

Unpacking the Adoption and Diffusion of Cryptocurrency: A Comprehensive Analysis of Social  
and Technical Factors

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science, School of Engineering

Bryan Zhao

Spring 2023

On my honor as a University Student, I have neither given nor received unauthorized aid on this  
assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Pedro A. P. Francisco, Department of Engineering and Society

## Introduction

In recent years, the traditional monetary system, backed by fiat currency, has faced increasing distrust due to the influence of central governments and their policies, such as their response to the 2008 financial crisis. This has allowed for the rapid adoption of cryptocurrencies, such as Bitcoin, which offer an alternative means of currency that is not dependent on central bankers. However, as people began seeing cryptocurrency as an investment vehicle opposed to a contemporary form of currency, cryptocurrencies began to be rife with speculation, garnering a reputation of distrust. By exploring the social, political, and cultural factors that have led to the emergence of cryptocurrency and analyzing the relationships between various actors in the monetary system, including central banks, governments, financial institutions, and individual users, we can gain a better understanding of the potential for cryptocurrency to become an entrenched part of the traditional monetary system. Furthermore, examining the historical transition from commodity-backed to fiat currency and considering the potential of blockchain technology can provide insights into how cryptocurrency could be effectively incorporated into both traditional digital currency systems and other industries.

There have been numerous social, political, and cultural factors that have led to adoption of cryptocurrency. Using a review of literature, these factors can be unveiled, including, but not limited to: the impact of economic crises', such as the 2008 financial crisis, leading to a decline in trust within the traditional monetary system, the role that political and institutional factors, such as government policies, regulations, and central banks, have had in shaping public perception and trust in the monetary system, as well as shifting societal and cultural norms within society that call for a desire of greater privacy and security within financial transactions, which have ultimately led to the emergence of cryptocurrency. Furthermore, analyzing the actors

involved, including central banks, governments, financial institutions, and individual users, can shed light on how their individual actions impacted the adoption and diffusion of cryptocurrency.

## **Background**

The very concept of money has become one of the most distinguishing features that shaped the development of society and economies across the globe and, as a result, mankind has unironically had an incredibly rich history with regards to the concept of money. There have been multiple interpretations and manifestations of the concept, but, ultimately, Carruthers and Babb (1996) state that money functions as a medium of exchange, a measure and store of value, a means of payment, and a unit of account (p. 1556). As such, throughout history, even money's earliest instances within human history has held a form not too different from contemporary currency.

As early as accurate records go back in history, money expressed itself in a non-tangible form through bartering and trading, which involved the direct exchange of items. However, as the inefficiencies of this system emerged, Ritter (1995) states that society began settling upon certain commodities, usually metals, as a medium of exchange (p.134). He claims that the standardization of this process, usually involving setting benchmarks for purity, design, and shape, ultimately introduced a layer of credibility, a process "undertaken by governments who [wanted] to establish a reputation for some degree of honesty [of its respective monetary system]." This eventually transitioned into "paper [currency] representing contracts between the bearer and a bank or government," which would be able to be exchanged into a commodity through each banking or central entity (p.135). However, as of Nixon's abolishment of the gold

standard in 1971, there was an inevitable shift from commodity backed currency to fiat currency - defined by faith or credibility in the issuing government - as the global standard.

Throughout the 20th century, the US dollar was cited as the primary currency of the world. According to Carbaugh and Hedrick (2008), the dollar derived strength from the “strong U.S economy and growing confidence... in its status as a safe haven.” Not only was it accepted in many other nations as legal tender, but they state that many nations poured their wealth into dollar-denominated assets, such as U.S Treasury securities, with many central banks “investing a substantial share of their currency reserves in dollars,” giving it the prestige and status of a reserve currency - a currency that is held in significant quantities by central banks (p. 93). This status, unquestionably, provided many benefits to the United States, in part by permitting a more “stable exchange rate”, the ability to run significantly “[larger] trade deficits”, a “decrease in the cost of commodities, and a “relatively low-cost” source of credit . These benefits, in conjunction with the dollar being a reserve currency, enabled the United States to “realize higher trade deficits,” enabling them to import goods and services in exchange for the dollar(p. 97). This status, as well as its subsequent benefits, certainly were driving factors that enabled the United States to be considered the world’s economic superpower. Nonetheless, according to Arslanalp et al. (2022), there has been a “substantial decline in the dollar share” held as “international reserves since the turn of the century”, with “deliberate portfolio diversification” by central bank reserve managers (p, 1-2). Lachmann, R. (2011) states that these trends, in conjunction with the budget priorities within the US government, have led to “elites [gaining] greater control over civilian spending and taxes” at the detriment of “investments fundamental to economic growth” (p.47). Furthermore, he claims that this issue is only being compounded by the seeming inability for the US to sustainably “simultaneously” spend money towards its commitments, including

