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Cryptocurrencies and the Promise of Individual Economic Sovereignty in an Age of Digitalization: A Critical Appraisal

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Abstract

Cryptocurrencies have fuelled an ideological bifurcation between utopian imaginaries of borderless individual economic sovereignty and egalitarianism among libertarian sympathizers since Hayek and more recent dystopian admonitions against financial disruption and inequality by state actors. Providing a state-of-the-art sociological account of this debate, this article conducts the first empirical study on the links between cryptocurrency adoption, individual economic sovereignty, and wealth inequality using a novel 2020 cross-societal database of the population-level adoption of the six largest cryptocurrencies. Analyses show that cryptocurrency adoption neither ameliorates nor worsens wealth inequality, but that the geographical expansion of cryptocurrencies is dependent on the very political economic conditions and state permissions that their libertarian enthusiasts spurn. This article concludes by invigorating a programmatic call and agenda for the empirical, sociological study of cryptocurrencies and the methodological designs required to sustain it.

Keywords: cryptocurrencies, digital capitalism, financial inequality, individual economic sovereignty, libertarianism

Introduction

Recent years have witnessed an upsurge of attention – and investment – toward cryptocurrencies as a nascent category of alternative finance among individuals, institutions, media, and governments, yet our understanding of them as a sociological phenomenon has not kept pace.

Cryptocurrencies are digital currencies that distinguish themselves from traditional fiat currencies with a public ledger technology ("blockchain") that consists of decentralized peer-to-peer networks that supersede the need for institutional banking authorities or a central administrator. The situation of cryptocurrencies beyond the purview of the state has served as the source of agitation and speculation about the future it brings for social development in general.

Wall Street investors have touted cryptocurrencies as "the people's money." Founder of social media platform Twitter and financial payments platform Block, Jack Dorsey has long argued that Bitcoin is a tool for establishing economic equality and peace around the world because of the decentralization it promises for the financial system (Dorsey, 2021). Echoed by Wall Street investors, the enthusiasm for Bitcoin and cryptocurrencies in general is premised on the belief that there presently exist "monopolies off balance [wherein] the individual doesn't have power and the amount of cost and distraction that comes from our monetary system today is real and it takes away attention from the bigger problems" (ibid; Fitzgerald, 2021). Academic blockchain enthusiasts have gone further to argue that they ought not to be regulated at all (Davidson & Block, 2015; Swan, 2015).

Although economists have kept pace with the development of cryptocurrencies by examining their risks and rewards (Liu & Tsyvinski, 2021; Makarov & Schoar, 2020; Shanaev et

al, 2020), sociologists have been comparably slow to examine their consequences for development and inequality.

Dodd (2018) provided one of the first and only sociological examinations of Bitcoin. He concurred that Bitcoin represents a moment of "disintermediation" from banking and state authorities (p.38), which constitutes the core of its political appeal. The push for disintermediation led by cryptocurrencies builds off a long-standing pattern of mistrust in financial authorities that began in 2008. The 2008 Financial Crisis ruined trust in counterparties among banks as well as in the financial system and institutions among citizens in advanced capitalist economies (Brenan, 2021; Crabtree, 2013; Roth, 2009; Van der Cruijsen, de Haan, & Jansen, 2016). This watershed moment for the global financial system kickstarted a new type of neoliberalism with more libertarian overtones (Davies & Gane, 2021). Criticism soon mounted against the centralized structure of the extant financial system, blaming it as the very cause for collapse.

Online radical conservative and reactionary "ideological entrepreneurs" seized the opportunity during this era of debate to advance libertarian ideals by theorizing the forms and merits of new "cybermonies" to replace fiat currency itself, including Peter Thiel, Nick Land, and Curtis Yarvin (Finlayson, 2021). This discussion placed in more radical and polemical terms classic neoliberal accounts from economics, namely, Milton Friedman's prescriptions for conceding the government's control over welfare to the family as an institution (Friedman & Friedman, 1980, p.33; Gane, 2021).

Bitcoin and its descendant cryptocurrencies were centered in this narrative as a vehicle for realizing technocratic liberalism. By enabling enable peer-to-peer transfers of rights without a

third party, they fuelled the vision of a stateless enforcement of rights and, more importantly, of cryptocurrencies as the backbone of a new order(ing) of monetary authority (Hayes, 2019). Just as how state institutions enforce property rights (Besley & Persson, 2009), cryptocurrencies were promised to allow individuals to reclaim and enforce rights over their money themselves. Free from having to rely fiat currency backed by a state deemed untrustworthy, citizens could instead rely on each other to manage the security and form of their money through cryptocurrency technology. In this utopian narrative, citizens would gain individual economic sovereignty and with it, massively improve their lives and economic wellbeing by apparently shielding themselves from state oversight.

