States' Responses to Blockchain Technology and Cryptocurrencies

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Abstract

This thesis examines the responses of diverse states and political systems to cryptocurrencies and blockchain technology. It also aims to understand the underlying factors. The thesis is positioned within the realms of political economy and comparative politics and seeks to understand how different political systems, including democratic and authoritarian regimes, respond to technology in general and blockchain specifically. Through a mixed-methods approach, combining quantitative and qualitative analyses, this study provides insights into states' orientations and the reasons behind them. Contrary to the hypothesis that cryptocurrencies and blockchains are threats to states, the research refutes this notion with 99% confidence intervals based on a comprehensive study of 87 countries. It reveals a moderate positive correlation between a state's level of democracy and its adoption of blockchain technology and cryptocurrencies. However, caution is warranted as authoritarian countries have found ways to utilize this technology for control. Additionally, bureaucratic challenges and political instability place democratic states at a disadvantage in the broader technological race. Economic power positively influences a state's ability to introduce its Central Bank Digital Currencies (CBDC), while economically struggling countries make progress in issuing CBDCs to address their challenges. The use of cryptocurrencies in the Russia-Ukraine conflict indicates the need for further study on their potential role in conflicts. The lack of international efforts to legalize cryptocurrencies reduces states' regulatory influence. This thesis culminates by generating hypotheses for future research and holds implications for investors, states, and international entities.

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Introduction

Currencies are a vital aspect of state sovereignty and they allow nations to regulate economic relationships based on their specific needs (Cohen 2013; Strange 1971). However, the emergence of cryptocurrencies and blockchain technology has introduced a disruptive paradigm, where non-state actors issue decentralized forms of money (Spithoven 2019; Noam 2019). This thesis explores government responses to this technology and the factors shaping their actions.

At its core, a blockchain is a decentralized ledger of transactions maintained by a network of computers or smartphones known as nodes (Andolfatto 2018, p.86-88). Cryptocurrencies, recorded on the blockchain, resist counterfeiting and double spending (Franken 2022). Unlike fiat currencies, cryptocurrencies are typically not issued by centralized authorities, seemingly immune to government interference.

The emergence of cryptocurrencies and blockchain technology challenges the established structure, operating outside state authority and facilitating illicit activities (Navarro 2019). However, some governments view this technology as an opportunity and explore the introduction of Central Bank Digital Currencies (CBDCs), leveraging blockchain's benefits (Bordo & Levin 2017). CBDCs can enhance monetary policies and provide greater control over cash flows and liquidity (Eswar 2021). Thus, what initially seemed like a challenge to government authority may become a powerful tool for the state.

This research aims to address the gap in the existing literature regarding how different political systems and states respond to blockchain technology and cryptocurrencies. In other words, the research asks the following question *How do diverse states and political systems react and handle cryptocurrencies and blockchain technology? What factors underpin the various responses of states to this technology?* To my knowledge, no other research has yet

tackled this issue. The significance of this research lies in challenging the libertarian discourse that portrays these technologies as anti-state tools (Atzori 2017) and exploring the factors that shape governments' reactions. The potential of blockchain technology to operate independently from state oversight and its ability to enhance direct democracy further adds to the importance of studying states' responses to this technology. While it might be expected that states would resist adopting blockchain technology, the efforts by authoritarian regimes like Saudi Arabia and China to develop it raise doubts about this assumption, emphasizing the need to examine the relationship between a state's political character and its approach to blockchain technology.

Understanding the influence of economic factors on states' responses to blockchain technology is also crucial and has been overlooked in the literature. Therefore, this research seeks to comprehensively examine how diverse states and political systems handle cryptocurrencies and blockchain technology. By addressing descriptive and causal inferences, this study holds relevance for nations, investors, and international entities. It enables investors to make strategic decisions based on countries' tendencies towards blockchain technology and provides insights for nations interested in adopting this technology. Additionally, states can learn from each other how to benefit from this technology and help democratic institutions respond effectively to the potential exploitation of blockchain by authoritarian regimes.

To achieve a comprehensive understanding, a mixed methodology combining quantitative and qualitative approaches was employed. The utilization of such a method in the blockchain and cryptocurrency literature is novel, underscoring the significance of this research. The research tested the hypothesis that states consider cryptocurrencies and blockchain as a threat and explored potential correlations between countries' stances on cryptocurrencies and their democratic attributes, as well as the relationship between a country's economic status and its progress in developing a CBDC. The study also conducted detailed analyses of the following case studies to investigate the application of blockchain technology

and to explore the causes behind states' response towards blockchain and cryptocurrencies: the US, Costa Rica, India, China, Russia, Ukraine, Venezuela, and El Salvador.

The research findings refute the prevailing perception that cryptocurrencies and blockchain are inherently threatening to states. Approximately 80% of states have enacted some form of legalization on cryptocurrencies, and 58% are in the advanced stages of introducing their own CBDCs. While a weak positive correlation exists between a country's democratic status and its openness towards cryptocurrencies, authoritarian regimes also show interest in cryptocurrencies to counter the influence of the US dollar and solve economic hardship. Moreover, a moderate positive correlation is observed between a country's GDP and its progress in developing a CBDC. However, economically less developed countries also demonstrate an interest in blockchain technology to address financial challenges.

States' policies on cryptocurrencies cannot be attributed to a singular theory, as each case requires a nuanced understanding based on its unique political, economic, and security circumstances. China's approach focuses on public-level blockchain technologies while prohibiting private-level cryptocurrencies. On the other hand, the policies of the US and Costa Rica are comparatively sluggish and subject to change due to their democratic systems and bureaucracy.

Some of the examined countries, such as Russia, Ukraine, India, Venezuela, and El Salvador, employ cryptocurrencies for diverse purposes that align with their political ideologies, address economic challenges or sanctions, navigate legal complexities, pursue international objectives, and consider the level of cryptocurrency adoption among their citizens.

The research transitions from testing hypotheses to proposing new hypotheses based on the findings. Factors such as economic challenges (i.e., inflation, low foreign investment and

high debt), political crises, cryptocurrency adoption, governance systems, legislative mechanisms, and bureaucratic structures emerge as influential in shaping states' responses to blockchain technology. Future research should delve into these aspects to gain a deeper understanding of the subject. The thesis also highlights the necessity of constructing an Econometrics model in the future to conduct a multi-linear regression analysis. This approach allows for an examination of the impact of each factor on states' responses to cryptocurrencies and blockchain. Moreover, an in-depth study of laws, regulations, and the decision-making process is essential for a comprehensive analysis.

This thesis is structured as follows: First, a theoretical background: which explains the most central concepts of the research, a literature review of the most prominent schools of thought (SoT), especially in political economy and comparative politics, then moves on to formulate the hypothesis and how I came up with my research question. Second, the methodology: explains the mixed quantitative and qualitative approach. Third, the quantitative results. Fourth, case studies and a general comparison between them.

Theoretical Background

This section gives a framework for understanding blockchain, cryptocurrency, political systems, and economic power. It examines the relationship between the state and the market concerning cryptocurrencies. The discussion focuses on technology's impact on the role of the state and individual autonomy, considering the contrasting approaches of statism and libertarianism. The theoretical background aims to position the thesis within the realms of political economy literature and comparative politics. It acknowledges that the creation of cryptocurrencies and blockchain technology influences and alters the relationship between the state and the market. Furthermore, it seeks to understand how different political systems, including democratic and authoritarian regimes, respond to technology in general and blockchain specifically. Lastly, this section explores prominent debates surrounding blockchain technology.

Definitions & Operationalization

Blockchain, Cryptocurrency and Smart Contracts

Blockchains are the primary technology that enables distributed ledgers to function. Transactions on the ledger are secured and verified by the "nodes" of the distributed network (in this case, computers). The decentralized nature of blockchain is its defining feature, where the transactions are disseminated across all nodes that participate in the network and not centralized within a primary server as in other traditional data networks. Another characteristic of blockchain is its transparency, where all transactions can be viewed by accessing a node (or running your own) or using a blockchain browser (Ghiro et al 2021). Additionally, these networks are frequently characterized as immutable, in that the stored transaction is exceptionally resistant to tampering, which underlies its utility in cryptocurrency. In its structure, a blockchain organizes transactions into linked blocks. As described by Hayes (2022):

> Blocks have certain storage capacities and, when filled, are closed and linked to the previously filled block, forming a chain of data known as the blockchain. All new information that follows that freshly added block is compiled into a newly formed block that will then also be added to the chain once filled.

Upon adding a new block to the chain, the node responsible for the action receives as a reward cryptocurrency, a form of digital or virtual currency secured through cryptography which is resistant to counterfeits or "double-spends" – i.e., spending the same coin twice simultaneously (Frankenfeld 2022). Cryptocurrencies are generally not issued by any central authority, making them resistant to government interference (ibid). These aspects thus make cryptocurrencies an attractive investment for individuals who wish to circumvent (or even undermine) traditional intermediaries such as the state or central bank.

The lifeblood of many blockchain networks is circulated by "smart contracts". Smart contracts are computer programs that self-execute when predetermined conditions encoded onto a blockchain are met. This feature assures participants that the outcome cannot be tampered with, increasing trust in the system. Smart contracts exhibit high-speed functionality, instill customer confidence, and enhance security. The application of smart contracts is widespread, and they can be utilized in various domains such as financial transfers, electronic voting, supply chain management, ownership transfers, and healthcare (Investopedia, 2023).

Central Bank Digital Currencies (CBDCs)

Some states see great promise in this new technology and have plans to create their own cryptocurrencies or even entire networks. One prominent example of this is CBDCs, which confer unique benefits to states. CBDCs are effectively centralized cryptocurrencies that are pegged to the respective government fiat currency and can be controlled by the state (Bordo & Levin 2017). This means that the government can control who is able to transact and knows what the true state of the ledger is at any point in time, which means that the states

would get higher authority over the individual (ibid). This allows the government to create a form of programmable money, which could take the form of a stimulus check that had to be spent within a certain timeframe, specific situation or on specific goods to combat recession (ibid). These CBDCs could help the state manage its monetary policy and monitor the money supply since states would know precisely, and for the first time, the money in circulation and act based on that. Additionally, CBDCs could allow central banks to introduce a negative interest rate to combat recessions, which could not be implemented with the current financial system since individuals and investors might prefer to keep their money out of banks to avoid the negative interest rate. Moreover, it could strengthen the state's relationship with the individual by improving the transparency of financial transactions and reducing bureaucratic overhead while combating tax evasion (Eswar 2021). A CBDC benefits from its backing from the central bank, while also capitalizing on transparency, speed of financial transactions, and low cost of blockchains (Walter et al 2017).

