

# Analysis of the Impact of European Policy on Distributed Ledger Technologies and Crypto-assets

Hasret Ozan Sevim<sup>1</sup>

<sup>1</sup> *Laurea Magistrale, Alma Mater Studiorum - Università di Bologna, Via Zamboni 33, 40126, Bologna, Italy.*

## Abstract

The impact of the current and upcoming regulations on the distributed ledger technology industry is expected to be significant, as security and financial concerns are important for decentralized applications and consensus mechanisms of distributed ledger technologies. The European Union takes consequential steps to create a safe, participatory but also innovative public policy for emerging technologies, including blockchain. The potential impact and the changes of the EU regulations that will be created in the future should be analyzed and foreseen for the stakeholders, policymakers, and participants of the distributed ledger technology industry. In this paper, firstly, the regulatory gap, the risk of “unregulation”, and the challenges of regulation in the distributed ledger technology industry are briefly analyzed. In this matter, proper digital and financial audits over relatively large entities are vital, along with the need for public guides to be published by the related public authorities. Secondly, the overall regulatory initiatives of the European Union have sorted then finally the potential impact of the current and upcoming regulations (especially the impact of the European Union Digital Finance Strategy Package) over distributed ledger technologies and crypto-assets is analyzed. The European Union aims to regulate the industry in all possible aspects, different from other global hubs. If the outflowing social, financial, and technological capital from other global hubs regarding distributed ledger technologies and crypto-assets is taken into consideration due to the long-going uncertain or restrictive public policies of these countries, the current approach of the European Union can be more fruitful than expected as long as the Union keeps a balance between promoting development and digital-financial security. At the end of this study, it is concluded that a balanced approach is being adopted in the European Union. For instance, some specific provisions keep more “decentralized” solutions out of the scope of the Proposal of a Regulation on Markets in Crypto-assets to keep the development of new distributed ledger solutions away from heavy compliance requirements while issuers of electronic money tokens are about to be taken under heavy scrutiny due to the risk on financial stability. The attitude of the European institutions towards the DLT industry and crypto-asset markets looks positive in terms of economic impact and providing legal certainty.

## Keywords

Regulation, European policy, crypto-assets, distributed ledger technologies, blockchain

## 1. Introduction

The European Union (EU) has the jurisdiction under which a significant amount of distributed ledger technology (DLTs) initiatives are created, checked, and operated. The impact of the upcoming regulations on the distributed ledger technology (DLT) industry is expected to be significant, as financial incentives and cyber-security are the cornerstones for decentralized applications and the consensus mechanisms of DLTs. In order to analyze or foresee the impact, it is important to clarify the

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EMAIL: hasretozan.sevim@studio.unibo.it (H. O. Sevim)

ORCID: 0000-0002-1923-737X (H. O. Sevim)



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risks of unregulated DLT applications, and the expectations from the stakeholders of the industry from relevant public policy and regulations. Then, the characteristics of the current and upcoming regulations should be evaluated to see the results.

The regulations that await the DLT industry will vary depending on the jurisdiction and the specific use case of the DLT. However, there are several key areas where regulation is likely to be focused: (1) Data privacy and security: DLTs often involve the storage and processing of large amounts of sensitive data, and regulators are likely to require robust data privacy and security measures to be put in place. (2) Anti-money laundering (AML) and counter-terrorism financing (CTF): DLTs have the potential to be used for illicit activities, such as money laundering and terrorist financing, and regulators are likely to require DLT platforms and service providers to implement AML and CTF measures. (3) Investor protection: DLTs have the potential to create new investment opportunities, but they also come with unique risks. Regulators may require issuers of DLT-based securities to provide more disclosure and transparency to investors. (4) Smart contracts and legal enforceability: Smart contracts, which are self-executing contracts that are encoded on a blockchain, raise questions about their legal enforceability. Regulators may need to provide clarity about the legal status of smart contracts. (5) Interoperability: DLT platforms may need to interoperate with each other to enable the seamless transfer of assets between platforms. Regulators may need to establish standards and guidelines for interoperability. (6) Cyber and network security: DLT platforms and related service providers should take security measures against cyber risks and threats while the vital actors in the industry can be taken under digital surveillance. Overall, the DLT industry is likely to face a range of regulations that aim to provide greater clarity and certainty to the participants of the industry and markets, protect consumers and investors, and prevent financial and digital crime. It is important for industry participants to stay abreast of regulatory developments and ensure compliance with applicable regulations.

It is possible to create a positive impact on the industry although the permissionless nature and operational autonomy of the participants in some DLT applications can be contrarian to public policies that prioritize security and stability. A harmonized approach between “on-chain” and “off-chain” rules will help the development of the blockchain industry. More importantly, public regulations as off-chain rules should have a balance and a fair trade-off between the objectives and purposes. For instance, promoting innovation by exempting small and medium enterprises in the industry from a wide-scale scrutiny cost and ensuring financial stability by imposing heavy reserve requirements for issuers of electronic money tokens can be adopted at the same time.

