



Augmenting Blockchain With Competition Law for a Sustainable Economic Evolution

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Since its introduction, blockchain technology has been revered, ridiculed, dismissed, embraced, and presently has become too large to ignore, witnessing exponential growth. The obvious indicator of this growth is that research revolving around blockchain technology has already raised competition in the form of directed acyclic graphs and hashgraph, all of which fall under the umbrella of distributed ledger technology (DLT). Segueing on the back of visibly positive effects of competition, we arrive at the essence of our paper. We show that the current competition regimes around the world are inefficient at promoting and maintaining competition around the world, dominated by the behemoth technology enterprises that have successfully monopolized and monetized data, which is indubitably, one of the most important assets in today's digital age. Data gathered from users fuels the algorithms, machine learning, and artificial intelligence programs employed by these tech giants, which further entrenches their monopolistic hold over cyberspace. Blockchain and DLTs, just like any other technology, pose new threats to the competition law regimes, while also allowing the authorities to utilize the technology themselves to explore new horizons involving smart contracts, Decentralized Autonomous Organizations (DAOs), Web 3.0, and enforce competition more effectively. In our paper, we briefly illustrate the challenges presented before the competition authorities by the assimilation of blockchain in the existing establishments, and how the competition authorities can themselves collude with blockchain stakeholders to take a holistic approach and establish a symbiotic relationship, which ensures that both, survive, prosper, and enhance consumer welfare.

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INTRODUCTION

Just as the technology of printing altered and reduced the power of medieval guilds and the social power structure, so too will cryptologic methods fundamentally alter the nature of corporations and government interference in economic transactions.

Timothy C. May, the Crypto Anarchist Manifesto

The relationship between law and technology has always been uncomfortable yet inevitable. Plainly understood, the law seeks to define a set of principles for governing human behavior in society while technology is applied science which constantly redefines the parameters of human behavior and society. In tune with contemporary scientific parlance, it would not be a stretch to assert that law represents *order* while technology represents *chaos*. Ancient beliefs exploring the

relationship between order and chaos are now being re-explored under a new branch of science known as *Complexity* (Sardar and Abrams, 2008). The (questionable) order attained by law based on the traditionally centralized institutions is once again threatened by a chaotic new technology known as blockchain.

Throughout the epochs of history, one finds that every century is marked by some scientific development that completely alters the way we perceive, think, and behave, as a society. At the heart of many such events, have been a handful of scientists, thinkers, philosophers, and inventors who challenged the *status quo* propounded radical theories and authored manuscripts that were considered either blasphemous or treasonous at their time, but which undeniably, altered the course of human civilization. Johannes Gutenberg, Galileo Galilei, René Descartes, Leonardo da Vinci, Adam Smith, Auguste Comte, Charles Darwin, Sir Isaac Newton, Francis Bacon, Karl Marx, Charles Babbage, Marie Curie, Albert Einstein, Alan Turing, John McCarthy, and Sir Tim Berners-Lee are among some of the most prolific figures of the past few centuries, whose contributions to humanity has effectively shaped the modern world as we know it.

It would not be an exaggeration to say that we stand at the precipice of another such revolution and when (*not if*) such revolution is successful, the person or group of persons hiding behind the pseudonym Satoshi Nakamoto, might join the ranks of the above-mentioned stalwarts, for inventing the blockchain technology mentioned in the Bitcoin whitepaper released in the year 2008. Although the Bitcoin whitepaper itself does not mention the term blockchain, it did provide a working framework for the blockchain technology by introducing the Bitcoin blockchain which fuels the bitcoin cryptocurrency.

The search for solutions to the existing problems of the Internet, such as security, privacy and scalability has been going parallelly with its expansion since the early 1980s and mathematician David Chaum even introduced eCash in the year 1993 which was the first digital currency on the Internet; but the solutions just couldn't gain traction and mass adoption. The ingenuity of the Bitcoin protocol is that it appeared to be a panacea to all the problems which were obstructing the further evolution of the Internet.