investments “extensive military involvements, social programs, education, infrastructure, and research” which are necessary to compete with other countries (p.44).

On the other hand, in comparison to the United States government holding a legal monopoly over United States currency, the fundamentals of cryptocurrency make it an inherently decentralized currency. Zetsche et al. (2020) suggests that this is done through a distributed ledger, in which, a “database is consensually shared and synchronized across networks... allowing a transaction to have multiple private or public witnesses” (p. 179). Rather than giving authority to a central entity, as is the case within the traditional banking system, Ghaemi et al. (2021) states that ledgers, for a given piece of information, are driven by interactions between multiple participants, “without the permission from a third party” (p.1507). This, in addition to the anonymity provided by “unique alphanumeric addresses” opposed to personal information, are fundamentals that grant cryptocurrencies its decentralized nature (p.1508).

However, there are certainly viable critiques of cryptocurrency. Although the technology can be considered to be in its infancy, it has drawn prying eyes as a result of its high market capitalization, which at times Auer, Raphael & Tercero-Lucas (2021) claim “rivalled that of silver, the world’s major financial companies, and even the stock markets of large advanced economies” (p. 2). Despite the inventor of the first major cryptocurrency project, Nakamoto (2008), revealing his intentions of creating an “electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party, (p. 1)” the adoption of Bitcoin cannot be attributed to solely this libertarian philosophy. However, Auer, Raphael & Tercero-Lucas (2021) claim that many saw it as an investment vehicle, and certain cryptocurrencies saw almost “ten-fold prices” as a result of hype and speculation (p.3). However, in May 2021, many

cryptocurrency prices collapsed. It would seem that an initially innocent project designed to give users a way to “opt-out” of the traditional monetary system was corrupted by speculators and investors.

In conclusion, money has had a rich history that evolved from bartering and trading goods and services to commodity and commodity backed currencies, which has ultimately transitioned to contemporary fiat currency. The US dollar has become the reserve currency, but there are growing concerns regarding its economic dominance as a result of its decreasing share as an international reserve and numerous budget priorities within the US government, which cannot be financed without a deficit. On the other hand, cryptocurrency offers a decentralized alternative to traditional currency, but its high market capitalization and speculative nature has drawn criticism. Ultimately, the evolution of money and the emergence of cryptocurrency demonstrate the ongoing need to reevaluate and adapt to changing economic and technological landscapes.

### **Methodology/Research Methods**

To discuss the research on the potential of cryptocurrency, the primary approach will be a review of literature of academic journals, books, and other scholarly sources. This will provide the theoretical foundation for the research and guide the development for potential solutions. Furthermore, case studies of specific cryptocurrency projects will be conducted to provide a more detailed analysis of the factors that contribute to the success or failure of certain types of cryptocurrency.

These methods will provide a comprehensive understanding of the adoption and diffusion of cryptocurrency. By taking into account both the social and technical factors that are a result of this phenomenon, a historical analysis of the development and evolution of cryptocurrency will be conducted, allowing for a nuanced understanding of the complex interactions between actors and the impact their actions have on the adoption of cryptocurrency.

