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Review Article

Decoding Cryptocurrency: A Sociological Perspective on Rigidity in Fluidity

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Abstract: In the contemporary landscape of modernity, characterised by the evolving information age, cryptocurrencies have emerged as a decentralised mode of transaction, qualifying to be termed as liquid modernity (Bauman, 2012). The apparent fluidity, flexibility and the unrevealed potentially rigid tendencies inherent in cryptocurrencies; present it as a virgin domain to be researched with sociological perspectives. This paper aims to understand and outline the history of monetary systems starting from the ancient practice of barter to the establishment of national currencies, and up to the recent advent of cryptocurrency, in an evolutionary framework. As the second objective, this paper attempts to delineate the mechanism of construction and the causal explanations for the adoption and diffusion of cryptocurrency from a sociological lens. In view of the factual status of its legitimation and denial by different governing authorities, the third objective of this paper is to explore into the nuances pertaining to trust, governance and dynamics of power relations with a exploratory concern for rigidity within the claimed fluidity of the cryptocurrency and its utilisation. However, we are assuming one conclusion for our study and that is we are going to get stuck with more significant questions rather than the answers for our objectives.

Keywords: Cryptocurrency, Monetary Evolution, Liquid Modernity, Sociological Perspective, Fiat Money.

INTRODUCTION

In the contemporary world, the existing knowledge is pushing towards the limits, where every concept appears to be fluid in nature. This holds true even for currency, a notion traditionally perceived as static or resistant to change, as discussed by scholars such as Locke (1689) and Jevons (1875). But with the emergence of dematerialised currency, seems to be novel as well as threatening, which aims to remove money from any sort of public, political and control (Spang, 2016).

Before delving into the causality of cryptocurrency, it is important to understand the historical evidence and the necessity for the existence of a monetary system. A monetary system is the framework or structure within which a society manages its money supply, facilitates transactions, and determines the value of its currency which encompasses various

components, including currency issuance, banking regulations, central banking policies, and mechanisms for conducting financial transactions. But even before this banking regulation along their sophisticated and bureaucratised system, there was human interaction and exchange of goods and services among them.

Though, the evolution of the monetary system can stretch up to several millennia, which reflects the changes in economic systems, societies, and technologies along with the evolutions in the human societies. Likewise, back in around 3000 BCE, for the exchange of goods and services people were relied on and used to trade directly with each other, a practice known as the barter system. In a barter system, individuals or groups exchange goods or services they possess for those they require from others which was without the standardisation of medium of exchange. This system operates based on mutual agreement between parties regarding the value of the items being exchanged. As one of the earliest forms of trade, it was commonly practised before the advent of money as a harmonised medium of exchange. But because it was complicated and inefficient.

Further, in line with human social evolution, there was also evidence of coinage in Mesopotamia

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during 3000-2500 BCE, where it was observed that some commodities such as grain and livestock as well as leather or stones were used as a medium of exchange. The standardisation was nearly tried to make possible with the available tools and technologies at the very time. Because when humans got control on metal, as evident during 7th century BCE in ancient India and Lydia (modern-day Turkey) found to have standardised metal coins as a medium of exchange.

After a huge gap, in Chinese Tang Dynasty (7th to 9th Century CE), they invented paper and the first known paper money was introduced and adopted easily because it was reduced to carry heavy metal coins. Later, in 13thCentury, Marco Polo noticed the potential use of nonmetallic forms of currency all over China. The history till now has shown the practice of standardisation of a monetary system on the masses to bring order in medium of exchanges.

These monetary systems were adopted because it holds these three promising functionalities, i.e.:

i. A medium of exchange, which is easy to handle, care and transport.
ii. A unit of account, helps in measure and calculations easily.
iii. A store of value, because it lasts longer.

The production of counterfeit currency has been a persistent challenge throughout various epochs, perpetrated by malefactors seeking to undermine economic stability. In response, regulatory authorities have consistently attempted to uphold economic integrity and standardisation within the global marketplace through the implementation of new monetary standards. Notably, during the 17th and 18th centuries, a period characterised by expanding global economic interactions or globalisation, there was a significant shift towards the adoption of the gold standard. This monetary system, which attached the value of national currencies to specific quantities of gold reserves, was adopted by numerous countries. Its adoption came in an era marked by relative financial stability and facilitated international trade transactions.