## 2. Risks and Regulation

It is observable that significant cyber and financial risks and threats exist in the DLT industry (particularly in the domain of blockchain and crypto-assets). Although cyber risks are a common topic among experts and regulators, due to the technical dynamism and complexity of blockchains, these risks remain under-addressed. From a general standpoint, cyber-attacks related to blockchains and cryptocurrencies could be analyzed and potentially mitigated from two angles: (1) by improving the technical resilience of technology used or related to the blockchain system and associated smart contracts, which may include developing incentive mechanisms under which blockchains would be more resistant to adversarial behavior; and (2) by introducing regulatory measures that mitigate these risks and alleviate the burden of the risks of attacks from the affected parties.<sup>2</sup> While the task of designing resilient and sustainable Distributed Ledger Technologies (DLT) lies mostly in the hands of private entities and decentralized communities, the introduction of regulatory measures could be considered a complementary remedy and a security reinforcing factor imposed by governments. For example, the technical vulnerabilities and cyber-attacks on a blockchain, such as DoS attack, eclipse attack, or contract code exploit, can be prevented with mandatory technical measures, or the results of these attacks can be removed or minimized with required insurance or civil liabilities.

Though some public blockchains are relatively more decentralized, several service providers exist in the blockchain ecosystem with vital features for the ecosystem. These service providers are the

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<sup>2</sup> Simona Ramos, Lela Mélon, and Joshua Ellul (2022). Exploring Blockchains Cyber Security Techno- Regulatory Gap. An Application to Crypto-Asset Regulation in the EU. 10th Graduate Conference in Law and Technology, Sciences Po (2022), June 18, 2022, p. 4.

central and vulnerable points of the industry with their large scale of capabilities in providing vital liquidity channels to the crypto-asset markets, wallet services, and financial services.

The idea that all government intervention is inherently negative or that all governments are equally oppressive is not a useful framework for understanding the complex realities of modern governance. It is also worth noting that the perspective that governments should have limited involvement in cyberspace is more commonly associated with crypto-anarchist political philosophy.<sup>3</sup> While it is important to be critical of government actions when they impede progress or harm citizens, it is not productive to generalize all government interventions as inherently negative or to demonize governments without considering the nuances of their policies and practices. It is possible to refer to the distinction between *on-chain* governance and *off-chain* governance of the technological infrastructure of a blockchain-based system.<sup>4</sup> On-chain governance refers to the rules that are developed directly in the technological infrastructure and automatically enforced by the technology. Improvement proposals for public blockchains, which are discussions of upgrading protocols, are a leading example of on-chain governance. But off-chain governance rules can be both endogenous and exogenous to a particular blockchain community. The social norms of blockchain developers and validators can be seen as endogenous off-chain rules while law and regulation are exogenous off-chain rules as they indirectly affect the operations of a blockchain system from outside the system. Exogenous off-chain rules are capable of solving social issues and reducing systemic risks which couldn't be effectively achieved with embedded mechanisms in the system. In the manner of regulating the domain of blockchains, having exogenous off-chain rules together with developed endogenous on-chain rules is more efficient to mitigate the risks and threats rather than trying to have stability only with on-chain rules.

From a financial and social point of view, there are many important issues that can be solved to a significant extent through public regulations. Legal uncertainty is a risk especially for institutions and developers in the DLT industry. It can stifle innovation and capital surge. Protecting investors and users from the spread of false information before and during the coin offerings and similar financial activities is another essential point. A potential systemic risk in the future in the case of high transitivity between the traditional markets and the crypto-asset markets may arise. These issues can and should be mitigated with regulation also, as the central actors are more detectable during activities that may harm the participants of the industry on a considerably large scale.

The decentralized governance, pseudonymous nature of network participants, and open-source nature of many public blockchains pose challenges to traditional liability remedies, including the fiduciary duties of the intermediaries. Another challenge occurs in law enforcement procedures over considerable decentralized protocols to identify the responsible person or intermediary. The lack of regulatory harmonization among the states creates inefficiency in the regulations, as having legal arbitrage is considerably easier on blockchains due to their technological nature. These challenging points should be the main targets for regulators and policymakers. A technical challenge is posed by cyber vulnerabilities and attacks such as *the 51 percent attack* on crypto-asset mining regarding the *proof-of-work* consensus mechanism.<sup>5</sup> Additionally, one may refer to the rising concerns over the energy consumption of blockchain consensus mechanisms such as *proof-of-work*. This concern has been expressed by many officials around the world, specifically upon the surge in energy prices after Russia's invasion of Ukraine.<sup>6</sup>

### 3. European Digital Finance Strategy Package

The European Union Digital Finance Strategy Package is a set of regulatory initiatives introduced by the European Commission in 2020 to create a harmonized regulatory framework for digital finance

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<sup>3</sup> Outi Korhonen, Juho Rantala (2021). Blockchain Governance Challenges: Beyond Libertarianism. *AJIL Unbound*, Volume 115, 2021, p. 408.