Political Systems and economic performance

The terms "the state," "the political system," and "the nature of the state" are used interchangeably to define state structures. Here, I must acknowledge that there is some nuance between these terms, but they were considered the same for the purposes of this research. Following the freedom-house dataset (2022), states can be classified into three patterns: democratic, partially democratic, and autocratic. For the case studies in this research, the USA and Costa Rica are classified as democratic, India, Ukraine and El Salvador are partially democratic, and China, Russia, and Venezuela are autocratic.

One topic of interest is the impact of a state's economic power on its attitude towards cryptocurrencies and blockchain. Usually, the higher the state' GDP, the higher the state's ability to adopt and benefit from technology. For this research, economic power is

synonymous with a country's GDP ranking. Countries in the top 20 are categorized as high-income or high-middle-income countries (Developed countries) (IMF 2022). This includes China, the US, India and Russia. On the other hand, countries with medium or weak economic powers fall under a low middle-income framework, less developed countries (ibid).

Markets and the State: Three Schools of Thoughts

The balance of power between the state and the market has fluctuated over the past two centuries, with changes occurring during significant periods such as World War 2, the Industrial Revolution, and the Global Financial Crisis of 2008 (Linn 2016, p. 1). Such state-market relationships are central topics in political economic literature. The emergence of blockchain technology has reignited this debate, now centered around whether the development of cryptocurrencies will reduce state power and increase the power of the market and individual, or whether states remain crucial in managing the economy and upholding collective interests. This highlights the reinvigoration of the political economy discussion with the introduction of cryptocurrencies. This section presents three schools of thought (SoT) on the state-market relationship.

Inverse state-market relationship

This SoT echoes the tenets of neoliberalism, which posit that the growth of markets necessitates privatization, limited state intervention, and the shrinking of the state's scope and influence (Mudge 2008). The neoliberal claim is that delegating power among diverse stakeholders will engender an optimal allocation of resources and a balanced system, obviating the need for a cumbersome state. Consequently, they claim, expanding individual and market autonomy contributes to advancing democracy, as espoused by prominent neoliberal intellectuals such as Milton Friedman (Linn 2016, p. 2).

The present theory contends that the free market is an efficient mechanism for regulation as it engenders competition, innovation, and cost minimization. The process of economic growth further requires compliance with market-oriented policies as aligned with the Washington consensus and its neoliberal principles (Rodrik, 2018). In contrast, state intervention allegedly engenders inefficient resource allocation due to a range of issues including corruption, bureaucratic red tape, rent-seeking, and the politicization of the economy (Moreira et al 2016; Stiglitz 2016, p. 6; Lohmann 2003). This is because political decisions are partly influenced by electoral interests, causing states to prioritize the interests of specific groups over the general welfare (Pryor 2017, p. 91; Lohmann 2003). Even if such decisions are made with the best intentions, the state still represents a single point of failure, raising concerns about state intervention's effectiveness.

Advocates of this ideology draw attention to free-market principles, capitalist nations' economic progress, and comparative advantages that accrue from the growth of capitalism (Porter & Kramer 2018). They claim this promotes specialization and exchange while improving communication (Kotz 2002, p. 64, 65). Such claims are further bolstered by the global reduction in poverty and increase in purchasing power that has occurred with the expansion of capitalism and the market, thus affirming the contributions of neoliberalism to the development of democracy and political liberty (Megginson 2001, p. 321, 328). With particular regard to cryptocurrencies, these digital assets embody the liberated capital and private money concept that Hayek envisioned (Howard 1977). This implies that democratic countries would be more inclined to adopt this technology with a deregulatory approach. Additionally, the growth of cryptocurrencies and blockchain would potentially undermine the role and influence of states.

Positive state-market relationship

This SoT stands in direct contrast to neoliberal ideology, asserting that as the market grows, the state's involvement not only accompanies it but also takes a leading role. This is because the expanding economy brings forth new obligations and instances of market failure that necessitate government intervention. Such claims are proffered by Anthony Giddens (1987), who emphasizes the state's role in issuing and enforcing laws, which are essential for the market to function effectively. He argues that the state's coercive power plays a pivotal part in ensuring the success and efficiency of the market (Giddens 1987, p. 148, 151).

Additionally, Giddens highlights the state's role in revenue collection through taxes to fund its operations and in providing public goods. These public goods have the potential to stimulate the economy by enhancing individuals' purchasing power, akin to the Keynesian multiplier effect, particularly during a recession (ibid, p. 158, 161). He further notes the state's role in managing monetary policy by manipulating interest rates and money supply (ibid pp. 158-159). Finally, Giddens argues that any significant economic expansion necessitates state investment in infrastructure, transportation, and communications, which the market cannot effectively provide (Dicken 2015, p. 174-175).

This SoT supports state intervention in cases of "market failure," such as imperfect competition and coordination failure, as explained by Stiglitz (2016, p. 6). This highlights the state's role in addressing positive or negative externalities due to the market's limited ability to do so through its price mechanism. Akerlof (1995) also points out that information asymmetry poses risks, including lower product quality and market inefficiencies, further underscoring the importance of state involvement in such disparities.

Proponents of this ideology point to the 2008 global economic crisis as evidence that the market and neoliberal ideals are illusory. They emphasize the state's crucial role in

safeguarding the market and capital from collapse. Advocates also highlight the state's effective management of the COVID-19 pandemic, which mitigated its spread and economic impact. Additionally, this perspective underscores the necessity of state intervention in addressing the global climate crisis, as market mechanisms alone are insufficient.

We could now connect this SoT to the blockchain space and the role of the state there. A state's role there would include safeguarding users from price volatility, the risk of password loss, and technical vulnerabilities like hacking or system malfunctions. The state also plays a crucial part in combating illegal and illicit use cases of cryptocurrencies, involving individuals, terrorist organizations, and countries like Russia and Iran.

It is worth noting that, according to this SoT, as blockchain and cryptocurrencies continue to evolve, the state's involvement is likely to grow. This is because the state may benefit from these technologies, such as through the development and implementation of CBDCs or other innovative solutions.

Cyclical/non-linear state-market relationship

The interplay between expanding markets and expanding states is explored in Karl Polanyi's work "The Great Transformation" (1944). Polanyi's theory of the "double movement" describes this in two stages. The first involves the promotion of liberalization and free market ideology. Subsequently, the state is compelled to intervene to safeguard society from the adverse effects of market liberalization.

In Pereira's 1993 work, a cyclical perspective on the state-market relationship is presented, echoing elements of Polanyi's theory. Pereira rejects the notion of a fixed relationship between the state and the market. Instead, he observes that during an expansionary phase, the state's excessive growth distorts the market, which is then rectified through

privatization. Conversely, expansive market growth during the state's deflationary phase can result in a contraction of the state. Pereira further argues that the relationship between the market and the state is in constant flux, lacking a definitive ideal degree of interaction. Ultimately, Pereira challenges the neoliberal hypothesis of a "minimal state."

Drawing on these theories, the development of CBDCs represents an example of the double movement. The state started to create its digital version in response to the rapid growth of cryptocurrencies and their associated market liberalization or expansion. This reflects the market restriction and state expansion phase of the double movement, as the state intervenes to mitigate the adverse effects of market liberalization.

Technology and the State: Statism and Libertarianism

The relationship between the state and technology has been extensively discussed in the literature, particularly within the field of comparative politics. Different perspectives exist regarding the impact of technology on state power, with some asserting that technology strengthens the state, while others argue that it empowers individuals and the market. Moreover, the comparative politics literature offers conflicting views on how different types of states respond to technology. Some argue that authoritarian regimes can leverage technology to enhance control over individuals, while others contend that democratic states provide a favorable environment for technological advancement.

The emergence of blockchain technology and cryptocurrencies has revitalized this debate, prompting further examination of the connection between the market and technology, as well as the relationship between the state and technology. By delving into the literature exploring these dynamics, we can develop a more comprehensive understanding of how blockchain technology intersects with the role of the state.

Libertarianism and Neoliberalism: Technology liberates individuals from state oppression

Schumpeter posited that competitive entrepreneurs play a crucial role in driving technological advancements (Sharipov 2015). This perspective aligns with the neoliberal viewpoint, which asserts that unrestricted market mechanisms foster significant technological progress (Bozeman 2000). Kaiser (1971, p. 801) supports this argument by emphasizing that direct individual involvement with technology facilitates the exploration of new opportunities and associated benefits. Proponents of this approach assert that the individual serves as the primary catalyst for technological development.

According to this perspective, technology serves as a means of individual emancipation and autonomy. Advocates highlight how social media platforms contribute to community mobilization, enhance individual awareness, and empower individuals beyond the confines of state authority and institutional boundaries. These platforms promote participatory democracy and freedom of expression (Habermas 2006).

The internet's resistance to state control exemplifies technology's liberating potential, fostering optimism, and bringing individuals closer to their utopian ideals. Lee (2006) notes the protective anonymity it provides, shielding users from state intervention. Social media, particularly Facebook, played a pivotal role in the Arab Spring movements, enabling protest organizations and documenting authoritarian violence (Rod et al. 2015). Technology also facilitates the inflow of influential information from Western countries, shaping activists' perspectives. Proponents argue that technology can replace inefficient state services, reducing bureaucratic burdens (Dunleavy 2017).

So-called “Cyberlibertarianism” opposes state interventions, viewing them as infringements on individual autonomy. Instead, the focus is on bolstering individuals' digital

protection. Pace (2020) highlights how cyberlibertarians caution against governments exploiting technology to enhance repression and surveillance, citing Saudi Arabia and China as examples (Baos 2006). This poses a threat to individual freedom, as autocratic regimes can exploit technology to manipulate public opinion and legitimize their rule through non-consensual monitoring of individual preferences (Gunitsky 2015).

Drawing upon this framework, it can be argued that the emergence of blockchain technology and cryptocurrencies may diminish state influence while promoting individual autonomy and market independence. This is particularly relevant due to the decentralized and anonymous nature of blockchain technology, and the privacy associated with cryptocurrencies. These technologies are seen as potentially fostering economic expansion and democratic development by operating outside the conventional regulatory scope of the state. Therefore, it is expected that countries will take a negative stance towards cryptocurrencies and work to ban them, just as it is expected that democratic countries will be more open, unlike totalitarian regimes that seek to control the individual and economic processes.