This article conducts the first empirical and critical appraisal of the links between cryptocurrencies, the libertarian vision of individual economic sovereignty, and economic wellbeing, which have gained salience during the COVID-19 pandemic. The market capitalization of Bitcoin alone, the progenitor cryptocurrency, reached over US$500 billion by the end of 2020 and over US$1 trillion by the end of 2021, making the enterprise worth as much as the largest technology firms in the world. In the wake of the ravenous appetite for cryptocurrencies seizing stakeholders and perturbing governments worldwide, this article addresses an important gap in the literature by interrogating the consequences they hold for economic wellbeing.

In what follows, this article theoretically examines the genealogy of the libertarian modality that animates investment in cryptocurrencies as a vehicle for privatizing money and realizing a utopian imaginary of individual economic sovereignty. This article then analyzes a novel database of cryptocurrencies, variegated measures of their integration, and wealth inequality in 58 societies. This article concludes by invigorating a programmatic agenda for the

empirical, sociological study of cryptocurrencies and the methodological possibilities required to sustain it.

Theorizing Cryptocurrencies: Libertarianism, the Privatization of Money, and Individual Economic Sovereignty

Cryptocurrencies are digital currencies that distinguish themselves from traditional fiat currencies with a public ledger technology ("blockchain") that consists of decentralized peer-to-peer networks. Participants are incentivized to operate the network by completing computational math problems to earn native, tradeable tokens. The process by which this occurs is called "mining."

The first of these cryptocurrencies was Bitcoin, created in 2009 by an individual or entity named Satoshi Nakamoto (2008). The selling point of Bitcoin was more than just the blockchain technology behind it: the usage of its tokens would preserve the same safeguards that enable fiat to function as currency (e.g. the prohibition of double-spending, when the same monetary unit is spent more than once by different hands). At the same time, Bitcion promised to shift the responsibility for overseeing these safeguards from a centralized monetary authority (traditionally banks and the federal mint) to individual participants or miners, among whom all transactions are broadcasted to all nodes.

Bound up in this seemingly innocuous design was a powerful rallying call: that there was too much power (and risk) behind assigning oversight of the monetary system to state institutions alone. Put differently, this design proposed that the foundational trust integral for money to exist in society (Dodd, 2018) ought not to be concentrated in the hands of government overseers (institutional trust), but in the hands of the people (communal and interpersonal trust).

In a large-scale Twitter study, for instance, Shanaev et al (2020) informatively observe that the prominence of discourses promulgating subversive themes against state-led monetary regulation was proportional to the interest and prices of cryptocurrencies. Although cryptocurrencies may differ in terms of the parameters for mining new tokens or the addition of new consensus mechanisms responsible for record-keeping, they all share the same public ledger or blockchain technology that situates them beyond the purview of the state.

The ideology of disintermediation, expunging centralized state authority from the role of regulating money, behind the operation of present-day cryptocurrencies has been an object of fascination for economists and sociologists. The roots of this discussion originated with Nobel laureate Friedrich Hayek's 1976 proposal to denationalize money. Hayek contended that governmental monopoly over the supply of money was a destabilizing force in the economy because unilateral changes in supply affected prices in the economy without regularity. For Hayek, this would eventually "create misinformation by disturbing the structure of relative prices, and hence resulting in a misallocation of resources" (Howard, 1977, p.1).

The libertarian spirit encapsulated in Hayek's desire to absolve government of its powers over the circulation of money energized substantial interest in the privatization of money. A turning point in the development of the libertarian spirit underpinning this privatization was captured in *The Sovereign Individual* (Davidson & Rees-Mogg, 1999). This book was a forceful account of how information technology would usher in "individual economic sovereignty" in which individuals would be "denationalized" (p.12). Fiat currency was conceived as a vehicle of the enfranchisement of individuals (p.101) by the state through taxes (p.8), mismanagement of the balance sheet, and lacklustre monetary policy that would devalue its value (pp.9, 255). As such, fiat currency was predicted – and demanded – to be cast out in favor of "cybermoney."

A progenitor schematic for what would later become cryptocurrencies, cybermoney was theorized as,

> "encrypted sequences of multihundred-digit prime numbers. Unique, anonymous, and verifiable, this money will accommodate the largest transactions. It will also be divisible into the tiniest fraction of value. It will be tradable at a keystroke in a multitrillion-dollar wholesale market without borders" (p.160).

Inherent in cybermoney was a moralizing promise of the liberation of individuals from reliance on state-backed fiat currency and the myriad forms of enfranchisement it implied. Such liberation was envisioned to "destroy the capacity of the state to charge more for its services than they are worth to the people who pay for them." (p.11) Doing so would purportedly ensure the individual would no longer be an "asset of the state, a de facto item on the treasury's balance sheet" (p.12), instead coming to be possessed of sovereignty.

The libertarian spirit implicit in *The Sovereign Individual*'s blueprint for cybermoney gained flesh in the invention of cryptocurrencies beginning with Bitcoin, which built upon, yet expanded this spirit by expressing a logic of neoreactionism (Land, 2012, p.3). Neoreactionism was essentially a response to the 2008 Financial Crisis that turned to cryptocurrencies and what they were believed to stand for: the decentralized peer-to-peer encryption of nodes and transactions between them in cryptocurrencies like Bitcoin expressed their ontological expansion from a market instrument to a commons instrument.