<sup>4</sup> Primavera De Filippi, Morshed Mannan, Wessel Reijers (2022). Blockchain Technology and the Rule of Code: Regulation via Governance. P. 26.

<sup>5</sup> Simona Ramos, Lela Mélon, and Joshua Ellul (2022). Exploring Blockchains Cyber Security Techno- Regulatory Gap. An Application to Crypto-Asset Regulation in the EU. 10th Graduate Conference in Law and Technology, Sciences Po (2022), June 18, 2022, p. 6.

<sup>6</sup> Euronews. EU regulator calls for a ban on proof of work Bitcoin mining to save renewable energy. Tom Bateman, January 20, 2020. URL: <https://www.euronews.com/next/2022/01/19/eu-regulator-calls-for-a-ban-on-proof-of-work-bitcoin-mining> (Accessed April 19, 2023).

and accelerate the digital transformation of the financial sector within the EU.<sup>7</sup> The package consists of four key components: (1) Digital Finance Strategy: The Digital Finance Strategy sets out the Commission's vision for the digital transformation of the financial sector in the EU. It aims to create a regulatory framework that is adapted to the digital age, promotes innovation and competition, and protects consumers and investors. (2) Retail Payments Strategy: The Retail Payments Strategy aims to make cross-border payments in the EU as easy, efficient, and affordable as domestic payments. It aims to promote the uptake of instant payment solutions and create a level playing field for payment service providers across the EU. (3) Legislative Proposals: The Commission has proposed a number of legislative initiatives to support the Digital Finance Strategy, including proposals for a Regulation on Markets in Crypto-assets (MiCA)<sup>8</sup>, a Digital Operational Resilience Act (DORA)<sup>9</sup>, and a pilot regime for market infrastructures based on distributed ledger technology (DLT)<sup>10</sup>. (4) Regulatory Sandboxes and Innovation Hubs: The Commission is encouraging the establishment of regulatory sandboxes and innovation hubs to foster innovation in digital finance while maintaining appropriate levels of consumer protection and regulatory oversight. The Digital Finance Strategy Package aims to position the EU as a global leader in digital finance and enable European consumers and businesses to benefit from the opportunities offered by digital innovation in finance. The European Commission aims to leverage synergies between highly innovative start-ups and incumbents in the financial sector while addressing associated risks.

Regulation on Pilot Regime for Market Infrastructures on Distributed Ledger Technology has been enacted. The Council of the European Union has agreed on the final compromised text of the Proposal on Markets in Crypto-assets Regulation. The text of the proposal is changed after important developments and serious events occurred in the industry such as the surge of “non-fungible” token protocols and the rising concern over the energy consumption impact of the “proof-of-work” consensus algorithm.

### 3.1. Regulation on Markets in Crypto-assets

The Regulation on Markets in Crypto-assets is a legislative proposal put forward by the European Commission in September 2020 as part of its Digital Finance Strategy Package. The MiCA aims to establish a harmonized regulatory framework for crypto-assets in the European Union (EU). The MiCA would establish a set of rules and requirements for issuers, service providers, and trading platforms that deal with crypto-assets, intending to promote investor protection, market integrity, and financial stability. Key provisions of MiCA include: (1) authorization and registration requirements for crypto-asset service providers, including crypto-asset exchanges, wallet providers, and custodians; (2) rules on marketing and advertising of crypto-assets, including the requirement to provide clear and understandable information to investors; (3) requirements for issuers of crypto-assets, including disclosure obligations, periodic reporting, and governance arrangements, (4) provisions for stablecoins, including the establishment of a new category of “stable tokens” that would be subject to more stringent regulatory requirements than other types of crypto-assets.

MiCA is also a reaction with an extensive and long-standing market monitoring and participation in international policy work, since the bubble of initial coin offerings in 2017, from the advice received from the European Banking Authority (EBA) and the European Securities and Market Authority (ESMA) on the 9th of January of 2019 and from the public consultation of the European Commission on an EU framework for markets in crypto-assets. It also seems to respond to the policy debate about

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<sup>7</sup> European Commission, 2020, Communication on a Digital Finance Strategy for the EU (Communication) COM 591 final, [https://finance.ec.europa.eu/publications/digital-finance-package\\_en](https://finance.ec.europa.eu/publications/digital-finance-package_en).

