

Cryptocurrencies: A Brief Thematic Review

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Abstract: Cryptocurrencies are an area of heightened pecuniary, numismatic, technological, and investment interest, and yet a comprehensive understanding of their theories and foundations is still left wanting among many practitioners and stakeholders. This discussion paper synthesizes and summarizes the salient literature on cryptocurrencies with a view to advancing a more general understanding of their order and purpose.

Cryptocurrencies: A Brief Thematic Review

Cryptocurrencies are an area of heightened pecuniary, numismatic, technological, and investment interest, and yet a comprehensive understanding of their theories and foundations is still left wanting among many practitioners and stakeholders. This discussion paper synthesizes and summarizes the salient literature on cryptocurrencies with a view to advancing a more general understanding of their order and purpose.

There is a frenzy around the notion of cryptocurrencies that is not met with a commensurate understanding of their nature, and to this point, the notion of “virtual money” is one that this long steeped in human engagement with both debt and money in any case (see Graeber, 2011). Interest in cryptocurrencies can be relegated to the previous decade’s sprouting of attention towards the technological and monetary aspects of such assets (Davis, 2011; Greenberg, 2011). As Farrell describes it, “The cryptocurrency market has evolved erratically and at unprecedented speed over the course of its short lifespan,” (2015). However, given the recency of cryptocurrencies specifically and the “excitement” around them (Narayanan et al., 2016), the literature can at best be described as emergent, and as an area of significant academic inquiry in the years to come.


At its simplest, a cryptocurrency can be thought of as a digital asset that is constructed to function as a medium of exchange, premised on the technology of cryptography, to secure the transactional flow, as well as to control the creation of additional units of the currency. There is a plethora of cryptocurrencies worldwide, including Bitcoin, Ethereum, Primecoin; and many theoretical ones have been proposed as well, such as Spacecoin (Park et al, 2015) or Solidus (Abraham et al., 2016). As early as 2014, Iwamura et al. counted more than 100 cryptocurrencies (2014b), and the number has only grown since then. Farrell (2015)



states that “since the release of the pioneer anarchic cryptocurrency, Bitcoin, to the public in January 2009, more than 550 cryptocurrencies have been developed, the majority with only a modicum of success.”

Researchers such as Al-Shehhi et al. (2014), have begun to look at determinants of “What are the bases on which online users choose to use and/or mine their cryptocurrency?” and “Which factors strongly affect the coin's popularity and value?” Their ostensible uses abound, ranging from partial (Delmolino et al., 2016) to the full substitution against fiat currencies (Ametrano, 2016). As Farell notes (2015), “research on the industry is still scarce. The majority of it is singularly focused on Bitcoin rather than a more diverse spread of cryptocurrencies and is steadily being outpaced by fluid industry developments, including new coins, technological progression, and increasing government regulation of the markets.”

Hughes and Middlebrook (2015) discuss the various regulatory options and frameworks that might be applied towards cryptocurrency regulation given their decentralized nature. Given precisely this decentralized nature, authorities seem to express worry, or at least perplexity, about their own relevance in the process. Independent oversight is a theme (see Chohan 2017a, 2017b, 2017c) somewhat absent from cryptocurrencies, because as its proponents argue, oversight is largely made redundant by the nature of cryptocurrencies themselves. However, the problem of *intermediation* is more pertinent to cryptocurrencies, and has been raised by Harwick (2016). The architecture for bitcoin creation (and mining) is also of great research interest, and as Barkatullah and Henke (2015) observe, “there is an intense technological race underway to build the highest-performance and lowest-power custom Bitcoin mining appliances.”



Ethical considerations are also important, and as Gladden (2015) asserts, “Building on advances in artificial intelligence, cryptography, and machine ethics, [...] it is possible to design artificially intelligent cryptocurrencies that are not ethically neutral but which autonomously regulate their own use in a way that reflects the ethical values of particular human beings – or even entire human societies.” Furthermore, Scott (2016) discusses the role that cryptocurrencies can play in enhancing social solidarity.

The interest in cryptocurrencies is explained by multiple sources of value that they create, and to this point, Kazan et al. (2015) identify six digital business models for cryptocurrencies that are in turn driven by three modes of value configurations, “with their own distinct logic for value creation and mechanisms for value capturing.” They find that value-chain and value-network driven business models “commercialize their products and services for each value unit transfer, whereas commercialization for value-shop driven business models is realized through the subsidization of direct users by revenue generating entities,” (Kazan et al., 2015). Cocco et al. suggest the creation of an “artificial financial market” for studying cryptocurrency markets (2017). Darlington (2014) applies *benefit analysis* to mapping the adoption of cryptocurrencies, while Brenig et al. (2015) use economic methods to analyze cryptocurrency-backed money laundering.

Cryptocurrencies fluctuate dramatically in value. Bitcoin, prime among traded cryptocurrencies, has grown by an astounding amount in value as of this writing. As Hayes notes, there are various determinants in the valuation of Bitcoin (2016). Can we stabilize the price of a Cryptocurrency? Iwamura et al. suggest that a better understanding of the design of Bitcoin and its potential to compete with Central Bank money is necessary (2014). Ametrano summarizes the problem as follows: “so far the affirmation of cryptocurrency as better money has been thwarted by dramatic deflationary price instability. Successful at



disposing of any central monetary authority, bitcoin has elected to have a fixed deterministic inelastic monetary policy, establishing itself more as digital gold than as a currency. Price stability could be achieved by dynamically rebasing the outstanding amount of money: the number of cryptocurrency units in every digital wallet is adjusted instead of each single unit changing its value," (2016). Some authors such as Koning look at the emission of a cryptocurrency by a central bank (2016).

Given their proliferation, the wider cryptocurrency "market" is increasingly being characterised by competition and competitive forces (Gandal and Halaburda, 2016). This leads to questions about participants in the cryptocurrency "industry," and to the broader question of "to bit or not to bit" (Evans-Pughe et al., 2014). Fry and Cheah (2016) draw upon the close relationship between statistical physics and mathematical finance to develop a suite of models for financial bubbles and crashes, and the derived models allow for a probabilistic and statistical formulation of econophysics models vis-a-vis cryptocurrencies. With respect to the bubble and mini-bubble aspect of cryptocurrencies, Cheung et al. (2015) for the period 2010–2014, using econometric analysis, detected a number of short-lived bubbles; including three huge bubbles in the latter part of the period 2011–2013 lasting from 66 to 106 days, with the last and biggest one being the one that 'broke the camel's back.'

The defense and protection of cryptocurrencies is also an area of concern. Houy (2014) asserts that "it will cost you nothing to 'kill' a proof-of-stake cryptocurrency," which is to say that, if the attacker's motivation is large enough (and this is common knowledge), he will succeed in his attack at no cost. The total amount of currency in circulation is also an area of research interest, and Gjermundrod and Dionysiou (2014) discuss the issue of deflation



that could occur in cryptocurrency systems supporting a finite cap on the total amount of currency that will ever be in circulation.

Will cryptocurrency truly replace fiat currencies in the future? Vigna and Casey argue that Bitcoin is “overturning world order” in several ways (2015). Howden (2015) describes the cryptocurrency evolution as a conundrum given that it is precluded by various types of uncertainty. Raemaekers (2015) argues that “while Bitcoin may not replace traditional and new payment methods to become a dominant alternative in the short term, banks should look at its underlying technology as a potential generic new way to transfer ownership of value in the longer term.” However, given the recency of cryptocurrencies specifically and the “excitement” around them (Narayanan et al., 2016), the literature can at best be described as emergent, and as an area of significant academic inquiry in the years to come.

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