There is no universally accepted definition of blockchain (yet). Different groups of people provide different definitions based on their understanding and application, but simply said, a blockchain is a distributed, decentralized, immutable, digital database where blocks of data are cryptographically linked and digitally signed (Saurabh and Saxena, 2020). This definition is also subject to modification based on the type of blockchain and the consensus mechanism used. Blockchains can also be broadly classified under the umbrella of distributed ledger technology (DLT), which also includes direct acyclic graph (DAG) and hashgraph.

Blockchain technology is not an unexplored frontier anymore. Blockchain technology is at the forefront of green computing (Saini and Khari, 2022), helps better map the neural networks (Dayal, Chawla and Khari, 2022), secure personal health records (Panwar et al., 2022), and together with Internet-of-Things (IoT) based devices (Nigam et al., 2022), hopes to transfigure the Indian agriculture (Sugandh et al., 2022). The transformative potential of

a foundational technology such as blockchain cannot be overstated (Saini, 2021). While offering numerous new possibilities, blockchain technology also poses some novel challenges in its practical application which need urgent attention by researchers.

This research paper does not discuss the technical aspects of blockchain or other DLTs but rather focuses on the legal regulation of the technology, specifically, regulation through competition laws. It might appear preposterous to some that competition law has any role in regulating blockchain, but such suspicion is easily dismissed when one begins to appreciate the similarities in the goals of both competition law and blockchain. Once the similarities between the two are eminent, we begin to explore how they can mutually assist each other in attaining their respective goals.

Research Objective

This research paper seeks to explore the interface of blockchain technology and competition laws which is comparatively underappreciated among blockchain stakeholders.

Research Methodology

This research is based on qualitative analyzes of the recent studies dealing with competition laws and blockchain technology. This is a doctrinal research paper that deliberates upon the problems faced by competition law enforcers due to blockchain technology and possible remedies.

This research paper begins by briefly introducing the history of blockchain technology and the interaction of law and technology in general. The second section of the paper probes the possible interactions between blockchain technology and competition laws. The third section of the paper deals with the competitive advantages of blockchain technology. The fourth section of the paper inspects the interrelationship between competition law and blockchain technology and its legal dimensions. The research concludes with some suggestions for both competition law and blockchain technology stakeholders that would help them cooperate for mutual prosperity.

BLOCKCHAIN AND COMPETITION LAW: A MARRIAGE OF CONVENIENCE

Cyberspace by design has always been elusive for law and policymakers. The first challenge faced by law in regulating cyberspace arose regarding jurisdiction. Law has traditionally been enforced on a specified physical territory, inhabited by a populace of people who subject themselves to the government which makes and enforces the law. Cyberspace is not subject to any territorial borders and hence, does not fall under any single legal jurisdiction. Cyberspace shall either abide by all the laws in all of the lands or none of them. The cyberspace itself is quite apprehensive about its regulation by law which was perhaps best illustrated by the online manifesto titled *A Declaration of the Independence of Cyberspace*, which ordained that the cyberspace is the new home of the mind where governments of the past are unwelcome and have no moral rights nor any effective means of

enforcing their laws (Barlow, 1996). Over time, we have come to realize that cyberspace cannot be left to itself, depending on its self-regulation by the users. The current global economy is considerably dependent on cyberspace, with the digital economy ushering in a new age of prosperity. This has been possible when governments realized that regulating cyberspace is only possible if they utilize the tools offered by cyberspace itself.

Blockchain technology along with other DLTs share a common goal with competition law. Both of them, seek to achieve decentralization in their respective fields (Geradin, 2009). Blockchain offers the opportunity to build a decentralized global network (Calcaterra and Kaal, 2021) while competition law seeks to ensure that the forces of competition remain unjeopardized in the free-market economy.

Blockchain has provided us with a way to manufacture *trust* without relying on any third party. The blockchain protocols are usually immutable and all transactions are time-stamped. This enables the parties using the blockchain to trust the integrity of the network without relying on any third party or centralized authority. This ingenuity offered by blockchain is the hallmark of its exponentially transformative capabilities. The decentralization offered by blockchains is only possible because of the trust it generates in the protocol's algorithm.