Statism: State intervention drives technology development for its own use

Proponents of statism argue that governments, driven by intense competition and resource constraints, possess an exceptional capacity for technology development and utilization to benefit society. Iranzo et al. (2008) illustrate this across both developed and developing countries, citing India's use of technology to enhance independence post-colonization. Statists further contend that the state serves as the primary catalyst for technological advancement, as education and knowledge required for such development are fostered through state involvement. Barneet et al. (1995) and Wolske et al. (2017) support this notion, acknowledging the state's role in diffusing technology through its institutions, including research and development efforts (Bozeman 2020).

In addition, new technology can be seen as increasing the state's role, from the internet to smartphones to blockchains. Maurizio explains that the emergence of a digital economy was dependent upon proactive states, and the US in particular. Many prominent applications can trace their lineage to state inventions. For instance, google maps and the internet would not be possible without the research efforts of the US government in GPS technology and, the predecessor to the internet, the Advanced Research Projects Agency Network (ARPANET) (Leca 2020). The state also plays an essential role in regulating social media by protecting privacy rights and preventing hate speech, as well as protecting users from hacking and electronic fraud (Hanna 2018, p. 2).

Drawing on this perspective, the states possess the capacity to manage and regulate cryptocurrencies while also recognizing the pressing necessity for government intervention to alleviate their detrimental impacts. Notably, the emergence of CBDCs illustrates how states can leverage technology to further their interests. Furthermore, the issuance of CBDCS entails a substantial expenditure, necessitating substantial economic and technological capacities, thereby conferring an advantageous position upon developed nations for the issuance of such currencies, in comparison to less developed ones.

Formulating the hypotheses

In general, there is a state of contradiction shown by the literature in defining the state's relationship with the market and the state's relationship with technology. This is very much true of the state's relationship to blockchain and cryptocurrency, knowing that literature is dominated by libertarians. Consequently, an anticipatory conjecture emerges wherein nations are poised to adopt a hostile stance towards cryptocurrencies, endeavoring to proscribe their usage. Simultaneously, it is anticipated that democratic states, in contrast to autocratic regimes, will demonstrate greater openness towards these digital assets. However, the state's

relationship with blockchain and cryptocurrencies has not been studied in depth, and the literature is satisfied with the hyped raised by the libertarians, which is what this research attempts to study.

This research aims to get descriptive and causal inferences, to know the general trend or states' approaches toward cryptocurrencies and blockchain on the one hand, and to understand the underlying reasons and factors behind states' policies on the other. The research asks the following question: *How do diverse states and political systems react and handle cryptocurrencies and blockchain technology? Do they confront, embrace, or redefine it to suit their interests? Are there any universal trends shared by all states in their approach to this technology? What factors underpin the various responses of states to this technology?*

The thesis contributes to our understanding of the relationship between the state and the market, as well as the relationship between the state and technology, specifically in the context of blockchain technology and cryptocurrencies. By examining the responses of different states to these innovations, insights can be gained into which school of thought, if any, can explain the current state-market relationship. From here, I come to my hypothesis:

> **Hypothesis**: On average, states consider cryptocurrencies to be an opportunity, as opposed to a threat.

In the face of illicit activities and fear of new technology, this hypothesis implies that states, in aggregate, would rather see blockchain as a beneficial tool. Additionally, this thesis examines correlations between democracy and cryptocurrency adoption. This is because democratic states may be more willing to adopt cryptocurrencies and blockchain since they are committed to free market principles and individual autonomy. Lastly, we look at the relationship between GDP and CBDC adoption, expecting those richer countries – with their

more plentiful economic resources and technological capabilities – to be more able to issue CBDCs.

Methodology

To address the research questions, a mixed quantitative and qualitative approach will be employed. The first step involves an examination of the legal trends in cryptocurrencies and blockchain technology across different countries. These trends can be broadly categorized into four legal methodologies: complete ban, partial ban, legalization of cryptocurrencies, and indeterminate regulations characterized by the absence of specific regulation[1]. This analysis aims to discern the general stance of countries towards cryptocurrencies and blockchain technology.

This data will contribute to understanding whether cryptocurrencies pose a perceived threat to states. Additionally, it will shed light on the reciprocal relationship between states and cryptocurrencies, whereby increased regulation by states may indicate a lack of perceived threat or a means of governing them in a less alarming manner. Therefore, the null hypothesis would be:

H0: 50% or more of the countries view cryptocurrencies and blockchain as a threat.

The chi-square test for the goodness of fit method will be utilized for this analysis, as it enables the examination of differences between two groups with categorical variables, specifically assessing whether the observed frequencies differ significantly from the expected frequencies, indicating whether the difference is due to chance. I rely on data from the Atlantic-council and free-man law.

A Pearson correlation analysis will examine the relationship between eighty-seven countries' inclination towards cryptocurrencies and their state's nature (democratic, partially democratic, or autocratic). Freedom-House data will be used due to its availability and

[1] The Atlantic Council provides a database of countries' laws related to cryptocurrencies. For more information, please see the following link: https://www.atlanticcouncil.org/programs/geoeconomics-center/cryptoregulationtracker/

comprehensiveness[2]. While the Freedom-House mechanism has faced criticism for its limitations in capturing variations among semi-democratic or defective democratic states (Merkel 2004), this study will rely on it as it primarily assesses the degree of democratic nature. The correlation to be tested is that democratic countries are more likely to embrace cryptocurrencies and blockchain technology. Freedom-House assigns scores from 0 to 100 to countries, indicating their level of democracy. Additionally, countries are categorized as Free (F), Partially Free (PF), or Non-Free (NF), with values assigned as F: 3, PF: 2, and NF: 1 for analytical purposes (Freedom-House 2023).

The study will differentiate between rich and poor countries, as economic factors can influence states' responses to blockchain technology. The research examines whether a country's economic capacity correlates with its ability to benefit from blockchain technology, particularly CBDCs. GDP, based on IMF data, will be used as an indicator of a country's wealth (IMF 2022), while data from the Atlantic-Council will gauge CBDC advancement. The Atlantic-Council ranks countries into seven levels with 1: No Interest 2: Cancelled 3: inactive 4: Research 5: Design 6: Pilot 7: Launched[3]. *Design*, *pilot*, and *launched* are considered positive indicators, and *research* is regarded as a negative indicator due to its uncertain outcomes. It is important to note that relying solely on legal frameworks may not capture a state's comprehensive stance, as they may prohibit private use while exploring public utilization of blockchain technology, as seen in China. CBDCs will be used as a proxy measure for public interest, while private cryptocurrencies will also be considered.

[2] For further information please visit the Freedom House website: https://freedomhouse.org/report/freedom-world.
[3] For more information on this data, please refer to the following link: https://www.atlanticcouncil.org/cbdctracker/.

Data from freedom-house, for 87 countries, (2022)[4], IMF (2022)[5], Atlantic-council (2022)[6] and Freeman-law[7] (2022) will first be imported an analyzed in Microsoft Excel. This choice is based on Excel's ease of use and ability to generate easily interpretable visualizations. Table (1) summarizes the hypothesis and the studied correlations:

Table 1. Research Hypothesis and Correlations

H0	Explanation 1	H1	Explanation 2
1. States consider cryptocurrencies a threat. 50% of the countries are anti-crypto, therefore they prefer to ban cryptocurrencies and show no interest in CBDC.	The more the states ban crypto currencies the more they consider it a threat	**States consider cryptocurrencies an opportunity.** 50% of the countries are pro-crypto, therefore they prefer to regulate part or all aspects of cryptocurrencies or show interest in CBDC.	The more they regulate cryptocurrency or the more they are advanced in CBDC the more consider it an option
Correlations			
2. Democracy increases cryptocurrency adoption	The more democratic a state is, the more they regulate cryptocurrency	**Authoritarianism increases cryptocurrency adoption**	The more autocratic a state is, the more they ban cryptocurrency
3. Higher GDP increases CBDC adoption	The more economic power the state has, the more they adopt blockchain and benefit from CBDC	**Lower GDP increases CBDC adoption**	The lower the economic power, the more they adopt and benefit from CBDC

[4] This data distinguishes between free, partially free and non-free countries with a scale ranging from (0-100). For further information please visit this link: https://freedomhouse.org/report/freedom-world

[5] This data indicates the countries GDPs and their ranking globally. For further information: Please visit this link: https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD

[6] This data describes the country's level of CBDC, ranging from (1 No interest, 2 Cancelled, 3 Inactive, 4 Research, 5 design, 6 Pilot & 7 Launched). For further information, please visit this link: https://www.atlanticcouncil.org/cbdctracker/
Additionally, Atlantic Council has dataset about the countries regulation towards cryptocurrencies, For further information, please visit this link: https://www.atlanticcouncil.org/programs/geoeconomics-center/cryptoregulationtracker/

[7] This dataset includes information about the states' regulations about cryptocurrencies. For further information please visit this link: https://freemanlaw.com/cryptocurrency/

For the qualitative analysis, I will examine eight cases according to two criteria: economic power (Developed or Less Developed country) and political nature (democratic, partly democratic, or autocratic). My research shall compare eight states from differing political systems, with each country or political bloc serving as a representative archetype, based on the aforementioned factors mainly. Case studies will allow me to explain the empirical results by delving into these cases to figure out the main reasons behind their policies and stance toward cryptocurrencies and blockchain.

In the case of authoritarian developed countries, two cases will be discussed: China, representing the archetype of developed authoritarian governments, and Russia, chosen due to its invasion of Ukraine, making it a unique case. The same applies to less-developed partially democratic countries in which both Ukraine and El Salvador will be studied. The case studies are utilized to provide a clearer understanding of each country's policies towards cryptocurrencies and complement the empirical findings. Additionally, the availability of data is a crucial consideration in conducting research, ensuring that the chosen case studies have sufficient data to support analysis and draw meaningful conclusions.