This shift in Bitcoin's conceptualization seized upon a general dissatisfaction with the existing monetary system that demanded radical, not piecemeal, reform. This dissatisfaction came to a head with the Financial Crisis. U.S. national banks were revealed to have taken on disproportionate risks when they unwound. The collateralized debt obligations (CDOs) and

collateralized loan obligations (CLOs) (tranches of securitized mortgages) that these banks traded melted down when widespread mortgage defaults spread through the nation. Even still, the state continues to increase its reliance on the mainstream financial system for security purposes (De Goede, 2012). Neoreactionist critics thus alleged that the state itself could not be trusted, given the role of national banks in the destabilization of the global economy.

Against the backdrop of this sociopolitical context, the enlistment of digital commons "in the forms of free or open source software" (Arvidsson, 2020, p.20) provided early inspiration for a utopian alternative to the market economy: a commons-based economy. Cryptocurrencies' decentralized networks were believed to support this commons-based economy by facilitating transactions beyond the purview of – and deemed illicit by – the state, such as sharing economies that consist petty production (Deka, 2018; Marx, 1867, p.541). Maurer et al (2013, p.262) remark that, "in the world of Bitcoin there are goldbugs, hippies, anarchists, cyberpunks, cryptographers, payment systems experts, currency activists, commodity traders, and the curious." Indeed, the core political appeal of cryptocurrencies is qualified by the perceived economic liberation and voluntary consignment of liberated actors in a new commons-based economy.

The advent of cryptocurrencies, backing transactions with monies owned by the same transactors, model a reversion of capitalist markets to an earlier stage in which "the labourer is the private owner of his own means of labour set in action by himself" (Marx, 1867, p.541). This form of market excludes the concentration of means of production and achieves, in some form, the promise of "cybermoney" for individual economic liberation.

Like how fully-sharing open licences that permit commercial exploitation ultimately create a "communism of capital" (Bauwens & Kostakis, 2014, p.360), the conversion of fiat currency to cryptocurrency (with their purchase) and their deployment in backing transactions

(with their use as money) represent a privatization of money. The jurisdiction of money is pried away from the monetary policy instruments of state banks or central financial authorities like the Federal Reserve. In its place, the responsibility for determining its value is taken over by the hands of its private holders.

Dodd (2018) identifies in Bitcoin's community sociological features that sustain the "techno-utopia[n]… socially necessary fiction of Bitcoin's finite supply" (p.43), namely, its much-lauded claim to horizontalism and how it comes to clash with the high degree of centralization in its mining. Still, Dodd (2018) observes, the contradictions of cryptocurrencies' practices do not deter the libertarian appeal behind their theory and image.

This is corroborated by a common view shared by Nick Land and Curtis Yarvin, popular "ideological entrepreneur" philosophers within cryptocurrency communities (Finlayson, 2021). They conceive the bricolage of cryptocurrencies to be "the creation of a global patchwork of competitive sovereign units—that is, a sort of mercantile joint-stock corporate structure that collapses together the economic and the political" (Berger, 2018).

The utopianism embedded in the imagery of this "patchwork" of "sovereign units" represented by cryptocurrencies finds parallels with what Lynch (2017) identifies as enclave libertarianism that gained force in the wake of the Financial Crisis. Lynch theorizes this to be a breed of libertarianism that operates by seeking out microcosms of minimal state power and maximal reach of privatization with the potential to expand to the whole of society. In his theorization, enclave libertarianism is driven by the logic that states must "not only obey the independent laws of the market, they must also become part of the market—effectively dissolving the state into the market—in order to incentivize efficiency and innovation" (p.85; Hanley & Sikk, 2016).

Capitalizing on the semiotics of metallic money like with mining (Maurer et al, 2013) and of scarcity as a source of value as with gold (Menger, 1892), cryptocurrencies succeed in capturing libertarian sentiment by appearing to offer "immutability, transparency, persistency, resilience, and openness… at an infrastructural level" (Rozas et al, 2021, p.2). These surface-level similarities are leveraged to support cryptocurrencies' claim that they support a growing ecosystem of peer-to-peer communities believed to usher in a commons-based economy. Cryptocurrencies thus capture a perfectly libertarian spirit in structure (their tokens being beyond state control) as much as substance (the determination of their value).

This article theorizes that the present landscape of cryptocurrencies has advanced the imagery of a commons-based economy at the core of their libertarian appeal both (a) structurally and (b) technologically.

(a) Structurally, cryptocurrencies enjoy never-before-seen plurality, with the advent and rise of different types of "coins." Figure 1 shows the trajectory of the collective market capitalization of six major cryptocurrencies in the world from 2013 to 2020: Bitcoin (BTC), Ethereum (ETH), Ripple (XRP), Litecoin (LTC), Binance Coin (BNB), and Cardano (ADA).