However, the 1930s witnessed a pivotal shift in the global monetary landscape with the onset of the Great Depression, which significantly impacted the major economies of the world. Here, it came to the genesis of fiat money and precipitated a profound evolution in the banking system. The economic unrest induced by the Great Depression made numerous countries renounce the gold standard, thereby granting them flexibility in their monetary policies to adapt to fluctuating economic conditions. Later in 1944, the Bretton Woods Agreement offered to end the US dollar as the predominant global reserve currency, which was also backed by the United States' gold reserves. This transition facilitated a move away from gold towards the US dollar as the standard reserve currency among nations. Nonetheless, this arrangement was short-lived, and in 1971, a significant paradigm shift occurred with the cessation of the US dollar's convertibility into gold, giving rise to the contemporary fiat currency system. In this system, the value of money is not underpinned by any physical commodity, representing a fundamental transformation in the conceptual and practical foundations of the global monetary system.

Emergence of Cryptocurrency

However, during the late 20th century and the early 21st century, the advent of the internet led to an era of electronic banking and digital transactions. The narrative of this evolution is not merely linear; rather, it entails a gradual progression characterised by successive advancements and technological innovations, eventually gaining widespread adoption among the general masses.

Nevertheless, it is an undeniable reality that computing devices have triggered a profound revolution within society, with their adoption occurring at an exceptional pace, thereby catalysing the emergence of new domains of discourse. If we understand the basics and functional unit of these computers, that is the electronic component known as the Central Processing Unit (CPU), which functions as the core of data processing. Within this processing unit, data serve as the foundational building blocks, with their organisation constituting the structure of information. Then, there comes the information as a tool for serving and ruling and moreover in the contemporary landscape, it is recognized that information has assumed the role of a new form of currency.

However, here the question arises, how has information come to be equated with currency? What mechanisms underlie this process? The functionality of currency in this context is predicated upon the logistics of the block cipher algorithm, and it is known as the "blockchain technology." Within this technology, private and public keys associated with blockchain are maintained in a cryptocurrency wallet, rather than the actual currency values themselves. These cryptocurrency wallets, which can be offered by various platforms, furnish users with the capability to transmit and receive tokens. Additionally, they allow users to adjust their balance in accordance with the blockchain ledger, facilitating a seamless integration of digital currency transactions within the broader framework of blockchain technology.

On the other hand, we can comprehend in which manner the data processors are stored and administered by machines, with their governance decentralised from any singular individual, institution, or organisation. Therefore, it is crucial to look into the fundamental principles of cryptology and its various branches, as they are instrumental in managing the logistics behind the existence of a currency derived from their technology. See Figure 1, cryptology is the study of codes, especially

the art of writing and solving them. It has two major branches, one which deals with the writing and solving codes to create abstraction and algorithms is cryptography, whereas the art of processing deciphering coded messages without having the key is cryptanalysis.