Additional factors have also been considered in the selection of these cases, such as unique mechanisms for dealing with cryptocurrencies. For instance, El Salvador stands out as the only country investing in Bitcoin and recognizing it as a legal tender. Furthermore, a state's international political impact and ideology are considered. Table (2) explains the different cases:

Table 2. Political and Economic Classification of Case Study Countries

		Political Systems		
		Democratic	Partially Democratic	Autocratic
Economic level	Rich developed	USA (1)	India (7)	China (2) Russia (11)
	Poor less developed or developing	Costa Rica (89)	El Salvador (108) Ukraine (59)	Venezuela (73)

Note: the number next to the country's name refers to its ranking in terms of GDP

To understand each state's position and approach towards blockchain technology, three factors are examined. Firstly, an analysis of detailed laws and regulations regarding cryptocurrencies and blockchain is conducted. This includes determining the legal relationship between cryptocurrency and the state and whether their laws encourage or criminalize its use. This analysis helps to comprehend the major policy adopted by each state.

Secondly, the focus is on the type of investment made by the states. Areas in which the states invest in blockchain technology and cryptocurrencies are explored, with particular attention given to CBDCs. Countries that actively seek to adopt CBDCs are considered more accepting of blockchain technology, given its significant impact on the economy, especially at the public level.

Thirdly, the size of investment in blockchain technology is assessed, considering both private and public sectors. The magnitude of investment indicates the level of impact and acceptance within the respective states. Additionally, the type of investor serves as an indicator of how the state engages with this technology. Governmental investment suggests a desire for control and adaptation according to the state's agenda, while significant private investment signifies a more neoliberal approach or a lack of state involvement.

Furthermore, the concerns expressed by each country regarding this technology are examined. These concerns may serve as obstacles to large-scale investment. The analysis

explores whether the states share common fears or if they have unique concerns that are specific to their existence and context.

In summary, my research aims to investigate the state response to blockchain technology and cryptocurrencies. The relationship between state policies and political nature, and the influence of GDP on the adoption of CBDCs will be examined. By understanding these factors, I seek to gain insights into how states perceive themselves when confronted with evolving technological landscapes. The hypothesis posits that despite the pressures and limitations imposed by cryptocurrencies and blockchain technology, states will adopt these technologies to enhance their monetary and fiscal policies, particularly through the implementation of CBDCs. However, each type of state may respond differently based on its political system and economic situation.

Empirical Data, Discussion and Findings

Descriptive Statistics

This study examines the policy landscape surrounding cryptocurrencies, CBDCs, and blockchain technology across 87 countries from various continents. Its objective is to provide a comprehensive overview of global trends and shed light on the regulatory stance adopted by different states. Countries were selected based on data availability, particularly legal information. Tables 3 & 4 summarize the descriptive statistics:

Table 3. Categorical Variables

Value	Count	%	Var	Count	%
Region			*CBDC Sentiment*		
Asia	25	28.7	Pro-CBDC	50	57.5
Europe	28	32.2	Anti-CBDC	37	42.5
Africa	14	16.1	*Crypto Legal Status*		
South America	9	10.4	Pro (legal or partial ban)	69	79.3
North America & Australia	11	12.6	Anti (complete ban or no reg)	18	20.7
CBDC Status			*Democracy Status*		
Lunched	3	3.45	Free	38	43.7
Pilot Phase	18	20.67	Partially Free	26	29.9
Design Phase	29	33.33	Non-Free	23	26.4
Research Phase	22	25.30	*Blockchain Sentiment*		
Inactive	7	8.05	Pro (pro-crypto or pro-CBDC)	74	85.06
Cancelled	1	1.15	Anti (anti-crypto & anti-CBDC)	13	14.94
No Interest	7	8.05	Observations	87	

Table 4. Quantitative Variables

	Sample	Mean	Median	Min	Max	SD
GDP Value	87	1126.105	348.076	8.158	3357	3357
GDP Ranking	87	52.43	43.5	1	150	37.25
Democracy Score	87	59.7	60	3	100	30.8
Ownership	87	4%	2.35%	0%	27.67%	1.534
Awareness	43	2.93	2.31	1.28	7.97	0.045

Analysis reveals that approximately 42% of countries have fully legalized cryptocurrencies, while only 16% have implemented a complete ban. Moreover, around 80%

of countries demonstrate a favorable legal framework by legalizing some or all aspects of cryptocurrencies, challenging the notion of inherent hostility towards cryptocurrencies. The absence of specific legislation is considered a negative indicator, indicating ongoing exploration and evaluation rather than rejection. This is done to increase the robustness of the research results.

We find a global acceptance and recognition of the potential benefits associated with cryptocurrencies. The study also incorporates data on CBDCs, revealing that approximately 58% of countries have progressed to advanced stages in the CBDC process, indicating commitment and engagement.

The dataset includes information on countries' GDP and democratic status. Approximately 43% of the sampled countries are classified as democratic, while approximately 26% are identified as autocratic. Most countries, comprising approximately 85% of the sample, demonstrate significant interest in cryptocurrencies, CBDCs, or both.

Inferential Statistics:

A Chi-Square Test of Independence to Determine the General States Stance towards Cryptocurrency

A chi-square test of independence was conducted to analyze the data, examining the association between a country's stance towards cryptocurrency and the null hypothesis. A chi-square test is a statistical tool that measures the deviation between expected and observed frequencies in categorical data. The equation for the chi-square test is as follows:

$$\chi 2 = \sum (O - E) 2/E \quad (1)$$

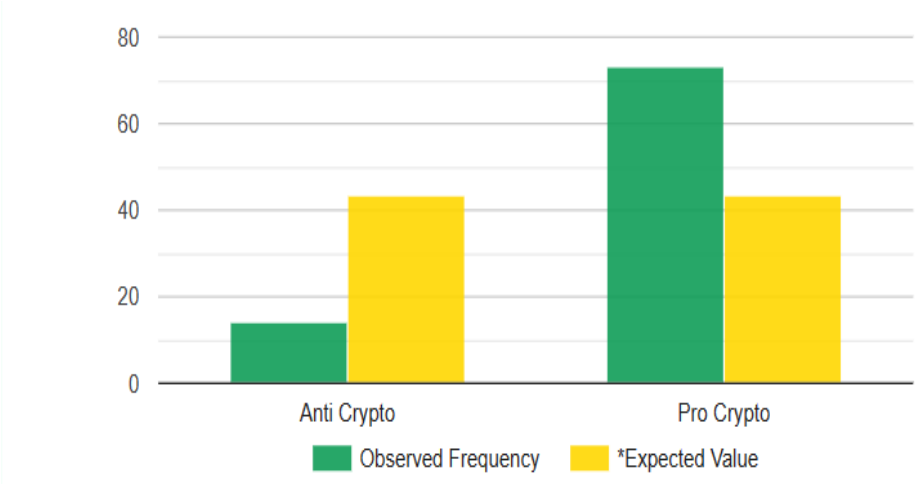
Here, $\chi 2$ is the chi-square value, O is the observed frequency, and E is the expected frequency. The chi-square test results indicate a statistically significant difference ($\chi 2$ (1) =

38.02, p < 0.01, 99% CI) between the observed distribution and the null hypothesis. The null hypothesis, that 50% or greater of the states consider cryptocurrencies a threat, is confidently rejected. Of the 87 countries, only 14 (16.1%) were classified as anti-crypto, while the remaining 73 (83.9%) were classified as pro-crypto. $P(Value) = 1 - P(x^2) \leq 38.02$. The critical Value is 6.635 and the chi-square value is much larger than it, therefore there is a significant difference between the observed and expected values and we can reject the H0 with 99% CI. The observed effect size phi is: $\varphi = \sqrt{\frac{x^2}{n}} = 0.678$. The phi effect is large. This indicates that the magnitude of the difference between the observed data and the expected data is large. The p-value equals 2.525e-10, ($p(x \leq \chi^2) = 1$). It means that the chance of a type I error (rejecting a correct H0) is small. The present study provides evidence that most countries are pro-crypto to some extent. The results of this study contribute to the ongoing discussion surrounding the global stance toward cryptocurrency and its potential as a mainstream financial asset. Table (5) summarizes the Chi-Square analysis, while figure (1) shows the difference between the expected and observed frequencies:

Table 5. Chi-Square Analysis of the Null Hypothesis

Variable	Value
Number of C^9, k	2
Sample Size, n	87
Chi Square Test Statistic, χ^2	38.02
Degrees of Freedom DF	1
Phi Effect, Φ	0.678161
P-Value	$2.525e^{-10}$

Figure 1. Chi-Square Goodness of Fit Test



Note: This figure compares the pro vs. anti crypto countries in comparison to their hypothesized status.

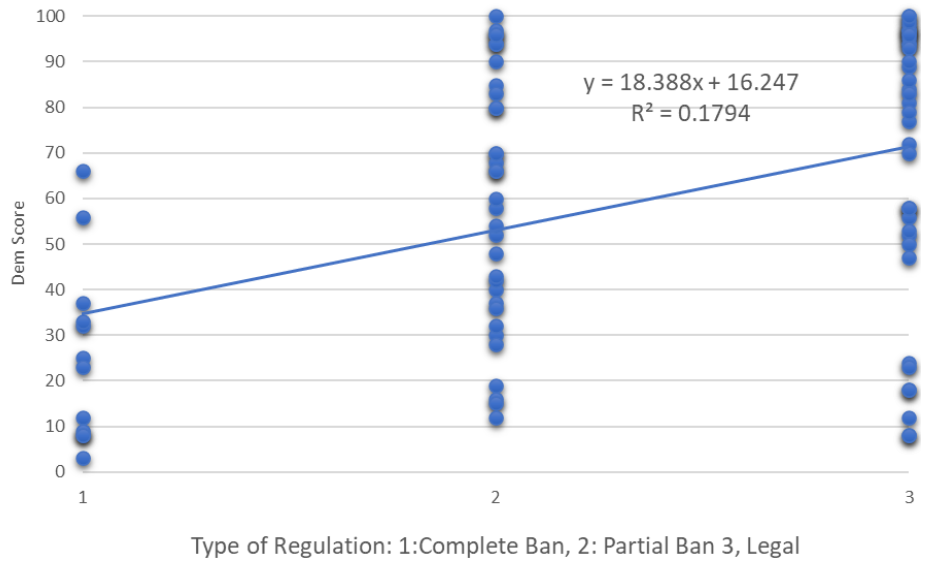
The findings of this study challenge the libertarian view that blockchain technology and cryptocurrencies are inherently oppositional to state authority. Instead, nation-states have found ways to utilize these technologies, such as through the creation of CBDCs or the implementation of regulations that align with their policy objectives and economic autonomy. This highlights the adaptability of states in leveraging technological innovations without compromising their principles.