Figure 1. Market capitalization of Bitcoin (BTC), Ethereum (ETH), Ripple (XRP), Litecoin (LTC), Binance Coin (BNB), and Cardano (ADA) in US$ billions (2013-2020).

INSERT FIGURE 1

Two patterns are of theoretical significance. First is the tremendous amount of volatility that these cryptocurrencies exhibit. From 2013 to January 2018, their collective value skyrocketed to over US$500 billion, before experiencing a vociferous – and sustained – decline to just under US$100 billion by January 2019. There, their value lingered for several months before gradually increasing again to US$250 billion by July 2019, then cratering again to US$150 billion in January 2020. Their value continued to dance within this range, before breaking past it to US$300 billion in July 2020 and continuing to attain new heights, surging to US$700 billion by the end of 2020. The volatility of the value of cryptocurrencies strips legitimacy from their labels as currency and instead energizes parallels with risky financial instruments accompanied by intense swings in value over a short period of time.

To corroborate this, the standard deviations of all six cryptocurrencies are calculated to measure their volatility[1], presented in Table 1. As can be observed, the volatility for the six cryptocurrencies based on standard deviations of returns at a monthly level from 2013 to 2020 is significant, ranging from 52.81% to 330.45%. Put differently, it means that the value of one's holdings in these cryptocurrencies may fluctuate anywhere from 52.81% to 330.45% from one month to the next.

INSERT TABLE 1

Second, the dramatic rise in the market capitalization of these major cryptocurrencies is itself theoretically informative. Cryptocurrencies are not productive assets in that they are underwritten by value production, so increases in unit price are *not* representative of growth in fundamental productivity underlying each unit as would be the case for a share of a company, but of growth in the *speculation* about their value. Put differently, the large market

[1] This is similar to the *Beta* for other securities such as stocks.

capitalizations of major cryptocurrencies are a direct barometer of the optimistic interest piling into them, with people keen to bid up their prices based on the beliefs that cryptocurrencies represent.

No longer is Bitcoin the only cryptocurrency on which the imagination of economic liberation is premised. Where Bitcoin initially offered such liberation by placing control over the value of money into the hands of the people, plurality as a sociological feature of digital monies advances this vision of liberation in two interrelated ways. On the one hand, it disrupts the idea of a monopoly with Bitcoin being the only cryptocurrency. On the other, it opens Pandora's Box in letting loose agency over the creation of digital monies; now, not only can individuals have a say over the value of their money, but anyone can *create* their own money also.

Figure 2. Number of cryptocurrencies over time.

INSERT FIGURE 2

Figure 2 shows the number of cryptocurrencies traded in the world from 2009, Bitcoin's inception, to 2020. The figure shows exponential growth, from Bitcoin being the only cryptocurrency to the most recent data showing over 5,000 cryptocurrencies in existence. In terms of value (the market capitalizations of BTC, ETH, XRP, LTC, BNB, and ADA) and plurality (the number of cryptocurrencies), the landscape of digital money has radically expanded from Bitcoin's creation in 2009.

(b) Technologically, cryptocurrencies after Bitcoin advance this vision of economic liberation by improving upon Bitcoin's limitations to expand the universe of possible economic transactions using blockchain technology. To illustrate, Ethereum explicitly picks up on

technical deficiencies in Bitcoin's programming language[2], in order to enable a broader range of types of economic transactions and features. For example, Ethereum better supports gambling by introducing a source of randomness in the blockchain data and withdrawal limits by moving from binary to multi-stage contracts (Buterin, 2014).

In a similar vein, the other four major cryptocurrencies propose different angles to expanding the capabilities of blockchain technology. Ripple introduces a new algorithm to close the ledger after transactions are agreed upon by nodes in the network to prevent fraudulent transactions from any one malicious node (Schwartz, Youngs, & Britto, 2018); Cardano implements new protocols to verify identities that require less energy and are more environmentally sustainable; Litecoin processes transactions four times faster than Bitcoin; Binance Coin is a cryptocurrency whose creation and funds were used to support Binance, now the largest cryptocurrency exchange in the world by daily trading volume.

Thus, this expanded variety of cryptocurrencies satisfies an even greater range of functions in the imagined infrastructure of a utopian commons-based economy. It invokes more strongly the ideological themes of decentralization and deflation that originally belonged to Bitcoin alone in Land and Dodd's accounts. These themes, moreover, originate in the political right "represented by classical liberalism, libertarianism and anarcho-capitalism, and… the antipolitics of economic autonomization, deregulation, disintermediation, distributed production of security, and – at the limit – algorithmic governance (or local political extinction)" (Land, 2018, §4.37).