Competition law on the other hand is in a precarious position right now. The global economy has been steadily transitioning into cyberspace and the recent COVID-19 induced global lockdown protocols have further exacerbated this phenomenon. The global economy is not representative of the free-market ideology which generally permeates the political narratives. The current global economy is best described as a capitalist construct which resembles an oligopoly. Competition laws exist, but their applications in the economic markets for enhancing consumer welfare are unimpressive.

Data has become the most valuable resource in the world (World Development Report, 2021). The largest corporations and enterprises in the world are those who gather an exorbitant amount of data from their users, offering most of their services for free to keep the users hooked on their platforms. These enterprises also happen to have the most advanced artificial intelligence (AI) algorithms at their disposal. For this paper, we understand AI to be an umbrella term and define it as a range of software-based technologies that encompass machine learning, logic and knowledge-based systems, and statistical approaches, that can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with (European Parliamentary Research Service, 2022). AI programs get better and stronger based on the amount of data that is fed to them. These programs analyze the data to identify and predict patterns of behavior which are then utilized by the companies to make their platforms more appealing and addictive to the users so that they keep using them for larger amounts of time and keep generating more data (Pasquale, 2019). This feedback loop coupled with the network effects of today's platforms enables the enterprises

owning them to exercise an unprecedented monopoly over cyberspace (Bamberger and Lobel, 2017).

Competition laws have become ineffective in reigning in these monopolistic enterprises dominating cyberspace. After all, these enterprises were able to achieve their currently gargantuan proportions despite the existence of stringent competition laws. Despite the laws, these enterprises continue to indulge in blatant anti-competitive conduct and exclusionary practices and get away with it (Witt, 2022). The fines imposed on them while exorbitant, are simply no more than a slap on their wrist considering the revenue they generate by indulging in their anti-competitive conduct. The fines do not act as deterrents, they just form a part of their capital investment, so to speak. The institutional, procedural, and cultural elements of competition laws correspond with the boundaries of competition in the digital economy and need to be revisited (Petit, 2021).

While it may appear that competition laws have lost all control over the digital economy, blockchain offers a better alternative to the current cyberspace and thus, affords the competition authorities with an opportunity to formulate laws and policies that consider the intricacies of the technology and incorporate it to increase their effectiveness.

REINFORCING THE COMPETITIVE ADVANTAGE OF BLOCKCHAIN

Blockchain offers several promising opportunities for competition and competition policy that agencies will want to investigate. However, in terms of competition law, the concerns are the same as they are in traditional markets. As a result, agencies will need to continue to apply their harm theories while focusing on rivalry, substitutability, and control of competing products (Pike and Capobianco, 2019).

Blockchain offers trust without relying on any third party to provide the trust. In the context of enterprises, trust refers to the role of trust in trust accountability systems. The normative basis for measurement and assessment is a result of trust in accountability systems. Competition among such trust accountability systems and the standards by which trust is evaluated results in polycentric transnational corporate accountability and trustworthiness measurement regimes that simultaneously increase and diminish company trustworthiness (Backer, 2021).

Competition law enforcement is complicated in digital economy markets. To facilitate exchange between members on both sides of the market, a platform requires a critical mass of participation by all its users (Hovenkamp, 2018). To do this, it may be necessary to employ some form of restraint on the markets which is not what we see in the current state of the monopolized digital economy. And to increase the effectiveness of the platform itself, blockchain offers its solutions.

United American vs. Bitmain

The process of verifying and validating the operations on a blockchain network is known as its consensus mechanism

(Nazzini, 2019). Different blockchain protocols have different consensus mechanisms, such as Proof of Work, Proof of Stake, Proof of Service, Proof of Authority, Proof of Identity, Proof of Capacity, Delegated Proof of Stake, Proof of Elapsed Time and many others. These mechanisms are in place depending on the nature and application of the blockchain, and also to sustain the decentralized nature of the network. But a small technicality complicates matters. These consensus mechanisms are more effective if the node validators pool their resources (computing power) and hence, they get better rewards (incentive for lending their computing power). This leads to the formation of cartels among the node validators, which is an offence under competition law. To illustrate the peril of this occurrence, we rely on the case of *United American vs. Bitmain*.