Two important factors should be considered regarding these findings. Firstly, the sample used in this research may not fully represent all countries, highlighting the need for future studies to include a broader range of nations to ensure the generalizability of the results. Secondly, cryptocurrency policies are subject to change over time, which may impact the outcomes of this study in the future. However, despite these limitations, the current findings provide valuable insights into the current landscape of state engagement with cryptocurrencies and remain robust in their implications.

Exploring the Correlation between Democracy and Cryptocurrency Legalization

Pearson's correlation coefficient is utilized to examine this association between democracy and crypto regulation, revealing a weak positive correlation between the variables. The findings indicate that as the level of democracy increases, there is a relatively small increase in the likelihood of cryptocurrency legalization, resulting in fewer instances of cryptocurrency bans. Figure (2) shows the correlation between democracy and type of regulation.

Figure 2. Democracy & Regulation Correlation



The correlation coefficient, r , has a value of 0.4236 indicating a positive association. r is calculated through the following equation:

(2) $$\sum\big((X - Mx)(Y - My)\big) \div \big((SSX)(SSy)\big)$$

Where X is the value of democracy score according to Freedom-house (0-100) and M_x is the overall mean, while Y is the corresponding value of regulation (1: General Ban, 2: Partial Ban & 3: Legal). SS_x is the squared deviation of democracy and SS_y is the squared deviation

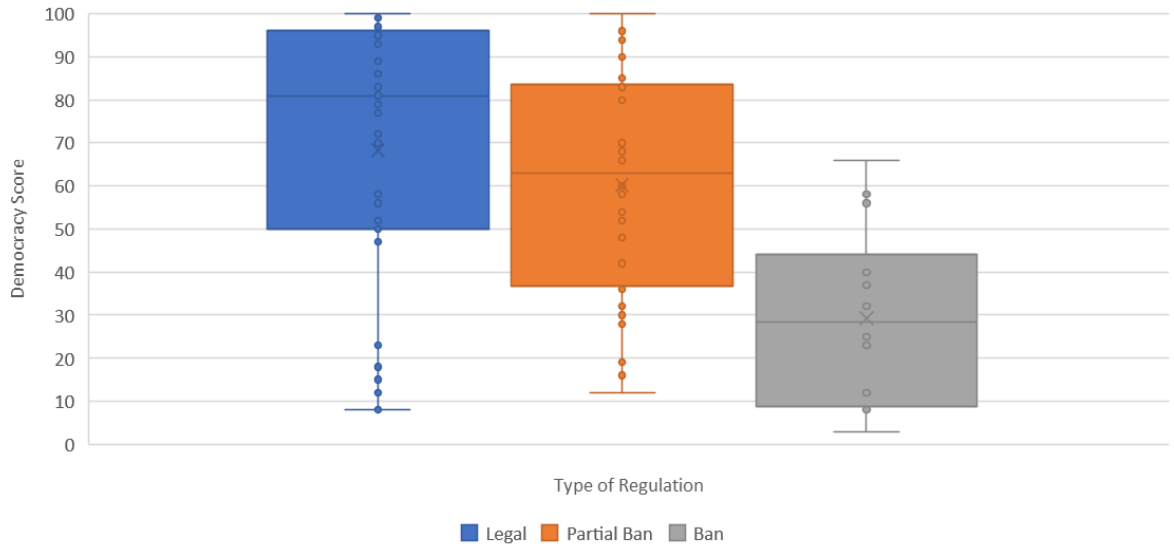
of regulation. Notably, four countries out of the 83 that have not taken legal actions have been excluded from the calculation.

The coefficient of determination, R^2 stands at 0.1794, demonstrating a positive but weak correlation. Understanding this correlation is crucial to examine the libertarian claim that cryptocurrencies are a democratic tool, implying that democratic countries are more likely to legalize cryptocurrencies. However, the statistical analysis reveals a weak correlation, which challenges this claim. In this analysis, the degree of democracy is the independent variable, while the extent of cryptocurrency legalization represents the dependent variable. The strength and direction of this relationship can be ascertained by calculating the correlation coefficient. The correlation equation is:

(3) $$Y = 18.388X + 16.247$$

The finding implies that as a country's democratic principles strengthen, the likelihood of adopting favorable cryptocurrency regulations increases. Moreover, the coefficient of determination suggests that democracy explains only 17.94% of the variability observed in cryptocurrency legalization among countries. Therefore, it can be argued that democratic states are more open to embracing the benefits offered by cryptocurrencies, opting for regulatory frameworks that facilitate their use rather than imposing outright bans. However, many authoritarian regimes also show interest in cryptocurrencies due to the advantages they may provide, such as addressing economic burdens or circumventing economic sanctions. Additionally, bureaucratic challenges within democratic countries, where multiple institutions are involved in the regulation process and political instabilities, may impede the development of coherent cryptocurrency regulations and account for the weak correlation observed.

Figure 3. Democracy Score and Regulation Type



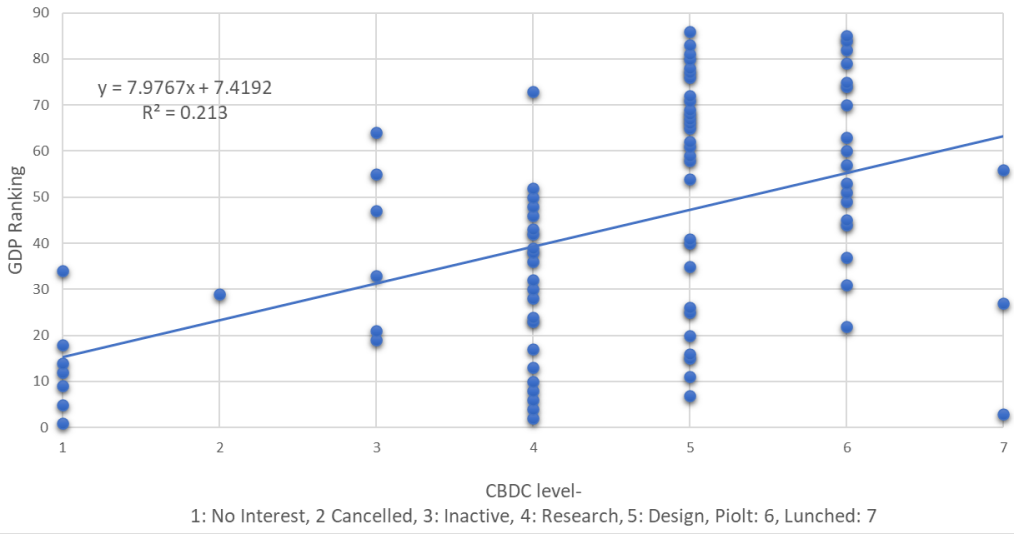
To present the findings more clearly, boxplots are used as an illustrative tool (Figure 3). The analysis of the blue box indicates that democratic countries often legalize and regulate cryptocurrencies. Interestingly, a significant number of authoritarian states, with low scores on the freedom-house scale, also fully legalize cryptocurrencies. On the other hand, the orange box represents democracies that have implemented partial bans on cryptocurrencies. In contrast, autocratic states tend to enforce complete bans. It is worth noting that even the highest-scoring democratic state in terms of freedom only enforces a partial ban. These findings support the existence of a positive but weak correlation.

In conclusion, this study provides empirical evidence of a weak positive correlation between a country's degree of democracy and its tendency to legalize cryptocurrencies. However, further research is needed to explore the underlying mechanisms and contextual factors that contribute to this correlation. Understanding the complex relationship between democracy, financial regulations, and technological advancements will enhance our understanding of cryptocurrency adoption and regulation dynamics.

Examining the Relationship between GDP-Size and Progress in CBDCs: A Pearson Correlation Analysis

This study employs Pearson's correlation coefficient to investigate the association between a country's GDP size and its advancements in issuing a CBDC, please see figure (4).

Figure 4. Comparison between GDP & CBDC level



The obtained correlation coefficient ($r = 0.4616$) indicates a weak positive correlation between GDP size and the progress in launching a CBDC. The coefficient of determination ($R^2 = 0.2131$) suggests that approximately 21.31% of the variability in CBDC progress can be explained by the size of a country's GDP. However, when excluding the outlier observation from Jamaica, the correlation becomes moderately strong ($r = 0.5111$) and ($R\text{^}2 = 0.2612$) indicates that GDP size explains 26.12% of the total variability observed in CBDC progress. It is important to note that the sample size is 86 after excluding North Korea, as no reliable sources were available for their GDP data. The correlation equation is

(4) $$Y = 7.9676X + 7.4192\,.$$

The moderate positive correlation between GDP size and CBDC progress suggests that countries with larger economies are more likely to possess the resources and infrastructure

necessary for implementing a CBDC. However, it is important to acknowledge that CBDC progress is influenced by various contextual factors beyond GDP alone. The exclusion of the outlier observation from Jamaica highlights the significance of considering individual country contexts and specific factors that may impact CBDC implementation.

The study emphasizes the need to take into account unique contextual factors and country-specific circumstances when examining the relationship between GDP size and CBDC progress. Future research should explore additional variables and factors to enhance our understanding of the complex dynamics involved in central banks' adoption and implementation of digital currencies. This would contribute to a more comprehensive understanding of the factors influencing the progress of CBDC initiatives and provide valuable insights for policymakers and researchers in the field.

Case studies:

In this section, I study eight countries to understand their stance on cryptocurrencies and blockchain technology. Finally, I assign a name for each state policy to distinguish between them.

USA: (Developed Democratic State) "Swing Policy"

Considering the neoliberal stance of the US, we might assume that the country would display greater tolerance and acceptance towards blockchain technology and cryptocurrencies. Yet, the reception of these innovations has varied across different administrations. Contrast, for example, the Trump and Biden administrations. Trump adopted an unyielding stance towards cryptocurrencies, openly expressing his aversion towards Bitcoin and other digital currencies, characterizing them as dangerous (Fox 2021). Trump additionally emphasized the sole legitimacy of the US dollar as a means of exchange in the country (ibid). Following Trump's tenure, President Biden demonstrated a more open and accommodating stance towards cryptocurrencies, evidenced by his executive order regulating the sector for optimal utilization (Rogers & Livni 2022). The policy objectives of the Biden administration are geared toward promoting innovation and investment, and the United States is presently working on issuing its CBDC (Jiang et al 2021).