## **Results and Discussion**

Cryptocurrency has long been criticized for its volatility, which makes it difficult to use as a stable means of exchange. To resolve or mitigate this issue, some proponents have suggested utilizing commodity-backed cryptocurrency. Commodity-backed currency, in general, is backed by a tangible asset, such as gold, silver, or oil. With the backing of a commodity, such tokens can offer greater stability and trust because they are backed by a tangible asset, which, in turn, provides a hedge against the aforementioned issue of volatility within the cryptocurrency market. However, there are numerous issues that must be overcome in order to legitimize such a cryptocurrency. One challenge is that commodity-backed cryptocurrency may be vulnerable to market fluctuations in the underlying commodity itself, which could impact their value. Furthermore, there may be difficulties with transparency, regulation, and liquidity when it comes to these currencies. For example, concerns may arise regarding how the value of the commodity is tied to the value of the underlying cryptocurrency. Moreover, ensuring that the cryptocurrency is actually backed by the stated amount of the commodity can be difficult. These challenges were demonstrated in a case study conducted by Wasiuzzaman and Haji (2021), which showed that five cryptocurrencies backed by gold still experienced volatility comparable to other non-backed

cryptocurrencies, and during extreme periods, showed very little with regards to the safe haven potential of their backing commodities (p.1).

However, despite these challenges, commodity-backed cryptocurrency has the potential to offer a more stable and secure form of digital currency. During the COVID-19 crisis period, Wasiuzzaman and Haji (2021) showed that “gold-backed cryptocurrencies can act as safe-haven investment during crisis periods” (p. 5). This recent study concluded with the fact that it provides evidence that there is the intrinsic “safe-haven [aspect] of Gold-backed cryptocurrencies. Furthermore, there have been discussions on different initiatives regarding different commodities, including a proposed digital currency backed by Venezuelan oil reserves and projects exploring the feasibility of tokenizing over other types of assets, such as real estate or art. Niforos (2017) states that this could be particularly significant in emerging markets or countries with unstable currencies or limited access to financial markets or services (p.4).

The potential implications of commodity-backed cryptocurrencies for the broader financial system are significant, as they can potentially provide an alternative to weakening traditional fiat currencies and central banking systems, particularly in emerging markets or countries with unstable currencies or access to financial markets or services. However, it is important to consider concerns around the impact on global trade and financial stability, particularly if commodity-backed cryptocurrencies become widely adopted and have a significant impact on commodity prices and markets.

In addition to the potential benefits of commodity-backed cryptocurrency, the blockchain technology that underlies it also has significant potential.. Chen et al. (2018) mentions that the blockchain has found itself incorporated into numerous “banks, internet companies, car manufacturers, and even governments,” outside of its original use-case within cryptocurrency.



Furthermore, they claim that it provides a means of sending money that is “simpler, faster, and cheaper” in comparison to the traditional banking system (p, 17). As such, there is further potential for cryptocurrency to develop potential uses outside of finance and business.

Commodity-backed cryptocurrency is certainly a promising area of development within the cryptocurrency ecosystem. Despite the challenges related to transparency, regulation, and liquidity, it has the potential to provide a more stable and secure form of digital currency, with further initiatives exploring the feasibility of tokenizing different types of assets. Additionally, the blockchain technology that underlies cryptocurrency has significant potential to transform numerous industries. Although this concept is still in a very nascent form, commodity-backed cryptocurrencies have the potential to provide a more stable and secure form of digital currency and it certainly is a promising area of development within the cryptocurrency ecosystem.

However, cryptocurrency itself has the potential to be used as a tool for social and economic empowerment, particularly in developing countries or emerging markets, who may have unstable monetary systems. Niforos (2017) claims that cryptocurrency can potentially re-engineer economic models and enable the development of markets and products that would be considered “unprofitable or unavailable” within the traditional economy. Niforos further insinuates that cryptocurrency being an alternative to fiat currency enables it to address currency instability and political risk in a “rapid and cost effective manner”, allowing the financial inclusion of “previously underserved consumer segments” (p. 3). Furthermore, she notes that demand within emerging markets enable it to service previously “financially excluded segments” (p.7). As a result, cryptocurrency can serve as a hedge against native currencies when there are periods of economic and political instability, as is the case within parts of Africa and Latin America. For example, a study conducted by Batycka (2023) shows that certain cryptocurrencies

known as stablecoins, which are cryptocurrencies pegged to fiat currencies, are used by a third of Latin American consumers for everyday purchases, as reflected in Figure 1.