<sup>8</sup> Proposal for a Regulation of the European Parliament and of the Council on markets in crypto-assets, and amending Directive (EU) 2019/1937 (MiCA), Interinstitutional File: 2020/0265 (COD), <https://data.consilium.europa.eu/doc/document/ST-13198-2022-INIT/en/pdf>.

<sup>9</sup> Proposal for a Regulation of The European Parliament and of the Council on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0595>.

<sup>10</sup> Proposal for a Regulation of the European Parliament and of the Council on a pilot regime for market infrastructures based on distributed ledger technology, COM/2020/594 final, <https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX%3A52020PC0594>. Accessed 4 March 2023.

global so-called “stablecoins” caused by Facebook's Libra proposal (its name is changed to “Diem”) in June 2019.<sup>11</sup>

The territorial scope of the regulation is broad, and it is intended to apply to all crypto-asset service providers that operate within the EU, regardless of whether they are based inside or outside the EU. The regulation applies to a wide range of crypto-asset service providers, including issuers of crypto-assets, crypto-asset trading platforms, wallet providers, and custodians. The regulation also applies to initial coin offerings (ICOs) and other forms of public offerings of crypto-assets in the EU, regardless of where the issuer is based. The regulation is also intended to provide enhanced protection for consumers and investors, by setting out clear rules on the marketing and sale of crypto-assets, and by requiring greater transparency from crypto-asset issuers and service providers. MiCA also includes provisions for the supervision and enforcement of the regulation. The European Securities and Markets Authority (ESMA) plays a key role in ensuring that the regulation is implemented effectively and consistently across the EU.

The proposed regulation targets the same risks as financial markets but for crypto-asset markets. The main body of the proposal is composed of the disclosure requirements for the offering and admission to trading of crypto-assets and the authorization and supervision of crypto-asset service providers, issuers of asset-referenced tokens, and issuers of electronic money tokens. For this reason, MiCA is inspired by MiFID II, the Prospectus Regulation, Market Abuse Regulation, the Payment Services Directive, and the Electronic Money Directive. Nevertheless, the framework established in MiCA tries to be proportionate and support innovation by not being as demanding as the above-mentioned financial legislation.

MiCA includes definitions of different crypto-assets. Different legal provisions apply to different crypto-assets. Crypto-assets other than security tokens are covered by MiCA since security tokens have already been included in the scope of the Union financial law. Security tokens offer rights to future profits by referencing only the representational value of an asset, not the asset itself. Electronic money tokens (EMTs) reference only one fiat currency by surrogating for banknotes to make payments whereas asset-referenced tokens (ARTs) often aim to store value by stabilizing their value. ARTs and EMTs can be classified as “significant” by the European Banking Authority, according to MiCA article 39. The main criteria to decide on it are: (1) the number of value of transactions in those ARTs or EMTs; (2) their market capitalization; (3) the number of value of transactions in those ARTs or EMTs; (4) the size of the reserve of assets of their issuers; (5) the significance of the issuer’s cross-border activities. Utility tokens provide a kind of access right to use an ecosystem, goods, or services. Utility tokens may also provide governance rights such as shaping the future of a network or the future of the issuer entity.

The Council of the European Union has agreed on the final version of the proposal to present it to the European Parliament. Important changes are seen between the proposed version and the agreed version of the text. In the first version of the proposal, there was no mention of the consensus mechanism based on crypto-asset mining. But this type of consensus mechanism in blockchains is seen as a concern in the final text, especially regarding its impact on the climate and other environmental impacts. The ESMA -in cooperation with the EBA- is considered to be developing draft regulatory technical standards to further specify the content and methodologies relating to sustainability with regard to climate and other environmental impacts. The issuers of crypto-assets and crypto-asset service providers should take more environmentally friendly consensus mechanisms into account. The ESMA should guide in this path by avoiding a double burden on companies. The initiative for international cooperation regarding crypto-assets is underlined in the final text. Additionally, the competence of having technical standards for the delineation of crypto-asset classes is delegated to the ESMA.

Crypto-assets whose issuers are not identifiable are out of the scope of MiCA.<sup>12</sup> Moreover, so-called “airdrops” and crypto-asset mining rewards and staking rewards obtained by holders in order to validate the transactions on a distributed ledger network are not subject to the application of the regulation.<sup>13</sup> “Non-fungible” tokens (NFTs) are excluded from the scope unless they fall under the above crypto-asset categories. However, the European Commission is obliged to prepare a comprehensive assessment

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<sup>11</sup> D. A. Zetzsche, F. Annunziata, D. W. Arner, R. P. Buckley, “The Markets in CryptoAssets Regulation (MiCA) and the EU Digital Finance Strategy”, European Banking Institute Working Paper Series No. 2020/77, 5 November 2020, p. 5.