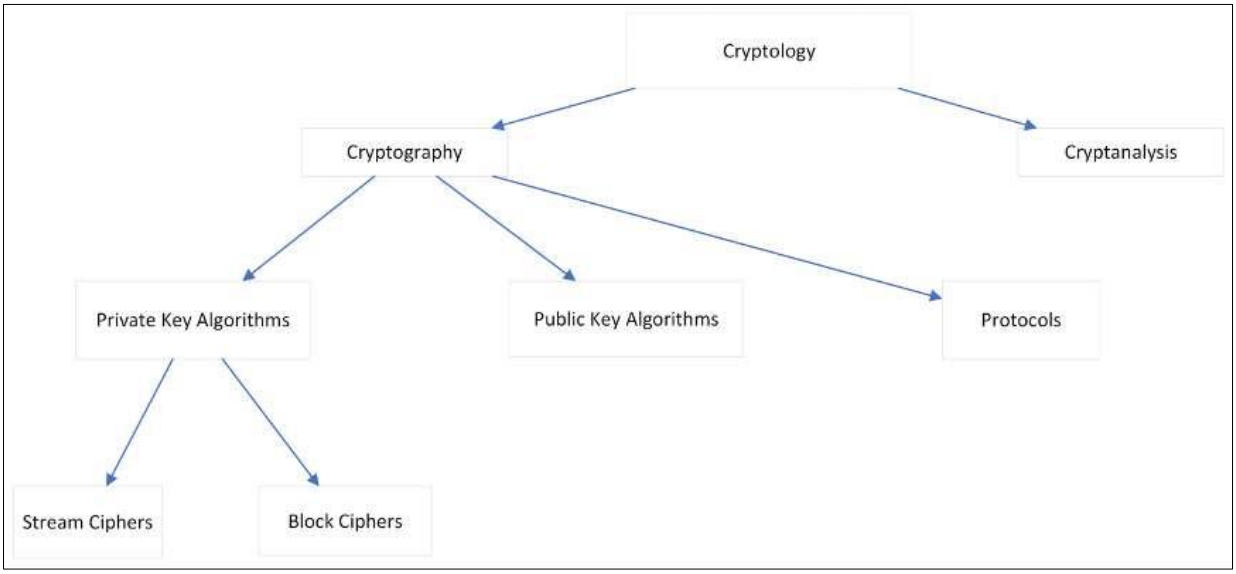

Figure 1: The division of Cryptology and its branches

In the progression towards encrypting data into secured information, particularly with a focus on accountability, as manifested in the context of currency, cryptographers have embraced the blockchain technology employing private key algorithm encryption. Cryptography operates through a tripartite framework consisting of private key algorithm, public key algorithm, and protocols (refer to Figure 1). The private key algorithm, a subset of algorithms, employs identical keys for both encryption and decryption processes, while the public key algorithm represents another subset where distinct keys are utilised for encryption and decryption. The private key functions akin to a password, known solely to the user, whereas the public key serves as a username, accessible and can be made visible to all. Furthermore, protocols encompass a defined set of rules dictating the exchange or transmission of data between devices.

Moreover, there are block ciphers and stream ciphers which represent two encryption methodologies within the private key algorithm framework. Stream ciphers function by encrypting plaintext into code on a byte-by-byte basis. Conversely, block cipher encryption employs a deterministic algorithm in conjunction with a symmetric key to encrypt fixed-size blocks of data. The encryption process in block ciphers operates on entire blocks, irrespective of whether transactions have occurred, represents blockchain technology a more rational choice for its utilisation in the medium of exchange.

Currency, serving as a medium of exchange, is subject to scrutiny concerning its durability and legitimacy. Just as the barter system was supplanted by the monetary system, there exist assertions advocating for computer-based cryptocurrencies. It is anticipated that the public will exhibit a degree of scepticism concerning matters pertaining to monetary transactions and their associated outcomes, especially when it is guaranteed and decentralised by machine. Therefore, an inherent query arises: What motivates individuals to acquire or possess cryptocurrency? There are few advocates of cryptocurrency acquisition that often draw parallels between its value and that of gold. Likewise, its demand is proportionate with its value. Therefore, the endorsement of electronic currency is not solely rooted in technological advancements, but also in the collective investments made by individuals.

Even though the anonymous launch of cryptocurrency was accepted by the major resource owners and currently it is owned by, we can call them the ‘haves’ or early innovation ‘adopters.’ Because innovation is a response to the unprecedented challenges posed by increasing citizen demands and social complexity (Walker, 2014). Where the adoption of innovations and the willingness to do so also vary on the same social complexity. Innovations are not uniformly adopted by all organisations, and differences are observed in the timing of innovation adoption.

As outlined by Nakamoto, cryptocurrency constitutes a decentralised form of electronic cash, facilitating peer-to-peer transactions without the oversight of centralised regulatory bodies. The prefix "crypto" is intrinsically linked to two computer-centric concepts: encryption and cryptography. Encryption encompasses a specialised computational process that transforms data into ciphertext to safeguard against

unauthorised access, while cryptography embodies the broader domain of code creation and solution, encompassing both encryption and decryption processes. The multifaceted realm of cryptology can be comprehensively elucidated through the visual representation depicted in Figure 1.