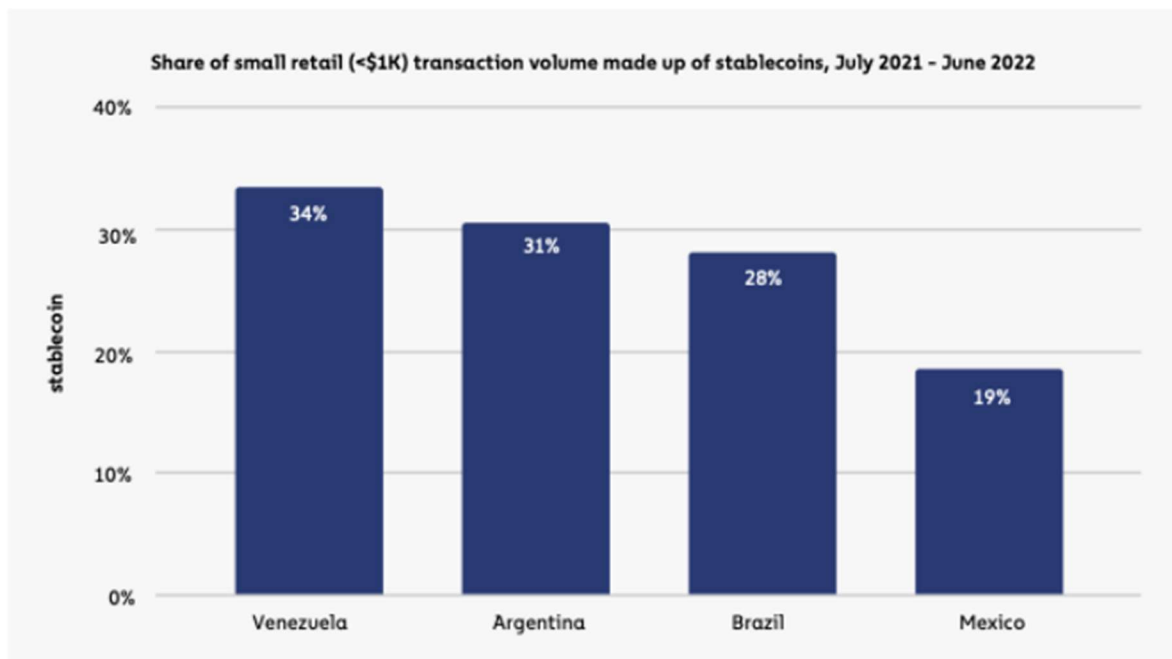


Figure 1: Share of small retail (<\$1k) transaction volume made up of stablecoins, July 2021-June 2022. Adapted from 'Emerging markets dominate Chainalysis 2022 Geography of Cryptocurrency Report' by Dorian Batycka, 2023.

There are certainly many forces that have influenced the adoption and diffusion of cryptocurrency. Governments and central banks are often skeptical of cryptocurrencies, with one argument frequently being the inconsistencies within the description of the technology's capabilities. Walsh (2018) states that this factor is problematic as investing in new technology, on a historical basis, is a significant drain on time and resources, and the frequent overstatements provided by cryptocurrency proponents is particularly problematic when considering the feasibility of integrating cryptocurrency into critical systems, such as voting or identity verification (p. 29). Furthermore, she raises valid points regarding the consensus network built

within cryptocurrency, stating that a few concentrated “mining” pools control over 50 percent of the network of individual cryptocurrencies, which can call into question the decentralization of certain cryptocurrencies (p. 30). However, it is also important to note that governments and central banks can view cryptocurrencies as a threat to the traditional monetary system and the control each central entity has over its respective currency. Huang and Mayer (2022) report that the Chinese government has directly banned financial institutions and payment systems from handling cryptocurrency exchanges, opting instead to issue a sovereign digital currency, which would improve the internalization of the Chinese currency, the RMB, while also diverting exposure China’s economy had to financial networks controlled by the United States (p. 328). On the other hand, while the United States seemed to be initially reluctant to regulate cryptocurrency, several government agencies have been assigned, on both a state and national level, to exert regulatory authority over cryptocurrency. The reason for government scrutiny over cryptocurrency is certainly influenced by a combination of the aforementioned multiple social and political factors.