United American vs. Bitmain has the unfortunate distinction of being the first competition law case involving cryptocurrencies. To summarize the facts of the case, Bitmain had a 75–80 percent market share in ASIC (Application Specific Integrated Circuits, computers optimized for the specific process of mining cryptocurrencies) manufacturing power, as well as a 60 percent control over global hashing (mining) power. During a scheduled software update in November 2018 for the Bitcoin Cash (BCH) blockchain network, there arose a difference between the choice of update between Bitcoin ABC 0.18.4 and Bitcoin SV 0.1.0 and the dispute was decided to be resolved by following the *Nakamoto Consensus* (miners using their computing power to vote for their choice of the software update and the option with the most votes would be implemented) (Nakamoto, 2008). Bitmain colluded with miners from the Bitcoin (BTC) main servers and hired them to come and hijack the voting process by using their hashing power. This act increased the hashing power of Bitmain miners by over 4,000%. This in turn manipulated the democratic voting process and allowed Bitcoin ABC to be implemented in the Bitcoin Cash blockchain network unfairly as before the hostile takeover by the rented miners, the native miners on Bitcoin Cash had voted in favor of the Bitcoin SV update with a 70% majority. The case for antitrust violation was filed by United American who is also a player in the cryptocurrency economy with its operations in mining, crypto-exchange, cryptocurrency development etc., in the Southern District Court of Florida, United States (Yawar and Shaw, 2022). The case was eventually dismissed due to the lack of factual evidence, and Bitmain got away with its anti-competitive conduct.

Although the case of *United American vs. Bitmain* falls in the realm of cryptocurrencies, that fact does not diminish the possibility of any such instance occurring on any other blockchain network. Granted, the consensus mechanisms keep changing and evolving on the back of radical innovations in the field of blockchain, which does not signify that there can be no such activities in the future (Østbye, 2017). Monopolies happen because controlling the resources of a given market area is immensely profitable for the

party enjoying the monopoly, which comes at the expense of the consumers and competitors.

Innovation Through Competition in Blockchain

Blockchain, and its derivative and associated technologies, such as Distributed Ledger Technology (DLT), Decentralized Autonomous Organizations (DAO), Smart Contracts, Machine Learning (ML), Artificial Intelligence (AI), etc. have an undeniably huge impact on the future of society. No aspect of society is untouched by either law or technology nowadays, and as such, the interplay of blockchain with competition laws presents a novel and necessary research area. The currently oligopolistic and centralized state of the digital economy will soon be transformed due to the advent of blockchain, and this is a crucial opportunity for effective competition law enforcement in cyberspace.

Cyberspace is a realm where the law has a precarious foothold. Making and enforcing laws is a slow and cumbersome process while cyberspace is a chaotic and exponentially growing dimension. Naturally, the law would struggle to keep up with it. But the lawmakers need to modify their approach if they ever hope to catch up. Law cannot operate as a mechanism for controlling the players in cyberspace. This is because the trans-jurisdictional and territory-defying nature of cyberspace results in too many demands being placed on the players, such that they cannot comply with them all, even if they chose to, which would indubitably stifle innovation, and also because the governments do not have sufficient resources or mechanisms to enforce its mandates (Reed, 2012).

Distributed ledgers are one of the most promising foundational technologies to have the same potential impact as the Internet. At a time when trust in centralized power structures is dwindling, blockchain's "trustless trust" provides an appealing alternative. Further growth will be determined in part by technological advances, in part by adoption patterns, in part by business innovations built on distributed ledger platforms, and in part by the resolution of governance challenges to the blockchain's trust architecture. It is tempting to see law and regulation primarily as impediments to these processes, but that would be a mistake. Too much or too little law might suffocate or push the blockchain underground, but so could too little law (Werbach, 2018).