<sup>12</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Recitals (12a).

<sup>13</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Article (4)(2)(b).

for the creation of a bespoke regime for NFTs. An issuance of crypto-assets as NFTs in a large series of collections is considered an indicator of fungibility. Therefore, the sole attribution of a unique identifier to a crypto-asset cannot be sufficient to classify it as non-fungible or unique.

A credit institution authorized under Directive 2013/36/EU can issue asset-referenced tokens without further authorization. The European Commission is able to make a threshold review between significant and non-significant tokens to initiate a legislative process. Issuers of e-money tokens should have recovery and redemption plans to ensure that the rights of the holders of the e-money token are protected even if the issuers don't comply with their obligations. Derivatives whose underlying asset is a crypto-asset are subject to the Market Abuse Regulation No. 596/2014.

In order to ensure continued protection of the EU financial system against money laundering and terrorist financing risks, it is necessary to ensure crypto-asset service providers authorized in the EU will apply increased checks on financial operations involving consumers and financial institutions from third countries listed as high-risk third countries, that have strategic deficiencies in their regime on anti-money laundering and counter terrorist financing, in accordance with Article 9 of Directive (EU) 2015/849 of the European Parliament and of the Council. The exchange of crypto-assets for funds or exchange of crypto-assets for other crypto-assets -when made by the issuer or offeror- is not seen as a crypto-asset service. Validators, nodes, and miners of a distributed ledger technology are not crypto-asset service providers in the eyes of the regulation.<sup>14</sup>

### **3.2. Digital Operational Resilience Act**

The Digital Operational Resilience Act (DORA) is a legislative proposal put forward by the European Commission in September 2020 as part of its Digital Finance Strategy Package. DORA aims to establish a harmonized framework for operational resilience in the financial sector, including digital financial services. The goal of DORA is to ensure that financial institutions, including banks and investment firms, have robust operational resilience in place to withstand and recover from cyberattacks and other disruptive events. The proposal aims to achieve this by establishing common requirements for risk management, incident reporting, and testing and monitoring of critical systems and services. Key provisions of DORA include: (1) establishment of a common set of requirements for operational resilience across the EU financial sector, including digital financial services, (2) requirements for financial institutions to identify and manage their information and communication technology (ICT) related risks, including third-party risks, (3) requirements for financial institutions to report significant incidents to their national authorities, who will be required to report to the European Supervisory Authorities, (4) testing and monitoring requirements for critical ICT systems and services, including requirements for regular testing and backup and recovery procedures, (5) penalties and enforcement mechanisms for non-compliance with DORA requirements.

### **3.3. Pilot Regime**

The pilot regime for market infrastructures based on distributed ledger technology (DLT) is a legislative proposal put forward by the European Commission in September 2020 as part of its Digital Finance Strategy Package. The proposal aims to provide a framework for the testing and development of DLT-based market infrastructures, such as trading platforms and settlement systems. The pilot regime would allow market infrastructures to operate under a limited period of exemption from certain regulatory requirements, such as those related to capital and liquidity requirements, while they test and develop new DLT-based systems. The goal is to encourage innovation in the financial sector while maintaining appropriate levels of consumer protection and regulatory oversight. Key features of the pilot regime for DLT-based market infrastructures include: (1) establishment of a voluntary pilot regime for market infrastructures based on DLT, (2) exemption from certain regulatory requirements, subject to certain conditions and safeguards, (3) requirements for market infrastructures to provide regular reporting and data to regulators, (4) sunset clause, limiting the duration of the pilot regime.

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<sup>14</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Recitals (63d).

## 4. Impact of the Regulations

### 4.1. Impact on Cyber-security of DLT-based Systems

While it is true that decentralization is often promoted as a way to limit government control and interference, it is important to recognize that governments can play an important role in promoting the development and adoption of blockchain technology. Governments can establish regulatory frameworks that support innovation while also protecting consumers and investors and they can provide funding for research and development in the field. In this manner, the DORA and the pilot regime act will have a positive impact on promoting and development of DLTs and crypto-assets across the EU with a more competitive and beneficial environment in comparison with other hubs in the world.

Technically, legal enforcement for most of the public blockchains is not able to be efficient due to the permissionless and operationally autonomous nature of blockchains for their participants. But still, the vital columns of the blockchain ecosystem are centralized. These centralized entities are vulnerable points in the ecosystem. Fortunately, it is more possible to enforce legal rules on these centralized entities. Especially, service providers, including wallet providers and financial platforms like exchanges, need strong and unified oversight and monitoring with a legal framework. The oversight actions that are required for the security of these actors are: (1) monitoring, (2) increasing awareness of users, (3) early detection, (4) timely reporting, (5) technology and security audits, and (6) employee compliance standards (where applicable).<sup>15</sup> The European Digital Finance Strategy Package includes complementary regulation proposals to provide these necessary actions. Especially, the DORA looks promising to mitigate the risks to some extent from the cyber aspects of the institutions that provide services in the DLT industry. The requirements that will be determined in accordance with the DORA will provide clarification for security measures.<sup>16</sup>

### 4.2. Economic Impact on Crypto-asset Markets

Despite the decentralized and borderless nature of many crypto-assets, regulatory actions are able to have a strong impact on crypto-asset markets, at least in terms of valuation and transaction volumes that are analyzed with qualitative methods.<sup>17</sup> It is observed that the relevant authorities should take global initiatives and cooperation for effective regulation.