In addition, financial institutions certainly are included within factors that have influenced the development and adoption of cryptocurrency. The evolution of the cryptocurrency market took scant a decade to reach US\$ 3 trillion before retracting (see Figure 2).

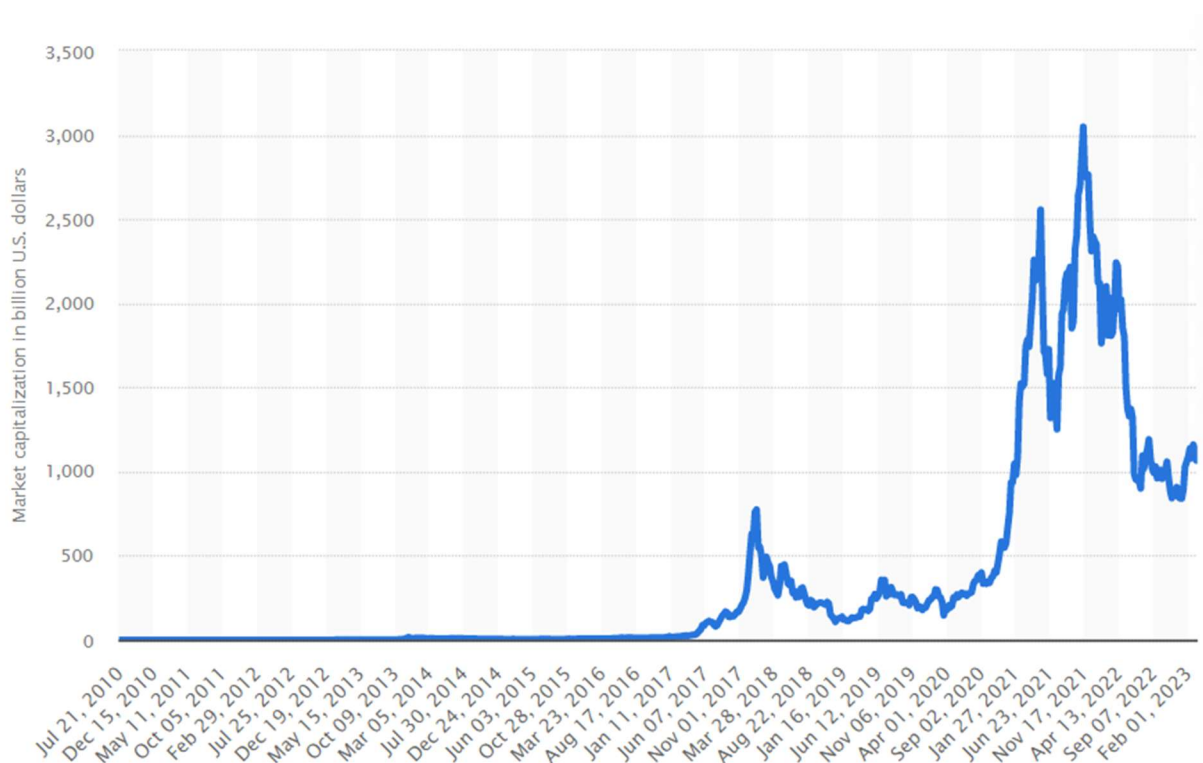


Figure 2: Market capitalization of cryptocurrency in billions of U.S. dollars. Adapted from ‘Cryptocurrency Market Value 2013-2023’ by Statista, 2023.