In terms of competition law, the anticipated transition from closed-centralized platforms to open-decentralized networks based on blockchain technology is as compelling, vital, and revolutionary as the Internet has been over the last decades. Today, antitrust authorities are concerned about a few large high-tech businesses that dominate the majority of digital markets through centralized platforms and databases. This economic paradigm is likely to alter soon, owing to decentralized networks based on blockchain technology rather than competition law interference (Massarotto, 2020).

The competitive advantages offered by blockchain technology secure the fact that innovation and research relating to them will keep on accelerating (Mohanty, 2019). The lawmakers simply need to take due care that they do not stifle this natural course of

blockchain technology by placing unnecessary constraints on it, while on the other hand, blockchain industry stakeholders also need to further explore these factors and engage in discourse relating to the laws and policies which are being envisioned all over the world regarding blockchain (Cavanagh, 2020). An ideal starting point for such dialogue would be competition law and policies.

THE INTERRELATIONSHIP BETWEEN COMPETITION LAW AND BLOCKCHAIN

Law evolves according to the needs of society. The advent of the information age, where information began to be exchanged at light speed on global networks, introduced the concept of *Lex Informatica*. The development of technical rules that reflect flexibility for information flows and maximises public policy alternatives while also allowing for the preservation of public-order ideals due to the capacity to integrate an immutable rule in system architecture became possible. These principles eventually alleviated a variety of issues that traditional legal systems confronted while governing the Information Society (Reidenberg, 1997).

The slow, seeping, steady, and collective shift among libertarians today towards neo-liberal and crypto-anarchist ideologies and beliefs has fuelled the cryptographical revolution which has led to the advent of blockchain. This cryptographical revolution has not been possible on the back of some flashy public protests or viral movement, but rather it is the fruit of the labors of computer scientists, mathematicians, economists, lawyers, and many others who kept looking for an alternate solution for beating the system by getting out of the system. And thus, we have moved from *Lex Informatica* to *Lex Cryptographia*. The *Lex Cryptographia* by design threatens the existing institutional framework, lawmaking and enforcement, and the modern society itself (Dimitropoulos, 2020). Law and policymakers should accept the fact that they need to integrate the desires of the people under their command and revisit their approach to the current social standards.

Blockchain application and integration may be in their nascent stages, but it has already started to gain traction with practical use cases. Blockchain networks are being used for the future of the internet (Adjovu, 2021), better environment compliance (Al-Qassim, Chen and Al-Sartawi, 2022), public procurement (Nin Sánchez, 2019), securities markets (Donald and Miraz, 2019), and even in the arts and creative industry (Whitaker, 2019). Competition is not simply a prominent force in the economic markets. In the animal kingdom, ‘survival of the fittest’ is nothing but the force of competition that makes animals compete with each other for survival (Darwin, 2021). Nobel Laureate Hayek famously remarked that competition is the natural force which seeks to minimize the exercise of the power of man over man (Hayek, 2006). Competition is also the force which drove countless minds into exerting their will and effort into building a technology that can transform the face of society as we know it.

Blockchains have already spurred a new branch of study in competition law scholarship which is called *Computational Antitrust* (Lim, 2021). Litigation involving blockchain networks has been rare, but not unheard of (Schrepel, 2020). Blockchain offers anonymity and pseudo-anonymity, which complicates law enforcement. Enterprises joining a blockchain network and using it to communicate with each other to indulge in anti-competitive conduct can do so without letting anyone else be aware, and also keep their identity hidden from each other (Svetiev, 2007). This would make competition law compliance difficult because a large number of enterprises are prosecuted under the competition laws. After all, one of the players engaging in cartelization or other anti-competitive conduct chooses to report the others to obtain leniency (in some cases, exemption) from the law. A blockchain based cartel would render this extremely difficult, if not impossible. Some scholars counter this fear by stating that the blockchain being immutable, also acts as a permanent record of the illegal activities of the cartel members and after being reported, the competition authorities can request access to the blockchain network and analyze the data available on it as irrefutable evidence (OECD, 2017).