As a federal system, the varying stances toward crypto in the US are manifested in state policies. For instance, Ohio began collecting taxes on cryptocurrencies, while other states have issued warnings against their use (Dewey & Patel 2022). These disparities in state regulations hinder a cohesive national policy.

The US also fears that widespread cryptocurrency adoption could undermine the US dollar's dominant position in global finance. This anxiety has been compounded by the significant growth of the cryptocurrency market, which has a global market capitalization of

approximately $1.14 trillion (Coin-Market-Cap 2023). There are 420 million users, constituting roughly 4% of the world's population, of which 46 million are based in the US (Triple 2023; Coin-Market-Cap 2023). Although these statistics depict the expansion of the cryptocurrency market, they do not necessarily imply a complete displacement of fiat currencies (Manjula et al 2022), as most cryptocurrencies are eventually converted into fiat (Kazan et al 2015). Helping the US dollar (and other fiat currencies) is the fact that cryptocurrencies have thus far been unsuitable as a medium of exchange due to their considerable price fluctuations. Even stablecoins which are backed by fiat currency present minimal threat to the US dollar since, for each dollar in the cryptocurrency market, there must be an equal amount of fiat currency in reserve (Eichengreen 2019). Consequently, stablecoins represent an alternative means of utilizing the US dollar rather than a substitute. These considerations underlie the Biden administration's report on the potential legalization of stablecoins and their categorization as bank-like institutions (Haar 2021).

The US is the second-largest investor in blockchain technology, with most of these investments channeled towards legal and technical research. Its goal is to leverage the technology to expedite financial transactions and store data in a tamper-proof manner (Newberry 2021). Furthermore, blockchain technology is utilized in sectors such as healthcare, supply chains, and property rights (Spatz 2018). Notably, a US-based pilot project seeks to establish a blockchain registry for land and home ownership (ibid). The primary funder of these projects comes from the private sector (Tian et al 2020). Moreover, 13.2% of the US total population has a cryptocurrency account (TripleA 2023).

Drawing on the above analysis, the US exhibits a more open and permissive approach toward blockchain technology and cryptocurrencies. Nevertheless, the US policy in this area is characterized by volatility and frequent shifts, due to political changes and bureaucracy, indicating what can be referred to as "Swing Policies."

India (Developed Partially Democratic State) "The International Policy"

India's cryptocurrency policy is characterized by a high degree of openness, as evidenced by the 8% of the population who hold cryptocurrency wallets and its 7th place global rank in terms of citizens' familiarity with blockchain technology (TripleA 2023; Brokerchooser 2023; Queiroz et al 2019). In addition, the Indian government has undertaken a comprehensive process of legalizing cryptocurrencies, including measures to combat money laundering, taxation and registration procedures (Freeman-Law 2023; Tambe 2023; Sunainaa 2023). The country has had many cryptocurrency exchanges operating since 2012 (Yadav 2021) and its public statements by those in government are further evidence of India's openness to dealing with crypto. For example, Shri Pankaj Chaudhary, the Indian Minister of State Finance, emphasized the need for international cooperation to prevent regulatory arbitrage (Tambe 2023; Bag 2023; Person & Ohri 2023) while India leveraged its position as the chair of the G20 countries to encourage a coordinated global approach to cryptocurrency (Bag 2023).

It is worth mentioning that India is the main sole country seeking international regulation, this is surprising knowing that any effective regulatory framework about cryptocurrencies requires international agreement. On the opposite side, India has recognized cryptocurrencies as a source of income and imposed taxes of up to 30%, which has been criticized for its potentially negative impact on investment in cryptocurrencies within the country (Tamb 2023). Overall, however, India's cryptocurrency policy demonstrates a commitment to comprehensive regulation and international cooperation, even while it grapples with the trade-offs between encouraging investment and preventing illicit activities.

India's policy of openness towards cryptocurrencies can be attributed to its technological prowess and a strong focus on emerging technologies such as blockchain and artificial intelligence. This emphasis reflects India's broader aim of achieving technological

leadership and becoming a “Five-Trillion-Dollar Economy” (Singh 2023). As India's economic success has been largely driven by progress in the technological field, its cryptocurrency policy aligns with the state's overarching policy goals (Shetty, 2021).

India has additionally made significant strides in developing CBDCs, exemplified by its experimentation with the "Digital Rupee" since late 2021 (Atlantic-Council 2023). The country's motivation for pursuing a CBDC is to accelerate financial transfers, promote financial inclusion, and reduce the role of commercial banks. Furthermore, the proposed model is intended to eliminate the need for paper money, thus reducing printing, storage, and transportation costs (ibid; Yadav 2021). We can then see India's embrace of cryptocurrencies and CBDCs as part of a broader effort to foster technological innovation and improve the efficiency of its financial system.

India has demonstrated a strong interest in utilizing blockchain technology across various sectors beyond financial applications, like China (which we review later). For example, India explored *on-chain* supply chain management with projects such as the Tea Supply Chain Tracking project (Dubey 2022; Shakya et al 2023). In addition, India has trialed environmental protection and resource conservation solutions with the Blockchain Drought Risk Management System (Poonia et al 2021). The same goes for land management and real estate, particularly due to the transparency of blockchains and the ability to mitigate corruption and data manipulation Thakur et al (2020).

Russia (Developed Autocratic State) “Shadow Policy”

Although, on paper, Russia imposed partial bans on cryptocurrencies, it has effectively enabled its use in practice. This can be seen particularly in the use of crypto during Russia’s invasion of Ukraine to avoid economic sanctions (Coin Telegraph 2017; Atlantic-Council

2023). Furthermore, the Russian Central Bank has recently taken steps to promote the use of cryptocurrencies for international payments (Nicenko 2023; Shovkhalov & Idrisov 2021). The mining of cryptocurrencies has experienced significant growth in Russia, making it the second-largest mining hub globally (The-Moscow-Times 2023).

Russia views cryptocurrencies as a challenger to the US dollar's prominence. The head of the Russian Duma's financial committee, Anatoly Aksakov, spoke to this point, "if we launch this, then other countries will begin to actively use it going forward, and America's control over the global financial system will effectively end" (Forbes 2022; Person 2022). With cryptocurrencies, Russia expects a global reduction in the reliance on US debt and financial institutions such as the IMF and the World Bank (Smith 2019; Ignatova et al 2020). This partly explains Russian attitudes towards crypto, along with crypto's transnational characteristics, the inability of the US to exert control over them, the significant growth of the cryptocurrency market, and the benefits of using cryptocurrencies such as fast transaction processing and low fees (ibid).

Russia is demonstrating a growing interest in the digital crypto economy, leading to a heightened focus on developing its own CBDC, which is currently being trailed with a launch date of 2024 officially (Atlantic-Council 2023; Ignatova et al 2020). This policy has had a discernible impact on Russian society's awareness and understanding of cryptocurrencies (Khalfaoui et al 2023) and the country now ranks second in terms of societal knowledge of cryptocurrencies and blockchain technology (Broker-Chooser 2023), nearly 10% of all Russian citizens using cryptocurrencies (Triple 2023).

Here, it is worth mentioning that Russia's prime motive is to circumvent sanctions and undermine the dollar's dominance. For this reason, I call the Russian policy the "Shadow

Policy". Still, there are a few non-financial blockchain use cases being trialed in Russia, particularly in the energy and railways (Levina et al 2021; Ding & Naserinia 2022).

China (Developed Authoritarian State) "Compete & Ban Policy"

China's approach to cryptocurrencies and blockchain technology has undergone a significant transformation. In 2017, China held the position of the largest cryptocurrency and mining market and conducted substantial trading activities, however, the Chinese government has since experienced a profound shift in its stance on cryptocurrencies, resulting in the announcement of a comprehensive ban on all transactions and operations (Sharma 2021). The initial stance, indicating openness toward cryptocurrencies, seems paradoxical considering the Chinese Communist Party's commitment to controlling all institutions and promoting sustainable economic growth through free-market principles (Ekman 2021). Interestingly, China's 14th five-year plan highlights the government's intention to extensively utilize blockchain technology (Akhtar 2021). The contradiction can be attributed to the Chinese government's desire to sustain economic growth while simultaneously safeguarding against institutions that operate beyond its sphere of control.

China shows that authoritarian states can quickly modify their policies, enabling them to respond to changes more efficiently. However, due to the concentration of power in the hands of a single entity such as the Communist Party, authoritarian regimes are more susceptible to mistakes compared to democracies which are subject to greater scrutiny and oversight. This particular response towards cryptocurrencies can be characterized as "Compete and Ban Policy." This means that China bans the use of cryptocurrencies and blockchain at the private level but utilizes it at the public level.

The policy contradiction can be partially explained by China's concern about capital outflows, given the role cryptocurrencies can play in facilitating this process (World-Economic-Forum 2022). In 2016, China's official currency, the renminbi (RMB), had depreciated by approximately 7% compared to the US dollar, representing the most substantial annual depreciation since 1995 (Zhang 2016). To illustrate the impact, nearly $50 billion left East Asia via cryptocurrency (Chainalysis 2020), most of it from China. China's second concern regarding cryptocurrencies is their potential impact on financial stability. This apprehension is shared among many nations, as cryptocurrencies have the potential to undermine the central bank's monetary and fiscal policies.

At the public level, China has a completely different strategy and is in the process of issuing its own CBDC to its citizens, named the "digital yuan". China began piloting this in four provinces, with a total financial transaction of 5.39 billion dollars (Atlantic-council 2023). Automating Chinese money will improve the central bank's ability to determine the money supply required to stabilize the market. This allows China to be more informed and decisive concerning its money supply. This process also benefits from other aspects of blockchain technology, such as speeding up operations, protecting information, and reducing costs.

Moreover, China has firmly committed to incorporating blockchain technology into its governmental institutions. For instance, the "Comprehensive Experimental Area of Big Data in Guangdong Province" shows promise in enhancing the quality and quantity of government operations and services, promoting transparency, and building trust in government services (Hou 2017). Additionally, China has initiated other blockchain-based projects, including developing a smart city, supply chain management and reforms to the banking industry to improve payment clearing and credit information systems (Shin 2023).