The perceived proximity of the present landscape of cryptocurrencies to such an economically libertarian and egalitarian future has commanded attention from enthusiasts as well

[2] This includes its inability to support loop functions, its centralized solution to determining the value of tokens in terms of fiat currencies during transactions, its binary treatment of unspent transaction outputs as spent or unspent.

as from critics and state authorities. Critics argue that cryptocurrencies worsen the inequality extant in the present capitalist system (with the state and central banking authorities managing the meaning of money, its enforceable rights, and value). A report by the U.S. Federal Trade Commission in 2021 that shows U.S. consumers have lost US$80 million on cryptocurrency scams from October 2020 to May 2021 (Federal Trade Commission, 2021).

Preliminary research by the U.K. Financial Conduct Authority (2019) finds that individuals of higher socioeconomic classes, with higher salaries, and further education own more cryptocurrencies than the rest of the population. Prominent academics like Nobel laureate Joseph Stiglitz and others have called for increased government regulation and even the outright ban of cryptocurrencies altogether (Costelloe, 2017; Shanaev et al, 2020).

These calls build upon sociological scholarship that finds that risky financial instruments abet inequality and disenfranchisement of low-class households that misjudge risk and incur substantial losses (Davis 2009; Deutschmann, 2011; Fligstein and Goldstein 2015).

Against the backdrop of this debate, this present article investigates the conditions and extent to which the promise of individual economic sovereignty and egalitarianism with cryptocurrency adoption are realized. In so doing, this article empirically tests whether cryptocurrencies benefit economic wellbeing, the core contention between enthusiasts and skeptics.

Data and Methods

The present dataset was constructed by drawing from Statista's 2020 Global Consumer Survey and national government reports on cryptocurrency activity in societies or nations with the highest levels of activity. These offer the only data by independent sources available that measure the retail ownership, use, production of cryptocurrency at a societal level. The final

dataset included 58 countries, which is reasonably large and robust for the sociological study of inequality. The 2020 Global Consumer Survey is administered through an internet survey twice a year for constituent countries of the Organisation for Economic Co-operation and Development (OECD), high-income economies, and once a year for non-OECD countries, non-high-income economies and measures national-level adoption of cryptocurrency among retail investors and ATMs.

As a measure of the egalitarianism core to the promise of individual economic sovereignty, the dependent variable is the Gini Index, which measures the amount of wealth inequality in a society. Though derivations of the Gini Index have been developed (Lerman & Yitzhaki, 1984), the basic premise is the same: that the Index measures deviations of wealth from the population mean wealth and averages these deviations to infer a measure of inequality in a nation. A Gini Index score of 1 represents perfect inequality in a nation, whereas a score of 0 represents perfect equality. National-level measures of the Gini Index are derived from the World Bank for this study.

The proportion of the general population in each society or nation that has owned or used cryptocurrencies is selected to represent cryptocurrency adoption as an independent variable for theoretical reasons. The total amount of cryptocurrency in a society or volume of transactions was considered but ruled out because of the stratification of cryptocurrency ownership by class (Financial Conduct Authority, 2019). Thus, retail ownership of cryptocurrencies provides a superior metric for assessing cryptocurrency adoption in a society by tapping into ownership and usage across the general population.

The adoption of the top six largest cryptocurrencies – Bitcoin (BTC), Ethereum (ETH), Ripple (XRP), Litecoin (LTC), Binance Coin (BNB), Cardano (ADA) – by market capitalization

are collated into a single measure of cryptocurrency adoption for a more parsimonious and theoretically compelling analysis. The prices of individual cryptocurrencies all tend to rise and fall with the same tide, suggesting nearly identical risk profiles and volatility, and no material financial difference between the choice to buy one cryptocurrency versus another among the six covered.

The second independent variable is the number of Bitcoin (BTC) automatic teller machines (ATMs) as a measure of how transactable cryptocurrencies are and, therefore, an alternative measure of their use in each society. Bitcoin ATMs are physical ATMs that allow holders of Bitcoin and other cryptocurrencies to purchase and sell them using fiat currencies and to convert one to the other.

The final independent variable is how much of the distribution of the global hash rate that a given society accounts for. It provides a measure of the mining of cryptocurrencies in a society, annualized to match the population-level proportion of cryptocurrency adoption. The hash rate is essentially the computational power per second used when mining new tokens for a cryptocurrency, or how many calculations (per second) are performed in the process of mining. A higher hash rate signifies a higher production rate of new tokens for a given cryptocurrency. The hash rate of cryptocurrency mining is measured on a global scale because the blockchain networks that support cryptocurrencies are transnational, all cryptocurrency tokens are mined from the same networks and count toward the same ledger, such as the notorious supply limit of Bitcoin being limited to 21 million tokens worldwide. Thus, the distribution of the global hash rate that societies in the sample account for is captured.

The distributions of the global hash rate are heavy-tailed, with the top nine miners of cryptocurrencies accounting for about 94.23% of the global mining that occurs: China, the U.S.,

Kazakhstan, Russia, Iran, Malaysia, Canada, Germany, and Ireland[3]. The remainder 5.7% is assigned to the other 49 societies based on approximations of their contribution to the global carbon footprint from cryptocurrency mining. Given that all 49 countries neared zero-rates in their proportion of the global carbon footprints, the conditions were appropriate for a mean imputation for this data (data was not missing at random and only mean values for each society were needed, see Donders et al, 2006).