Some people also assert that smart contracts and DAOs make it very easy to execute anti-competitive agreements. By design, they can be programmed once and then left to their devices, they can subtly but surely execute their algorithm to gain an unfair, anti-competitive advantage for their progenitors. To make things even more complicated, the terms when executed or programmed into a smart contract algorithm or DAO are often so rigid that even if they are detected, it might be impossible to stop their application (Sklaroff, 2017). At least that is what it appears for the time being. Innovation in this area is also progressing, which keeps the hope alive that a legally viable smart contract programming interface would be possible soon enough (Dwivedi et al., 2021).

Collusion on blockchains and collusions with the help of blockchains is also a vexing frontier for competition law scholars (Schrepel, 2019). Research exploring the various interactions of blockchain, DLT, DAO, AI, and machine learning (ML) etc. with competition laws is slowly populating the competition law scholarship (Schrepel, 2021). The common theme in all these speculative discourses is that they are all being considered by competition law scholars, academicians, and lawyers who are educating themselves with the nuances of blockchain technology, to prepare themselves for the occasion when the digital economy transitions into a blockchain-based economy, where they can better enforce the competition law and policies. Such efforts from blockchain industry stakeholders are few and far between, which does not bode well for the law and policymaking aspects of blockchain. Perhaps an AI can suggest some solutions? (GPT-3 (under the supervision of Thibault Schrepel), 2021).

CONCLUSION

The global economies have changed considerably. The world is now better seen as a global economy ruled by instantaneous

capital and service transfers, based on data and electronic signals. Modern, high technology firms are radically different from the traditional business models. Technological innovations continuously challenge the limits of traditional law and economic principles. Cyberspace is ruled by chaos and complexity, where anything can go viral and everything is forgotten in an instant. Technology is not only changing the legal or economic dimensions of society but also drastically influencing the way we act and behave.

The current cyberspace already resembles some dystopian forebodings. Freedom of speech is regulated by the media houses, user data is collected and sold indiscriminately, the big technological giants gobble up any new startups or agencies that pose even a sliver of threat to them (Witt, 2022), and information is manipulated to influence democratic elections, and the users stay hooked to the platforms as if addicted to an abusive drug.

Blockchain offers an opportunity to remedy all the shortcomings of cyberspace and reorganize it while keeping the consumers' interest at the forefront. Users do not need to trust the enterprise or any third party. They simply need to trust the integrity of the algorithm, which stores their information. Users can be the owners of their assets, i.e., their data, and share them according to their own needs. They can even share data without disclosing the information contained in the data, verifying their identity with what is known as zero-knowledge proof. And this is just the beginning, the possibilities are limitless.

Law, policymaking, and enforcement are difficult in and of themselves in cyberspace, and the advent of blockchain has upped the ante. But the law and policymakers should not be intimidated by this, rather rejoice in the opportunity to rebuild better cyberspace where they can perform their duties and enhance consumer welfare in an ideal manner.

Similarly, blockchain industry stakeholders need to shed their apprehension about the law. They should not look at the law as a hostile entity which seeks to control them. But they should understand that law simply regulates human behavior. Law seeks to make cyberspace a better place for all the people

participating in it. So far, the law has not convincingly fulfilled this responsibility. But with the help of blockchain industry stakeholders, the law and policymakers can gain a better understanding and broaden their perspective. A better understanding of blockchain would enable the law and policymakers to use blockchain itself for governance and enforcement activities.

Finally, blockchain industry stakeholders and competition law authorities around the world should engage in a mutual discourse which would prompt further inter-disciplinary research that enables them both to achieve their respective goals in harmony.

Blockchain technology has not completely matured yet and has still managed to touch virtually every aspect of society. Further research and practical application, aided by proper legal and regulatory framework would induce an unprecedented change in the global economic, administrative and regulatory spheres.

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