This rapid adoption, undoubtedly, drew in the prying eyes of institutional investors, who began to accrue interest ever since 2017, ultimately resulting in a sharp surge in market capitalization. According to Auer et al. (2022), the introduction of institutional money undoubtedly led to the shift of cryptocurrency serving as a decentralized currency towards what could be considered a “high volatility asset”, with valuations sensitive to “news” and “noise”, such as media statements and high-profile investors. There are multiple motives that can be attributed to institutional interest in cryptocurrency - perhaps it was portfolio diversification, or maybe an alternative store of value or “digital gold” (p. 5). Regardless of whatever the causal factors were, institutional interest in cryptocurrency, culminating in the entry of major financial

players within the cryptocurrency ecosystem, such as Paypal and Visa, undoubtedly assisted in cryptocurrency proponent's attempts to legitimize it and give it mainstream appeal.

Furthermore, individual users undoubtedly play a significant role within the adoption and diffusion of cryptocurrency. In his initial paper describing the methodology of the blockchain, Nakamoto (2008) discusses how the traditional financial system requires trust within intermediary third parties - including banks, credit card companies, and payment processors. However, Nakamoto argued that having these third parties created vulnerabilities within the financial system, with the potential for fraud, censorship, and lack of privacy for users (p.1). Furthermore, some, such as Weber (2014), have speculated that one of Nakamoto's initial intent of cryptocurrency would be to build a digital based currency payment system in "direct response" to what is perceived as the "deep-rooted problem of the current system revealed by the [2008] crisis" (p. 18). With that being said, many early adopters of Nakamoto's (2008) cryptocurrency, Bitcoin, were drawn to the technology's potential for anonymity, privacy, security (p. 1) - an ability that was able to disrupt traditional power structures in the financial sector. Although many adopters of cryptocurrency in the later stages may not hold the same libertarian values that Nakamoto initially intended, its adoption has most definitely benefited as a result of the heightening interest within the public. As such, individual users have certainly been integral to the mainstream's acceptance and adoption of cryptocurrency into the traditional monetary system.

As alluded to above, one of the driving factors for the adoption of cryptocurrency is a result of the declining trust within the traditional monetary system. This is best represented by the Great Recession of 2008, which resulted in a widespread mistrust of banks and other financial institutions. Lee (2018) states that the Great Recession threatened the fiscal stability of

the state, constrained government spending, and reduced aid to the “relatively disadvantaged”(p.59). While stimulating the economy has become standard practice of the Keynesian and government playbook during recessive periods, the aforementioned factors within the Great Recession made it so that the problems to less “well-equipped [citizens]” were exacerbated. In addition, the affluent have enjoyed “greater increases in income and state of well-being over... those at median and below-median incomes.” Furthermore, the government’s response to the Great Recession involved tax cuts and bailouts favored towards big corporations, while citizens ended up “paying for the costs of the recession” in the form of lost jobs or increased tax burdens (p.60). On top of that, according to Jordhal (2007), inequality is a strong determinant of trust, so it can be concluded that the Great Recession, and the subsequent actions taken by the government, led to diminishing trust from citizens at median and below-median incomes.

## **Conclusion**

Overall, the adoption of cryptocurrency has been shaped by a complex web of interactions between various actors and their actions - including central governments and banks, financial institutions, and individual users. While some entities have sought to restrict, regulate or ignore this new technology, others have embraced it and sought to promote its adoption. Ultimately, the future and potential of cryptocurrency will be dependent on how the aforementioned actors interact with one another, and the reverberations generated will ultimately indicate to what extent they are able to navigate through the complex regulatory and social landscape surrounding this emerging technology.