A simple linear regression is conducted to produce a general visualization of the effects of measures of cryptocurrency adoption on wealth inequality across the 58 countries in the 2020 dataset[4]. Logarithmic transformations were not performed on the data because the residuals were normally distributed. Standard measure of goodness of fit tests were conducted.

Results

The present analysis begins by mapping out the global distribution of Bitcoin ATMs to descriptively flesh out their geographical expansion and scale of uptake. Tables 1 and 2 present the top ten and bottom twenty societies by number of Bitcoin ATMs, respectively, additionally capturing all societies that have matching numbers of ATMs.

From Table 2, it is observed that the U.S. leads the world in the number of ATMs, followed by Canada, and the remainder is consisted entirely of European nations with the exception of Hong Kong, a highly advanced capitalist society. It is worth noting that all of them are high-income societies, except for Romania, which is upper-middle income, according to the World Bank.

INSERT TABLE 2

[3] The dataset included China in the global distribution of hash rates in 2020, but note that the Chinese government has since ramped up a crackdown on the mining of Bitcoin and other cryptocurrencies, so its portion of the global hash rates is to be significantly lower in 2021, for future reference.
[4] Standard diagnostic tests showed no multicollinearity between the variables included.

Table 3 shows a broader mix of nations that have either just one ATM or none, which is where more heterogeneity can be observed. In this ranking are just five nations that are European, seven from Asia, four from Africa, three from the Middle East, and one from Oceania. In addition to the geographical mix, we also observe a greater mix of income levels, where only about half of them are high-income or upper-income nations and the remainder are lower-middle income.

INSERT TABLE 3

Descriptively, the variations observed between Tables 2 and 3 lend for a closer analysis of the role of cryptocurrency policy in addition to geography and income in the adoption and expansion of cryptocurrencies.

Most nations with the greatest adoption of Bitcoin ATMs in Table 2 have minimal to no regulation of cryptocurrencies. Two types of regulatory permission emerge.

(i) The first, in the U.S., Switzerland, Czechia, Greece, Romania, and Spain, is lack of regulation outright. This is rooted in indecision about what to do with cryptocurrencies because they fall outside the purview of traditional financial instruments and their adherent, complex financial regulatory regimes.

(ii) The second, like the U.K., Austria, Hong Kong, Canada, and Poland, is to embrace cryptocurrencies, typically by annexing them into extant regulatory regimes. The U.K. has embraced one type of cryptocurrencies called stablecoins as a type of payment. Hong Kong has taken a more hybrid approach, allowing laymen to buy and sell cryptocurrencies freely but requiring institutions licensed with the local financial regulating authority (the Securities and Finance Commission) to sell cryptocurrency-related assets to only do so to sophisticated investors. Poland allows free purchases as well, but requires residents to report their holdings.

Canada and Austria even accept cryptocurrency ownership to the extent of taxing residents' earnings related to it.

Thus, the utopian imaginary of economic liberation from state influence is grounded by reality. We do not see cryptocurrencies evoking libertarianism to "effectively [dissolve] the state into the market" (Lynch, 2017, p.85), but the reverse: cryptocurrencies flourish in part because states permit them to, with some even absorbing cryptocurrencies into regulatory regimes such as taxation to support state apparatuses.

Opposite to this portrait of cryptocurrency acceptance, we observe two types of barriers to acceptance in the nations with the lowest numbers of Bitcoin ATMs in Table 3. (i) The first is regulatory, consisting of nations that reject cryptocurrencies as dangers to state-backed fiat currencies or state authority. These include Egypt, China, Iran, Saudi Arabia, Pakistan, Morocco, South Korea, and Lithuania. Some like South Korea and Lithuania subject cryptocurrencies to stringent regulations that extend to any virtual asset service provider. Others are openly hostile, threatening prosecution for cryptocurrency transfers like Pakistan, issuing bans on processing transactions like Egypt, Iran, Saudi Arabia, and Morocco, or outlawing even mining like China.

(ii) The second is political economic, affecting mostly low-income nations, namely, Kenya, Nigeria, and India. The income level of a nation is a barrier to cryptocurrency use, partly because of the high prices of cryptocurrencies compared to the purchasing power of residents, as well as the financial infrastructure required to own them. Cryptocurrencies, like public equities, require exchanges to be traded, many of which do not have operations in low-income nations with underdeveloped financial systems and low internet access.

There exist nations that do not fall under either, including Malaysia, Japan, New Zealand, Denmark, Norway, and Sweden. Their lack of Bitcoin ATMs may be explained by lack of

recognition. Though states do not regulate them, they also do not recognize them as legal tender in everyday transactions and so demand for them may not have taken off.

Ultimately, the promise of borderless individual economic sovereignty and libertarian utopia inherent in cryptocurrency support appears highly intricated with extant state policy and political economic development. Put differently, though the ideological appeal of cryptocurrencies is "algorithmic governance… [and] local political extinction" (Land, 2018, §4.37), they are in practice dependent on the very political economic conditions that their libertarian enthusiasts spurn.

