Strengthen the Regulation of Crypto-Assets,” Brookings Institute, March 18, 2019, p.7. See also Commodity Futures Trading Commission, “CFTC Backgrounder on Oversight of and Approach to Virtual Currency Futures Markets,” January 4, 2018, at https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/backgrounder_virtualcurrency01.pdf

³ See “Bitcoin Price Today, BTC Marketcap, Chart, and Info.” CoinMarketCap, accessed October 28, 2020. <https://coinmarketcap.com/currencies/bitcoin/>

⁴ See Testimony of CFTC Chairman Timothy Massad before the U. S. Senate Committee on Agriculture, Nutrition and Forestry, December 10, 2014, <http://www.cftc.gov/PressRoom/SpeechesTestimony/opamassad-6>; and Massad (2019), pp. 32–33. See also Commodity Futures Trading Commission, “CFTC Backgrounder on Oversight of and Approach to Virtual Currency Futures Markets,” January 4, 2018, at https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/backgrounder_virtualcurrency01.pdf

With most commodities, the CFTC's lack of authority over the cash market has not meant an absence of standards. Standards for trading in many cash markets have developed over the years through custom, industry associations or other regulatory oversight. But the cash market for crypto-assets was new, growing fast, and without standards. That created a problem for oversight generally including for crypto asset derivatives: if the underlying cash market is susceptible to fraud and manipulation, how can one have confidence in the integrity of crypto-asset derivatives based on pricing in that market?

The Securities and Exchange Commission had only limited jurisdiction as well. If a crypto-asset is a security, then its issuance and subsequent trading must comply with U. S. securities law, a framework that has been developed over decades and has worked quite well. The SEC issued its first warning that at least some crypto-assets could be securities in the DAO Report. In the report, they stated that crypto-assets could be securities and offerings must be registered unless they met exemption requirements.⁵ That was largely ignored. It seemed that anyone with even a half-baked idea for a crypto-asset was soon launching an initial coin offering, without registering it with the SEC. That boom brought us new lows in disclosure standards. There were ICOs that not only lacked any meaningful financial information; some didn't even name the issuer's jurisdiction of organization, much less any information about their backers.⁶

The determination of whether a crypto-asset was a security turned on the application of a 1945 Supreme Court case known as *Howey*.⁷ Crypto enthusiasts often express disbelief or annoyance over the fact that the principles of a decades-old case about orange groves in Florida should determine the law for this new technology. But the case articulated a standard that has been tried and tested: an investment contract (which is one form of a security) exists where there is an investment of money in a common enterprise with the expectation of profit from the managerial efforts of others. The application of that standard has meant some leading crypto-assets—including, most notably Bitcoin and Ether—were not deemed to be securities.⁸

⁵ U. S. Securities and Exchange Commission, "Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO," July 25, 2017, <https://www.sec.gov/litigation/investreport/34-81207.pdf>

⁶ See Dirk A. Zetzsche et al. "The ICO Gold Rush: It's a Scam, It's a Bubble, It's a Super Challenge for Regulators," *UNSW Law*, No. 17-83 (2021). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3072298

⁷ SEC v. W. J. Howey Co., 328 U. S. 293 (1946).

⁸ See William Hinman, "Digital Asset Transactions: When Howey Met Gary (Plastic)," June 14, 2018. Speech. <https://www.sec.gov/news/speech/speech-hinman-061418>

Thus, in the United States, we have a regulatory gap, which means the cash market for crypto-assets that are not securities—which includes the trading of Bitcoin and Ether, among others—is basically not subject to regulatory oversight.

Other jurisdictions have faced similar challenges. The United Kingdom's Financial Conduct Authority launched a task force to figure out whether crypto-assets fell within its regulatory purview. It too identified gaps and articulated a standard not dissimilar to *Howey*: only those assets which carry clear contractual rights (such as to cash flow or claims on assets) fell within its jurisdiction.⁹ Germany's BaFin stated that it would determine “on a case-by-case basis whether a token constitutes a financial instrument” within the meaning of four different laws regulating securities and capital investments.¹⁰ Canada considered crypto-assets to be “investment contracts subject to regulation if they meet a four-part test that is quite similar to the United States *Howey* test.”¹¹ Hong Kong law had a gap similar to the U. S. approach as well. Singapore said the issue was whether a crypto-asset is a “capital markets product”.¹²

The financial sector often generates innovations that do not fit neatly into existing regulatory categories. Indeed, innovation is often driven by the desire to devise products or services that are outside or on the edge of the regulatory framework and thus subject to less oversight. That can be a source of competitive advantage. A unitary financial regulator with broad powers to look across the financial system may be better positioned than a set of regulators whose respective jurisdictions are based on product or functional lines. But even the unitary financial regulator can be faced with definitional and jurisdictional challenges when assessing a new innovation. And that is assuming the regulator believes it should act. It can be very difficult to determine when an innovation may be generating sufficient risk that intervention is required, and determining what action is appropriate. In that regard, let us look at two of the worst financial crises the world has known, and the innovations that contributed to them.