Costa Rica (Developing Democratic State) “The Turtle Policy”

Costa Rica has been the slowest in establishing cryptocurrency regulatory measures among the eight countries examined in this thesis. Presently, there are no laws about the definition of cryptocurrencies, mechanisms for their trade, or taxation protocols (Freeman-Law 2023; Remax 2022). This is despite the population’s keen interest in cryptocurrency – numerous Costa Rican firms offer salaries in cryptocurrency (Freeman-Law 2023; Remax 2022) – as well as the parliament's efforts to implement regulatory laws. This may be changing, for example as Johanna Obando proposes a bill to Congress which aims to regulate the cryptocurrency market in Costa Rica (Salvo 2022). Importantly, the lack of regulatory laws governing cryptocurrencies in Costa Rica does not imply illegality. However, investing in such an environment may pose risks to investors, given the possible future regulation (Sunsets 2023).

Several factors contribute to the slow pace of crypto legislation in Costa Rica. Firstly, there are lengthy bureaucratic procedures in the lawmaking process (Basrtuo 2013). Secondly, Costa Rica has environmental concerns about cryptocurrency (For example, 98% of its energy usage comes from renewable sources) (Thelwell 2020). This makes the country reluctant to involve itself in crypto-mining operations. Thirdly, Costa Rica's interest in technology is relatively weak compared to other countries (Trading Economics 2023). This is reflected in the lack of public investment in cryptocurrency and blockchain technology. Finally, there is a fear that cryptocurrencies will be used illegally for tax evasion, money laundering, and financing violent acts.

Costa Rica’s policy extends beyond cryptocurrencies and encompasses the treatment of the central bank's digital currency. According to the Atlantic-Council's 2023 report, the CBDC is presently considered "inactive." The report highlights that out of the 120 countries examined, 101 countries have progressed further than Costa Rica concerning CBDCs, with only two

countries, namely Ecuador and Senegal, ranking lower than Costa Rica (the rest are equal to Costa Rica).

In contrast, Costa Rica demonstrates a considerable interest in non-financial applications of blockchain technology. The country has pursued blockchain-driven projects to bolster data security, transparency, and organizational efficiency. Among these projects is the CADENA initiative, which aims to leverage blockchain technology in border management. Overall, it can be posited that democratic nations tend to exhibit a sluggish response to technological advancements. As a result of its languid stance, Costa Rica's policy is called the "Turtle Policy," symbolizing the country's slowness.

Ukraine (Less Developed Partially Democratic State) "The Resistance Policy"

Ukraine exhibits remarkable rankings and developments in cryptocurrencies and blockchain technology. It holds the second position globally regarding the proportion of its citizens possessing cryptocurrency accounts relative to the total population, representing approximately 16% or around 5.6 million individuals (TripleA 2023). Additionally, Ukraine ranks first worldwide regarding its citizens' awareness level regarding blockchain technology and cryptocurrencies, with an impressive rating of nearly 8 out of 10 (Brokerchooser 2023). The growing adoption of cryptocurrencies in Ukraine can be attributed to their perceived advantages as cost-effective and expeditious tools for financial transactions, besides using them as a tool during the conflict (Trachova et al 2022; Fomina et al 2019). Facilitating this widespread usage is the supportive stance adopted by the Ukrainian government, which has fully legalized cryptocurrencies (TripeA 2023).

Moreover, Ukraine has made substantial progress in issuing its CBDC, with its central bank's efforts starting in early 2016 (Atlantic-Council 2023). The government has embarked

on an experimental phase of its CBDC, "e-hryvnia." and endorsed a draft law titled "On Virtual Assets," which regulates the trading and distribution of virtual assets (ibid). Notably, legislation enacted in 2021 has officially legalized CBDC, incorporating them as equivalents to cash. Ukrainian President Volodymyr Zelensky expressed support for a pilot program that enables ministry employees to receive their salaries in CBDC (ibid). These advancements and initiatives have persisted and accelerated despite the challenges posed by the Russian invasion of Ukraine.

In the current Ukraine-Russia conflict, cryptocurrencies have played a significant role, with an estimated utilization of approximately $300 million through different blockchain platforms such as “DAO Ukraine”, and in various domains, such as medical services, relief assistance, and demining equipment (World-Economic-Forum 2023). Because of this, Ukraine can be said to have a “Resistance Policy” towards blockchains. The deployment of cryptocurrencies transcended Ukraine's borders, as the United Nations High Commissioner for Refugees (UNHCR) initiated a project leveraging stablecoins to provide aid to Ukrainian refugees (UNHCR 2023).

The increased adoption of cryptocurrencies posed a significant challenge for the Ukrainian government, necessitating the establishment of a legal framework to regulate their usage (Drobyazko et al 2019). To address this issue, Ukraine employed the regulatory guidelines provided by the European Union, particularly the "Market in Digital Assets" (MiCA) framework (Horiashchenko 2022). Furthermore, the interest in cryptocurrencies extended beyond the realm of the state and its citizens, as numerous companies, including prominent entities such as Metinvest and DTEK Energy, demonstrated a keen inclination towards engaging in cryptocurrency transactions (ibid).

El Salvador (Less Developed Partially Democratic State) "The Gambling Policy"

El Salvador has been widely regarded as crypto-friendly due to its adoption of Bitcoin as a legal tender – the first country to do so – and the public trading of the asset by its leader, Nayib Bukele (Arslanian 2021). To this end, the Bukele administration purchased 2,381 bitcoins at a total cost of $107 million (Al-Jazeera 2023). El Salvador's laws permit the use of Bitcoin as a medium of exchange, loan repayment, tax payment, and other purposes (Belsie, 2021). Moreover, El Salvador permits the issuance of cryptocurrencies and digital assets within its borders (ibid). In November 2021, the government declared plans to establish "Bitcoin City," which will rely on cryptocurrencies and blockchain technology to oversee its operations and finance all activities with cryptocurrencies, mainly Bitcoin (Euklidiadas 2022). The city will rely on geothermal energy produced by a nearby volcano (Al-Jazeera 2023). Furthermore, the government aims to become the most prominent center for cryptocurrency mining globally (ibid).

The country's motivations for adopting Bitcoin as a legal tender are threefold. First, it aims to improve the efficiency of remittances, which constitute more than 20% of the country's GDP (Arslanian 2021). Secondly, the crypto policy aims to decrease the number of unbanked individuals, accounting for approximately 70% of the total population (ibid). Thirdly, it is attempting to attract foreign investment in the cryptocurrency industry (ibid).

The adoption of Bitcoin was met with widespread protests and demonstrations, with critics accusing the policy of being biased towards the wealthy and an external investor class (Burke2022). The IMF and the World Bank institutions also disapproved of this policy (Arslanian 2021), raising concerns about cryptocurrencies' legal risks, financial vulnerability, and speculative nature, which could lead to irreparable harm (O'Boyle 2023). Furthermore, the IMF criticized the lack of transparency mechanisms in the Salvadoran government's handling of Bitcoin (ibid).

In broad terms, the policy of adopting Bitcoin as a legal tender in El Salvador has not been successful thus far. Despite the government's efforts to encourage individuals and businesses to use Bitcoin and offer financial incentives, organic adoption has been slow, with only 20% of companies accepting payments via Bitcoin (Belsie 2022). This can be attributed to the volatility of Bitcoin, which has experienced a significant decline in value, and negatively impacted El Salvador's credit rating and its ability to secure loans (Valenzuela 2023; Vaco 2023). Moreover, local borrowers have been forced to offer higher interest rates due to a decline in the confidence of external investors. The policy's objective of increasing remittances has also not been met, with a reported 18% decrease in remittances in early 2023 (Mollen 2023; Kshteri 2022).

Despite its keen interest in blockchain technology and cryptocurrencies, El Salvador has not proposed any project to create its CBDC. Instead, its approach can be characterized as a high-risk "Gambling Policy", as its extensive adoption of cryptocurrencies could potentially pose a risk to its economic stability in the event of cryptocurrency collapse remains. Alternatively, it could be an opportunity for economic growth if cryptocurrencies recover their value and experience future growth.

Venezuela (Developing Authoritarian State) “Dual Policy”

Venezuela's stance on blockchain technology has garnered attention due to its unexpected openness towards them, despite being a socialist and authoritarian state. In 2017, the government launched its cryptocurrency, E-Petro, which President Maduro declared a legal tender (Fast 2021), which is sometimes used to pay employees (Bączkowski 2021) and to which the minimum wage is pegged (Reynolds 2022). This policy has resulted in Venezuelan citizens' widespread adoption of cryptocurrencies, with approximately 10.5% of the population owning cryptocurrencies (TripleA 2023). Venezuela also announced a CBDC, the “digital

bolivar", which is currently at an advanced stage. Lastly, the government facilitated the exchange of cryptocurrencies to fiat currencies (TripleA 2023) and legalized Bitcoin mining activities, which has generated interest among investors due to the low energy costs in the country.

Scholars find Venezuela's stance paradoxical, given the decentralized and anarchic nature of cryptocurrencies, which typically do not align with the Venezuelan regime's policies (Freeman-Law 2023; Atlantic-council 2023). However, the positive receptiveness of the Venezuelan government towards cryptocurrencies and the introduction of its CBDC can be attributed to the country's economic struggles, including inflation, currency devaluation, high debt, and widespread poverty (Pereira 2023). The government's desire to evade economic sanctions and challenge the predominance of the US dollar in the global economy is another factor. Furthermore, cryptocurrencies facilitate remittances and international humanitarian aid, which are crucial components of the Venezuelan economy. Not all crypto use cases in Venezuela are financial, however; blockchain started to be used to protect property rights which is a major obstacle to getting rid of the recession (Rendon 2018).

These policies have proven effective and had an impact on improving the economy and reducing corruption (Shanaev et al 2019). However, Venezuela's cryptocurrency policy has significant risks. One concern is the infeasibility of purchasing bolivar using E-Petro, raising doubts about the practicality of this policy. Moreover, the vulnerability of the internet and electricity networks poses a threat to cryptocurrency investments (Ellsworth 2021). These challenges have resulted in restrictions on cryptocurrencies, including the detainment of cryptocurrency investors and the Venezuelan government's shutdown of some mining farms (Lanz 2023). In addition, the significant increase in electricity costs raises doubts about the long-term viability of Venezuela's cryptocurrency policy, given the high energy consumption associated with mining activities (Rosales 2021).