To further assess the realization of the promise of individual economic sovereignty with cryptocurrency adoption, a simple linear regression is conducted on population levels of cryptocurrency adoption, number of Bitcoin ATMs, and proportion of the global hash rate against wealth inequality to visualize general patterns (Figures 3, 4, 5).

A moderately positive correlation is observed between cryptocurrency adoption among retail investors and wealth inequality, suggesting that greater cryptocurrency adoption may lead to more, not less, wealth inequality in a nation. However, this figure ought not to be over-interpreted[5].

Figure 3. Wealth inequality by the percentage of cryptocurrency adoption in a society.

INSERT FIGURE 3

[5] Not pictured are OLS regressions that predict the effects of cryptocurrency adoption, Bitcoin ATMs, and distribution of hash rates on the Gini Index while controlling for the level of economic development (GDP per capita and the unemployment rate) and their changes in 2020 compared to 2019. No significant correlation is observed for any measure of cryptocurrency integration in any of the models, once the effects of GDP per capita, changes in GDP, the unemployment rate, and changes in the unemployment rate are controlled for.

Figure 4. Wealth inequality by the number of Bitcoin ATMs in a society.

INSERT FIGURE 4

Figure 5. Wealth inequality by the distribution of the global hash rate that a society accounts for.

INSERT FIGURE 5

Interestingly, no significant correlation is observed for the number of Bitcoin ATMs[6] or the distribution of the global hash rate. Figure 4 casts light on the types of regulatory regimes identified prior. The types of regulatory permission and barriers to adoption that cleave apart societies in terms of the number of Bitcoin ATMs they possess disappear when measured against wealth inequality in Figures 3, 4, and 5. Societies of varying types of permissions and barriers exhibit no observable pattern or segregation in the graphs.

This means that although different regimes may determine the number of Bitcoin ATMs that a given society adopts, it appears that the presence of those ATMs do not yield meaningful benefits for aggregate wealth inequality. Furthermore, contrary to popular expectations that mining is a viable source of income for residents of low-income societies, there is no measurable advantage in the present analyses. Whether societies mine more of the world's cryptocurrencies on a global blockchain or less does not appear to have any material effect on differences of wealth within their populations.

[6] Note for Figure 4, the Bitcoin ATMs, the number of ATMs for the U.S. and Canada are removed, which far outstripped the number of ATMs in other countries, for visibility purposes. However, this did not change the later regression results. For Figure 5, the distribution of the global hash rate, it is noted that China was removed as an outlier, accounting for nearly 60% of the global hash rate. Even still, the regression line did not change, as a large number of countries reported accounting for a near-zero proportion of the global hash rate.

Though the level of economic development has been found elsewhere to have an enduring correlation with the societal level of wealth inequality (Dion & Birchfield, 2010; World Bank, 2021), there is no such distinction in the present analyses. Nations of varying income-levels are scattered in all three graphs, even the most advanced capitalist economies that report high levels of inequality (McCall & Percheski, 2010; Piketty & Saez, 2006). In sum, there is no significant correlation between cryptocurrency adoption, the number of Bitcoin ATMs, or the distribution of the global hash rate in a society and its level of inequality.

Discussion: A Sociological Agenda for Cryptocurrencies

Inherent in the decentralized technological infrastructure of cryptocurrencies in a global blockchain, their extralegal barter, and the surge of financial interest in them is belief in a libertarian promise: that decentralization provides a model of borderless individual economic sovereignty. Behind this belief is an apology for privatization and an allegation that cryptocurrencies will "effectively [dissolve] the state into the market" (Lynch, 2017, p.85) and improve economic wellbeing overall.

Yet, this article demonstrates that for all the ideological highs that cryptocurrencies offer, they struggle to escape the gravity of state power. It is believed that because the mining of cryptocurrencies is done by a global blockchain, there exists no relationship between national characteristics and their uptake. However, this article finds that the geographical footprint of their adoption and trade are patterned by the nature of the national regulatory regimes and political economic conditions of the states in which they are traded.

By way of individual economic sovereignty, this article also finds that greater cryptocurrency adoption is not significantly correlated with the alleviation *or* abetment of wealth inequality. Sociologically, two explanations are discussed.

The first is that cryptocurrency adoption remains too small at present to move the needle for wealth inequality. Cryptocurrencies remain cordoned off from the purchase of goods and services in a large part of the consumer economy. So long as people cannot use Cardano to pay for their groceries or Ether to pay their bus fares to work, cryptocurrencies and their proposal as a force for financial disintermediation will have little merit as currency.