As defined by Nakamoto, the cryptocurrency is purely peer-to-peer electronic cash that is free from any centralised state's regulation. The term *crypto* is associated with two computer related terms, encryption and cryptography where encryption is special form of computation of codes to form data into cipher text to prevent from unauthorised access and cryptography is the art of writing or solving codes which consist both encryption and decryption. The whole branches of cryptology can be understood through the below given figure (Figure 1).

We all know about cash or 'paper money' that we use to buy things or pay for services. People also use their phones or computers to make payments, but even then, it's just moving the cash in their bank accounts. But now, there's a new kind of money that doesn't rely on banks or physical cash at all. This new money, called digital or cryptocurrency, is protected by complex coding to make sure it's real and safe.

The uncertainty around this digital money has made many countries take a closer look at it. For example, in India, the government hasn't decided how to deal with cryptocurrencies yet, even though the Indian central bank once banned them. This new technology for making payments could really change how our economy works. The big talk about cryptocurrency is about how it lets people own and share money without central control. Usually, when we trade goods and services for money, there need to be rules to make sure everything is fair and real. The old barter system only worked well if two people had exactly what the other wanted, which was pretty inconvenient. Then, we started using coins and metals, which leaders set standards for to make trading easier. Later, we created national currencies backed by gold. But even these can be affected by big changes in government or crises. That's why there was a push to have one global currency for international trade or emergencies, and the US dollar became that currency because it's used by most international businesses. However, it's still controlled by the US Federal Reserve, a central authority.

In simpler terms, as we've moved from trading goods directly to using coins, then cash, and now digital money, we're always looking for better ways to buy, sell, and trust in our economy. Digital currencies are just the latest step, but they bring up new questions about how to keep everything safe and fair without central control.

CONCLUSION

This paper set out to decode a central paradox of the cryptocurrency ecosystem: its ideological celebration of fluid, borderless, decentralized exchange, set against the sociological reality of profound rigidity. Through a sociological lens, we have seen that while cryptocurrency markets operate on a technical architecture designed for maximum liquidity and individual autonomy, their social structure tells a different story. The very mechanisms that enable trust lessness - immutable code, algorithmic governance, and fixed monetary policies like Bitcoin's 21-million cap - introduce new, non-negotiable constraints. These are not bugs but features: they function as digital counterparts to what sociologists of money have long called the "social scaffolding" of value. Fluidity, in this context, is not the absence of rules but the presence of a different, more unforgiving kind of rule set - one enforced not by courts or nation-states, but by consensus protocols and cryptographic finality.

Furthermore, our analysis reveals that this rigidity manifests most clearly in the social hierarchies and power asymmetries embedded within seemingly flat networks. From the concentration of mining power in proof-of-work systems to the influence of core developers and the rise of centralized exchanges as de facto custodians, cryptocurrency communities reproduce familiar patterns of stratification. The "code is law" mantra, rather than democratizing authority, often elevates technical expertise into a new form of capital, creating gatekeeping mechanisms as rigid as any bureaucratic institution. Meanwhile, the pseudonymous nature of transactions, while enabling fluid movement of value, simultaneously hardens accountability into a binary of absolute transparency or complete anonymity leaving little room for the nuanced, negotiated trust that characterizes traditional financial and social relationships.

In conclusion, the dichotomy of rigidity and fluidity in cryptocurrency is not a failure of design but a fundamental sociological tension. Cryptocurrencies do not transcend social structure; they re-embed economic exchange into new, often more brittle, technological containers. For policymakers, developers, and users alike, recognizing this tension is critical. The future of digital money lies not in choosing fluidity over rigidity, but in designing systems that acknowledge the necessity of both - where code can be adaptive rather than absolute, where governance includes human deliberation alongside automated rules, and where the promise of decentralization includes genuine social flexibility. Until then, cryptocurrency will remain a powerful mirror of our existing social contradictions: a radical tool for liquidity that paradoxically depends on its own, often invisible, forms of rigidity.

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