It is analyzed that general bans on crypto-assets or treatment to crypto-assets under securities law have an adverse effect on the crypto-asset markets.<sup>18</sup> Additionally, restricting the interoperability of crypto-assets with the regulated markets and the news about combating money laundering and financing terrorism have also adverse effects. But the establishment of specific legal frameworks for crypto-assets and public offerings of tokens coincides with strong market gains. So, regarding the economic impact of the regulations over crypto-asset markets, the following formulation can be used:

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$$R_t^{LegalStatus} = R_t^{Framework} + R_t^{Currency} - R_t^{Ban} - R_t^{Security}$$

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$$R_t^{LegalStatus}$$

= Favourable events for crypto-asset markets

$$R_t^{Framework}$$

= Events of adopting specific a legal framework

<sup>15</sup> Simona Ramos, Lela Mélon, and Joshua Ellul (2022). Exploring Blockchains Cyber Security Techno- Regulatory Gap. An Application to Crypto-Asset Regulation in the EU. 10th Graduate Conference in Law and Technology, Sciences Po (2022), June 18, 2022, p. 18.

<sup>16</sup> According to Ramos, Simona and Mélon, a system audit plays a crucial role, including functionality and code review, vulnerability, incident and security management, disaster recovery, risk management, cyber security. According to these authors, the Innovative Technology Arrangements and Services Act of Malta is an advanced example for a cyber approach.

Simona Ramos, Lela Mélon, and Joshua Ellul (2022). Exploring Blockchains Cyber Security Techno- Regulatory Gap. An Application to Crypto-Asset Regulation in the EU. 10th Graduate Conference in Law and Technology, Sciences Po (2022), June 18, 2022, p. 19.

<sup>17</sup> Raphael Auer, Stijn Claessens (2018). Regulating cryptocurrencies: assessing market reactions. BIS Quarterly Review September, p. 51-65.

<sup>18</sup> Raphael Auer, Stijn Claessens (2018). Regulating cryptocurrencies: assessing market reactions. BIS Quarterly Review September, p. 52.

$R_t^{Currency}$	= Events that indicate that crypto-assets are classified similar to a currency
$R_t^{Ban}$	= Events of official bans or restrictions on crypto-assets
$R_t^{Security}$	= Events that indicate crypto-assets to be a security

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In other words, crypto-asset markets react positively when a legal clarification is adopted for crypto-assets with a legal framework or when crypto-assets are classified similarly to a currency. But the markets react negatively to any ban on crypto-assets or when crypto-assets are classified to be as securities. When the global hubs of the DLT industry and crypto-asset markets are evaluated, it shows us a comparable advantage of the EU on the market-friendly side according to the formulation above.

China was an undisputable base for crypto-asset markets and DLT startups for many years along with being a home for the majority of the Bitcoin mining hash power for more than two years.<sup>19</sup> But the official ban of China over any usage of crypto-assets hit the DLT and crypto-asset activities to the bottom in the country in the year 2022.<sup>20</sup> A volatile stand is observed for the policy of the United States (US) over crypto-assets. The US stood neutral and didn't provide a specific legal framework on crypto-assets for years. But many political and legal processes had started in the US to take advantage of the general ban of crypto-assets in China. Then a contrarian stand has been seen in the actions of the related authorities in the US. The Securities Exchange Commission has taken actions that indicate that crypto-assets are securities, except for Bitcoin.<sup>21</sup> Moreover, the banks that are the gateway between the traditional banking system and crypto-asset markets in the U.S. became insolvent over a night though one of these banks was looking officially well-audited.<sup>22</sup> In the case of the EU, there is no general ban on the usage or trade of crypto-assets. But there is a general financial ban on financial activities with Russia upon invading Ukraine, covering the use of crypto-assets. Only security tokens are subject to the Union's financial law. It means that the majority of the crypto-assets are not considered securities in the EU. The EU has started the adoption process of a comprehensive legal framework for crypto-assets and their underlying technologies. Overall, it is possible to say that the EU has a higher  $R_t^{LegalStatus}$  score in comparison with the other global DLT and crypto-asset hubs over the world, according to the formulation above to detect the economic impact of the regulation on crypto-asset markets. In other words, the current European policy on crypto-assets has a relatively more positive impact on crypto-asset markets.