The second, less-examined sociological explanation for the disconnection between cryptocurrencies and economic sovereignty is the fact that cryptocurrencies are not productive assets. Holders of cryptocurrencies only own tokens. This means that cryptocurrencies are insulated from the vicissitudes of economic productivity in countries that might otherwise encourage economic wellbeing by, say, strengthening the core productivity of firms. Cryptocurrencies' disintermediation from the purview of a central banking authority also strips them of the utility that fiat currencies have for improving wellbeing when central bank-run monetary policy toggles their production (a country's money supply) to stabilize interest rates, housing prices, and inflation.

Having provided a state-of-the-art analysis of cryptocurrency adoption and individual economic sovereignty, this article concludes with a programmatic call for future research and a discussion on the sociological importance and the methodological limitations of its contemporary study.

Cryptocurrency adoption matters for sociological studies of social indicators and public attitudes. As was elaborated earlier, the theoretical moorings of cryptocurrency adoption rest on a libertarian instinct for subsuming economic life (even the value and creation of currency itself) and the state into private ownership as well as supplanting trust in states with grassroots trust. Empirically, it will thus be important to disentangle the effects of cryptocurrency adoption on

social attitudes and liberal values, such as trust in authority figures like police, trust in neighbors, and intergroup trust and tolerance.

Cryptocurrency adoption also matters for the sociological study of inequality, particularly as it gains in popularity as an alternative investment for households. In light of this article's findings, a paradox presents itself with cryptocurrency adoption: greater cryptocurrency adoption may actually intensify the already-volatile swings of their value, culminating in potentially significant losses for large swaths of the general population. The risks for financial loss amplify as cryptocurrencies grow in plurality when more and more individuals take advantage of the ability to not just use cryptocurrencies but create their own.

As observed in sociological research on financial inequality, widespread access to risky financial instruments may do more harm than good for households. This is especially so for those belonging to lower socioeconomic classes with inferior financial assets, resources, and education to cushion against losses or guard against overexposure (Bandelj & Grigoryeva, 2021; Dwyer, 2018).

Given the descriptive links between the dearth of governmental regulation and cryptocurrency adoption identified in this article, this risk is amplified. It bears noting that part of the 2008 Financial Crisis was caused by both the inordinate amounts of risk that ordinary households were taking on *and* by the lack of information and appreciation about how widespread such risks already were by the time IndyMac (trailed by hundreds of mortgage lenders and banks) had begun to default.

To make possible these lines of study on public attitudes and individual economic sovereignty, there is need for better data. Though this study has presented a state-of-the-art

analysis of existing data, there exist important limitations to be discussed and attended to in future empirical studies.

There is no cryptocurrency data at a household level, so the present analyses are focused on the population level. Having smaller units of analysis would permit more nuanced views of inequality, economic wellbeing more broadly (e.g. by household income), and their patterns across demographic attributes, given the large amount of sociological research that shows disparities in financial resources by race/ethnicity, class, and gender (Bandelj & Grigoryeva, 2021; Deutschmann, 2011; Dwyer, 2018). This would paint an important portrait of the extent to which cryptocurrency adoption (and the types of cryptocurrencies held) has already perforated households (by race/ethnicity, class, and gender) in countries worldwide and, relatedly, the amount of risk that exists among household assets and in the financial system overall due to cryptocurrencies.

There is also need for more systematic cryptocurrency ownership data by state-run institutions. Existing cryptocurrency data is scarce, decentralized, and often run by third parties that may have vested interests in the cryptocurrency space and whose methodologies for collecting data may be opaque or even self-serving. Regular state-run collection of cryptocurrency data would allow for more longitudinal analyses of cryptocurrency ownership, rather than just cross-sectional analyses. One application, to illustrate, could be to analyze the impact of the timing of regulatory changes on the number of Bitcoin ATMs available in society.

Additionally, systematic state-run data collection would allow for cryptocurrency measures to be integrated into existing household financial data, supporting analyses of other measures of individual economic sovereignty, such as fluctuations in household income or social mobility within and across generations.

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Tables

Table 1. Volatility of the six major cryptocurrencies based on standard deviations of returns (monthly) from 2013 to 2020.

Cryptocurrency	Standard Deviation of Return
Bitcoin (BTC)	52.81%
Ethereum (ETH)	55.10%
Ripple (XRP)	119.03%
Litecoin (LTC)	182.86%
Binance Coin (BNB)	330.45%
Cardano (ADA)	105.01%

Table 2. Top ten societies by number of Bitcoin ATMs.

Society	**BTC ATMs**
United States	22235
Canada	1776
United Kingdom	166
Austria	157
Hong Kong	130
Switzerland	124
Spain	117
Poland	89
Romania	78
Czechia	67
Greece	67

Table 3. Bottom twenty societies by number of Bitcoin ATMs.

Society	**BTC ATMs**
Malaysia	1
India	1
Indonesia	1
Kenya	1
Nigeria	1
Italy	1
Japan	1
Lithuania	1
Saudi Arabia	1
South Korea	1
United Arab Emirates	1
China (mainland)	0
Egypt	0
Iran	0
Morocco	0
Pakistan	0
Denmark	0
New Zealand	0
Norway	0
Sweden	0