The outcome of Venezuela's cryptocurrency policy remains uncertain, but it is a stark example against the libertarian notion that cryptocurrencies and blockchain promote democracy. This notion is challenged by the cases of China and Russia, where this technology has been utilized to support authoritarian or semi-authoritarian regimes. Venezuela's unique dual policy of issuing cryptocurrency and CBDC merits close monitoring since it appears to be the only country to have done so.

Case Studies Comparison:

Based on the analysis of eight cases, it is evident that most countries (7 out of 8) have a supportive stance towards cryptocurrencies and blockchain. This support is manifested through the legalization of certain aspects of cryptocurrencies or active efforts in developing their own CBDCs. China stands out as the only country that has implemented a comprehensive ban on cryptocurrencies in the private sector due to concerns about capital outflow and potential threats to its centralized economic system. On the other hand, Costa Rica has not yet introduced specific legislation, and the examination of specialized cryptocurrency laws is still ongoing, likely due to bureaucratic challenges inherent in democratic systems. These case studies further strengthen the main research conclusion, which highlights that most countries view cryptocurrencies as favorable opportunities.

Additionally, the case studies support the quantitative findings that indicate a weak positive correlation between democracy and cryptocurrency legalization. For example, the democratic USA demonstrates a favorable stance towards legitimizing cryptocurrencies, while the dictatorial regime in China enforces a ban. However, it is important to note that some dictatorial countries, like Venezuela and Russia, have legalized cryptocurrencies, while a democratic nation like Costa Rica has no specific laws addressing the matter. These observations suggest that while democratic countries show a greater inclination towards cryptocurrency legalization, the extent of such legalization remains limited. Furthermore, it is crucial to acknowledge the influence of other factors, which will be discussed later, in shaping a country's position on cryptocurrencies. It is paramount to acknowledge that the efficacy of democratic nations in technological advancement, demanding expeditious resolutions, can be compromised by bureaucratic processes and political instabilities. Conversely, democratic institutions must remain aware of utilizing blockchain technology and cryptocurrencies within autocratic nations. The very technology that initially emerged as a catalyst for augmenting

individual freedom is progressively being leveraged to fortify dictatorial regimes' control over their populace and circumvent economic sanctions.

The examined cases align with the quantitative evidence, supporting a positive moderate correlation between a country's GDP and its progress in implementing a CBDC. Notable advancements in CBDC initiatives are observed in China, Russia, India, and the United States, while Costa Rica and El Salvador are in the later stages of progress. This suggests a positive relationship between GDP and CBDC development. However, it is noteworthy that countries with comparatively weaker economic capacities, such as Venezuela and Ukraine, have made significant strides in their digital currency efforts. Ukraine in particular has surpassed the US in this domain, despite disparities in economic power. Moreover, the US lags behind Russia, China, and India in CBDC development. This shows that other variables play an important role in determining states' CBDC policy.

The case studies reveal five influential factors that shape states' policies regarding cryptocurrencies, CBDCs, and blockchain technology. Firstly, bureaucratic and governance systems play a crucial role, with democratic nations often experiencing slower decision-making processes due to the multiple stages involved. Political changes following elections, as observed in the US and Costa Rica cases, also contribute to bureaucratic delays. This is evident in the ongoing efforts of the EU to establish the MiCA law, which began in 2019 and is projected to be implemented by 2024 at the earliest (European Parliament 2023). This suggests an urgent need for democratic countries to solve bureaucratic obstacles if they want to remain in the technological race. Secondly, the prevailing political landscape and existing conflicts influence states' directions. Ukraine and Russia, for instance, have shown accelerated progress in cryptocurrency legalization, potentially influenced by their unique political situations. Thirdly, economic hardships are a significant factor, as countries facing inflation, limited foreign investment, and high levels of indebtedness tend to exhibit greater openness towards

cryptocurrencies, such as Venezuela and El Salvador. Fourthly, the level of public awareness and adoption of cryptocurrencies and blockchain among citizens plays a pivotal role in shaping state policies. This is evident in countries like India, Venezuela, Costa Rica, and Ukraine. Lastly, the relationship between countries and the US dollar also influences their stance, as some view cryptocurrencies as an alternative to the dollar such as Russia, Venezuela and China. Consequently, countries with close ties to the US tend to adopt more conservative policies, while those with a more adversarial relationship take a more open approach.

The research has transitioned from hypothesis testing to generating new hypotheses, highlighting the need for further investigation to deepen our understanding of these complex dynamics. A common thread observed across the cases is the public concern surrounding the use of cryptocurrencies for illicit activities such as tax evasion, illicit transactions, and financing terrorist organizations. Countries also show interest in exploring the non-financial applications of blockchain technology, including enhancing governance and improving supply chain monitoring and traceability. However, there are distinct variations in countries' policies towards cryptocurrencies.

In general, the US (*Swing*) and Costa Rica (*Turtle*) experience ongoing fluctuations in their policies due to electoral changes and bureaucratic processes. China has implemented a ban on private-level cryptocurrencies but seeks to harness their benefits at the public level (*Compete and Ban*). Ukraine (*Resistance*) and Russia (*shadow*) have utilized cryptocurrencies in their respective conflicts. Both Venezuela and El Salvador utilize cryptocurrencies as means to solve economic hardships. While Venezuela (*Dual*) sees them as a potential solution to economic challenges and to undermine US dollar dominance over the global economic system, which is manifested through having both cryptocurrency (E-Petro) and CBDC (Digital bolivar). El Salvador takes an *investor-oriented approach* towards cryptocurrencies with the

aim that the country gets profits and attracts foreign investments, while India stands out as the only country interested in formulating a comprehensive *internation* policy.

These observations raise important questions about the absence of a robust international framework governing cryptocurrencies. Given that the success of any cryptocurrency policy relies on international cooperation, the lack of an established international policy framework warrants further investigation and scholarly scrutiny to gain a comprehensive understanding of this phenomenon in the future. Table (6) & (7) summarize the eight case studies:

Table 6. Case Study Countries, their Policies and the Reasons Behind Them

Name	Pol	Eco	Policy	Reasons
USA	F	Dev	Swing	Fear for the status of the dollar, pursuit of technological and economic superiority, liberal policy
China	NF	Dev	Compete and Ban	Fear for the capital outflow and losing control over the financial system
Russia	NF	Dev	Shadow	Avoiding economic sanctions, challenging dominance of US dollar, maintaining state centralization
India	PF	Dev	International	Seek to impose international policy that ensure the effectiveness of their policies are maximized
Costa Rica	F	LDev	Turtle	Bureaucratic democracy, weak economic and technological capabilities
Venezuela	NF	LDev	Dual	Confronting hyperinflation, challenge dominance of the US dollar, supporting remittances.
Ukraine	PF	LDev	Resistance	Enable cheap and direct financial aid, improving wheat and energy export operations
El Salvador	PF	LDev	Gambling	Encouraging foreign investment, strengthening the remittances system

Note: Dev = Developed, LDev = Less Developed

Table 7. General Comparison among the Case Studies

Name	Legal Status	CBDC-Level	GDP-Ranking	Democracy Score	Awareness	Ownership
USA	Legal	Design	1	83	NA	13.22%
China	General Ban	Pilot	2	9	NA	4.08%
Russia	Partial Ban	Pilot	8	16	7.46	5.87%
India	Partial Ban	Pilot	5	66	4.39	7.23%
Ukraine	Legal	Pilot	59	50	7.79	16%
Costa Rica	No Regulation	Research	87	91	NA	1.71%
El Salvador	Legal	Cancelled	108	56	NA	9.72%
Venezuela	Legal	Design	71	15	6.03	10.5%

Note: Awareness is measure on a scale from 0 to 10

Conclusion:

This research aimed to investigate the responses of different states and political systems to cryptocurrencies and blockchain technology while identifying the underlying factors that shape their policies. The significance of this research lies in the limited attention given to this topic in existing literature. The study aims to provide descriptive and causal insights by examining the general orientations of states and uncovering the rationales behind their policies. The findings of this study are relevant to investors, countries, and international organizations as they help to understand the future direction of cryptocurrencies and blockchain technology and draw valuable lessons from country-specific policies. To address the research question, a mixed-method approach incorporating both quantitative and qualitative methodologies was employed, which is a novel approach not previously utilized in the crypto and blockchain literature. Additionally, the research findings show the necessity for democratic states to become less bureaucratic to remain in the technological race. Moreover, the research warns us that authoritarian states find ways to utilize this technology for their own interests, indicating the necessity for democratic institutions to address this problem.

The research findings challenge the libertarian perspective that portrays cryptocurrencies and blockchains as inherently anti-state tools. Instead, countries have demonstrated an adaptive capacity to utilize this technology in alignment with their interests, indicating a favorable disposition towards its adoption. Overall, the research reveals a weak positive relationship between a country's level of democracy and its inclination to embrace cryptocurrencies. Furthermore, a moderate positive correlation is observed between a country's GDP and its progress in implementing a CBDC. However, there are two limitations to consider in this research. Firstly, the availability of data limits the scope of analysis, affecting the results based on the selected sample of 87 countries. Therefore, future research must include more case studies for more robust results. Secondly, it is crucial to consider other factors in future

research, such as economic challenges, the political landscape, decision-making processes, bureaucratic systems, a country's relationship with the US dollar, and the level of awareness and adoption of cryptocurrencies.

Countries' policies diverge due to variations in their legal, political, and economic circumstances, as well as their specific concerns and fears. The research findings also highlight India's pursuit of an international policy, emphasizing the absence of coordinated international efforts despite the inherent requirement for international cooperation in successful cryptocurrency policies.

As a result, this research has transitioned from hypothesis testing to proposing new hypotheses that aim to explain countries' responses to cryptocurrencies. It is important to emphasize the need for further investigation of these hypotheses in future studies. Hence, it is imperative to construct an econometric model that incorporates these variables, thereby facilitating an understanding of their effects on states' policies regarding cryptocurrencies. Moreover, the thesis underscores the necessity of conducting a comprehensive examination of laws and decision-making processes, employing content analysis and process tracing methodologies. This would enable us to understand states' stances toward cryptocurrency clearly in depth. Furthermore, there is a need to assess the success of countries' policies and regulations towards blockchain and cryptocurrencies, particularly to CBDCs. This could help us understand the state's ability to influence this technology. Finally, there is a need to understand the obstacles that undermine the states' ability to come up with international regulations.

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