### 4.3. Impact on Public Offerings

Under MiCA, issuers of certain types of crypto-assets will be required to prepare a whitepaper that contains information about the issuer, the asset, and the risks and benefits associated with the asset.<sup>23</sup> The whitepaper will be submitted to relevant national authorities. The whitepaper could be reviewed by the relevant public authority to ensure that it complies with disclosure requirements imposed by the MiCA. While the review process is intended to protect investors and ensure that issuers provide accurate and complete information, it could also lead to delays and additional costs in the development and deployment of new DLTs and decentralized applications. This is especially true for smaller and newer projects that may not have the resources to go through a lengthy review process. The review process

<sup>19</sup> Statista (2023), Distribution of Bitcoin mining hashrate from September 2019 to January 2022 by country, Raynor de Best, <https://www.statista.com/statistics/1200477/bitcoin-mining-by-country/> (Accessed April 19, 2023).

<sup>20</sup> The People's Bank of China, 中国人民银行有关负责人就《关于进一步防范和处置虚拟货币交易炒作风险的通知》答记者问, September 2024, 2021. <http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4348556/index.html> (Accessed April 19, 2023).

<sup>21</sup> U.S. Securities and Exchange Commission, Exercise Caution with Crypto Asset Securities: Investor Alert, March 23, 2023, <https://www.sec.gov/oiea/investor-alerts-and-bulletins/exercise-caution-crypto-asset-securities-investor-alert> (Accessed April 19, 2023).

<sup>22</sup> Board of Governors of the Federal Reserve System, Joint Statement by Treasury, Federal Reserve, and FDIC, March 12, 2023, <https://www.federalreserve.gov/newsevents/pressreleases/monetary20230312b.htm> (Accessed April 19, 2023).

<sup>23</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Article (8).



could be streamlined or made more efficient over time, which could mitigate some of the potential negative impacts on innovation.

When a crypto-asset is not classified as a security token, electronic money token, or asset-referenced token, it becomes a utility token by default in the eyes of MiCA. Consequently, a large number of crypto-assets that will be issued in the EU will be treated as utility tokens.

#### **4.4. Impact on so-called “Stablecoins”**

MiCA defines e-money tokens as "digital representations of fiat currencies that are stored on a device or a server and used as a means of payment".<sup>24</sup> E-money tokens are subject to specific regulatory requirements under MiCA, including authorization by the relevant national authorities and compliance with certain transparency and conduct of business requirements.

Algorithmic stablecoins, on the other hand, are a type of crypto-asset that are designed to maintain their value relative to a particular asset or index using algorithms and market mechanisms. MiCA states that "so-called algorithmic 'stablecoins' that aim at maintaining a stable value, via protocols, that provide for the increase or decrease of the supply of such crypto-assets in response to changes in demand should not be considered asset-referenced tokens, provided that they do not aim at stabilizing their value by referencing one or several other assets".<sup>25</sup> While some algorithmic stablecoins may be pegged to fiat currencies or other assets, they do not necessarily meet the definition of e-money tokens under MiCA. The classification of an algorithmic stablecoin issuer depends on various factors, including the specific design and features of the stablecoin. However, in general, an algorithmic stablecoin issuer is not necessarily counted as an e-money token issuer under the Regulation on Markets in Crypto-assets (MiCA). If an algorithmic stablecoin issuer meets the criteria of a "crypto-asset issuer" under MiCA, it will be subject to certain regulatory requirements, including authorization by the relevant national authorities and compliance with certain transparency and conduct of business requirements. However, the specific requirements will depend on the type of crypto-asset being issued and its features.

#### **4.5. Impact on Decentralized Finance**

Decentralized Finance (DeFi) is an ecosystem of decentralized applications that provide financial services built on top of peer-to-peer and trustless networks, meaning that they do not need a central authority. DeFi is usually described as an open, permissionless, and highly interoperable protocol stack built on public distributed ledger technologies to replicate existing financial services more transparently and openly.<sup>26</sup>

DeFi projects are purely decentralized models that rely only on smart contracts and, therefore, are not within the scope of MiCA since its provisions would not apply if there is no legal or natural person to be held accountable. For this reason, it is essential to know when we are facing a decentralized protocol and when MiCA does not apply to a DeFi project. But MiCA will impact the DeFi industry in several ways.

A quite critical point is that the term “decentralized” is not explained clearly in MiCA although decentralized protocols are not in the scope of the regulation. Consequently, the administrative implications by the supervisory authorities and the case law of the European Court of Justice will enlighten what “decentralized” means. At this point, understanding “decentralization” in DLTs is important to foresee the future decisions of the supervisory and juridical authorities.