9 HM Treasury, Financial Conduct Authority, and the Bank of England, “Cryptoassets Task Force: Final Report,” Updated October 2018, <https://www.gov.uk/government/publications/cryptoassets-taskforce>

10 BaFin, “Initial Coin Offerings: Advisory letter on the classification of tokens as financial instruments,” March 28, 2018, https://www.bafin.de/SharedDocs/Downloads/EN/Merkblatt/WA/dl_hinweisschreiben_einordnung_ICOs_en.html?nn=11089708

11 Canadian Securities Administrators, “Securities Law Implications for Offerings of Tokens,” June 11, 2018, http://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20180611_46-308_securities-law-implicationsfor-offerings-of-tokens.htm

12 Monetary Authority of Singapore, “A Guide to Digital Token Offerings,” November 30, 2018, <http://www.mas.gov.sg/~media/MAS/News%20and%20Publications/Monographs%20and%20Information%20Papers/Guide%20to%20Digital%20Token%20Offerings%20last%20updated%20on%2030%20Nov.pdf>

3 Part II: Innovation and the panic of 1907

The Panic of 1907 was the first worldwide financial crisis. Financial crises occurred frequently in the United States between the late 1800s and the early 1900s—there were eight between 1863 and 1913 alone.¹³ But the Panic of 1907 stands out as the worst until the Great Depression, because of its severity and the ripple effects felt around the world. Moreover, it led to significant reforms—most notably, the creation of the Federal Reserve System.

Former Federal Reserve chairman Ben Bernanke explained the causes of the 2008 crisis by distinguishing triggers from vulnerabilities.¹⁴ The former may set off the fire, but the fire threatens widespread damage only because of the underlying vulnerabilities. That construct is useful in thinking about any financial crisis, because it is psychological factors—panic and herd mentality—that can turn events that might not seem so threatening into a crisis, particularly where there are underlying weaknesses.

In the case of 1907, the innovation that created a significant vulnerability was the rise of trust companies. In those days, the U. S. financial system had state banks and national banks. But trust companies were a new form of financial intermediation chartered at the state level. They were a relatively small part of the financial system in terms of overall size and volume of activity. In many ways, they were an early form of private wealth management—bankers to rich families. But they developed riskier portfolios over time, and made loans the commercial banks could not make. The most notable were uncollateralized loans to those speculating in the stock market. They also had large commercial real estate loan portfolios unlike the national banks. They held lower cash reserves relative to deposits. According to two scholars of the crisis, Jon Moen and Ellis Tallman, those reserves were around 5 % for trust companies, compared to 25 % for national banks.¹⁵

A primary trigger of the Panic was a failed attempt by two speculators to corner the copper market, at a time when liquidity conditions were already very constrained. The seasonal demand for liquidity was high because of the need to finance transportation of crops from the Midwest to New York and then to Europe. Movements in international gold markets also constrained the money supply, which was based on the gold standard, at precisely the worst time.

13 Gary Richardson and Tim Sablik, “Banking Panics of the Gilded Age,” Federal Reserve History, December 4, 2015, accessed October 26, 2020, https://www.federalreservehistory.org/essays/banking_panics_of_the_gilded_age

14 Ben S. Bernanke, “Causes of the Recent Economic and Financial Crisis,” Testimony before the Financial Crisis Inquiry Commission, September 2, 2002, <https://www.federalreserve.gov/newsevents/testimony/bernanke20100902a.htm>

15 Jon R. Moen, and Ellis W. Tallman. “The transmission of the financial crisis in 1907: an empirical investigation,” FRB of Cleveland Working Paper No. 14-09 (2014), <https://ssrn.com/abstract=2491541>; See also Roger Lowenstein. *America’s Bank: The Epic Struggle to Create the Federal Reserve*. (New York, NY, Penguin Books, 2015), pp. 60–65.