## References

- Arslanalp, S., Eichengreen, B., & Simpson-Bell, C. (2022). The Stealth Erosion of Dollar Dominance and the Rise of Nontraditional Reserve Currencies. *Journal of International Economics*, 1-23. <https://doi.org/10.1016/j.jinteco.2022.103656>
- Auer, R., Farag, M., Lewrick, U., Orazem, L., & Zoss, M. (2022). *BIS Working Papers No 1013 Banking in the shadow of Bitcoin? The institutional adoption of cryptocurrencies*. <https://www.bis.org/publ/work1013.pdf>
- Auer, Raphael & Tercero-Lucas, David. (2021). Distrust or speculation? The socioeconomic drivers of US cryptocurrency investments. *BIS Working Papers No 951*.
- Batycka, D. (2023, January 31). *Emerging markets dominate Chainalysis 2022 Geography of Cryptocurrency Report*. CryptoSlate. <https://cryptoslate.com/emerging-markets-dominate-chainalysis-2022-geography-of-cryptocurrency-report/>
- Carbaugh, R., & Hedrick, D. (2008). Losing Faith in the Dollar: Can It Remain the World's Dominant Reserve Currency? *Challenge*, 51(3), 93–114. <http://www.jstor.org/stable/40722504>
- Carruthers, B. G., & Babb, S. (1996). The Color of Money and the Nature of Value: Greenbacks and Gold in Postbellum America. *American Journal of Sociology*, 101(6), 1556–1591. <https://doi.org/10.1086/230867>
- Chen, W., Xu, Z., Shi, S., Zhao, Y., & Zhao, J. (2018). A survey of blockchain applications in different domains. *Proceedings of the 2018 International Conference on Blockchain Technology and Application - ICBTA 2018*.

- Ghaemi Asl, M., Rashidi, M. M., & Hosseini Ebrahim Abad, S. A. (2021). Emerging digital economy companies and leading cryptocurrencies: insights from blockchain-based technology companies. *Journal of Enterprise Information Management*, 34(5), 1506–1550. <https://doi.org/10.1108/jeim-08-2020-0348>
- Huang, Y., & Mayer, M. (2022). Digital currencies, monetary sovereignty, and U.S.–China power competition. *Policy & Internet*, 14(2), 324–347. <https://doi.org/10.1002/poi3.302>
- Jordahl, H. (2007). Inequality and Trust. *SSRN Electronic Journal*, 715. <https://doi.org/10.2139/ssrn.1012786>
- Lachmann, R. (2011). The Roots of American Decline. *Contexts*, 10(1), 44–49. <https://doi.org/10.1177/1536504211399050>
- Lee, Y. (2018). The Great Recession, Government Performance, and Citizen Trust. *Journal of International and Area Studies*, 25(1), 57–70. <https://www.jstor.org/stable/26485930>
- Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. Retrieved from [https://www.usssc.gov/sites/default/files/pdf/training/annual-national-training-seminar/2018/Emerging\\_Tech\\_Bitcoin\\_Crypto.pdf](https://www.usssc.gov/sites/default/files/pdf/training/annual-national-training-seminar/2018/Emerging_Tech_Bitcoin_Crypto.pdf)
- Niforos, M. (2017). Blockchain in Financial Services in Emerging Markets, Part I. *World Bank Publications - Reports*. <https://ideas.repec.org/p/wbk/wboper/30369.html>
- Ritter, J. A. (1995). The Transition from Barter to Fiat Money. *The American Economic Review*, 85(1), 134–149. <http://www.jstor.org/stable/2118000>



Statista. (2023). Overall cryptocurrency market capitalization per week from July 2010 to March 2023 (in billion U.S. dollars) | *Statista*. Statista; Statista.

<https://www.statista.com/statistics/730876/cryptocurrency-maket-value/>

Walch, A. (2018). Blockchain Applications to International Affairs: Reasons for Skepticism. *Georgetown Journal of International Affairs*, 19, 27–35.

<https://www.jstor.org/stable/26567524>

Wasiuzzaman, S., & Haji Abdul Rahman, H. S. W. (2021). Performance of gold-backed cryptocurrencies during the COVID-19 crisis. *Finance Research Letters*, 101958.

<https://doi.org/10.1016/j.frl.2021.101958>

Weber, B. (2014). Bitcoin and the legitimacy crisis of money. *Cambridge Journal of Economics*, 40(1), 17–41. <https://doi.org/10.1093/cje/beu067>

Zetsche, D. A., Arner, D. W., & Buckley, R. P. (2020). Decentralized Finance. *Journal of Financial Regulation*, 6(2), 172–203. <https://doi.org/10.1093/jfr/fjaa010>