The term "decentralized" is used in several different senses across the DLT industry. Firstly, the term is used in the “settlement layer”, where a network of nodes comprises a permissionless blockchain through peer-to-peer connections between unrelated and independent agents, rather than relying on a central server or a central organization. This meaning of decentralization is referred to as architectural distribution. Secondly, the term may refer to the decentralization of custody of crypto-assets (non-

<sup>24</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Article (3)(1)(4).

<sup>25</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Recitals (26).

<sup>26</sup> Schär F. (2021). Decentralized Finance: On Blockchain and Smart Contract-based Financial Markets. Federal Reserve Bank of St. Louis Research Paper Series, p. 2.

custodial of crypto-assets by an intermediary). In traditional finance, custody is a financial service in which the custodian safekeeps assets on behalf of the client. Usually, this type of service is endorsed by the social consensus on the custodian's reputation, together with the law. In the application layer, a non-custodial protocol allows users to have complete control of their crypto-assets deposited in a smart contract address for a specific finality of a protocol without relying on a centralized party. The interaction between the protocol and the user is autonomous and automatic, without any contact with the development team; thus, transferring the responsibility from the intermediaries to the users. Thirdly, the term refers to the decentralization of management, organization, and ownership of a protocol. Even though this type of decentralization is fundamental across all layers, there is a clear trend toward "decentralized governance" across DeFi protocols. In DeFi, political decentralization is similar, at first sight, to shareholder voting for corporations, but, in substance, they are considerably different; in traditional corporate governance, shareholders may only part-take in macro/structural decisions, whereas in DeFi, a token holder may potentially influence any protocol element, from high-level direction to aspects of its daily operation.<sup>27</sup>

The earnings rewarded from the validation of transactions on a DLT network are out of the scope of MiCA as stated in MiCA.<sup>28</sup> Consequently, the staking rewards from proof-of-stake consensus mechanisms will not be subject to the provisions of MiCA. But in this context, the status of "liquid staking" protocols which allow the stakers to financially benefit from their staked holdings might be a controversial status in the eyes of the supervisory authorities.

The way of regulating significant e-money token issuers and the implication of periodic measures on e-money tokens will definitely have an impact on DeFi protocols and the governance of these protocols since the biggest *decentralized autonomous organizations* such as MakerDAO have significant amount of so-called decentralized "stablecoin" DAI which is composed of a basket from different percentages of e-money tokens issued by centralized financial institutions.

## 5. Conclusion

Distributed ledger technologies and crypto-asset markets have many issues that could not be solved efficiently with on-chain governance rules that are the rules improved and enforced within the DLT-based and specifically blockchain-based systems. At this point, off-chain governance initiatives can improve the industry. An important exogenous off-chain governance tool is law and regulation that are shaped out of the specific technologic system and have an indirect effect on DLT network without automatic enforcement. But regulating DLT-based systems and crypto-asset markets has challenges that particularly derive from the permissionless, cross-border, and operationally autonomous nature of the underlying technology. A regulation or set of regulations can be successful for the DLT industry as long as regulations have a balanced approach between promoting innovation and providing security and stability.

The regulations will have a significant impact on the development of digital finance in the European Union and could help shape the future of the distributed ledger technology industry in the region. The distributed ledger technology industry is likely to face a range of regulations that aim to provide greater clarity and certainty to its cyber security aspects, market participants, protect consumers and investors, and prevent financial crime. It is important for industry participants to stay abreast of regulatory developments and ensure compliance with applicable regulations. Different attempts from the European institutions are being observed regarding policymaking on distributed ledger technologies and crypto-assets with approaches through different fields such as privacy compliance, financial stability, promoting innovation, and anti-money laundering. Especially the regulatory attempts in the framework of the European Digital Strategy Package and the General Data Protection Regulation have a significant impact on DLTs and crypto-assets. The comprehensive, democratic, and transparent way followed by the European authorities to shape a general policy around DLTs and crypto-assets will provide a relatively huge financial and technological benefit for the EU. Because legal arbitrage is much easier

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<sup>27</sup> Maia, Guilherme and Vieira dos Santos, João (2021). MiCA and DeFi ('Proposal for a Regulation on Market in Crypto-Assets' and 'Decentralised Finance'), p. 5-6.

<sup>28</sup> Proposal for a Regulation on Markets in Crypto-assets (MiCA), Recitals (63d).

in the use of crypto-assets and their underlying technologies while especially the United States and the United Kingdom tumble with contradictory steps in policymaking on DLTs and crypto-assets. As the nature of blockchains requires a more polycentric governance to regulate the ecosystem due to its modality of *rule of code*, an international regulatory initiative at the European level looks a quite fruitful step.

The Regulation on Markets in Crypto-assets would establish a set of rules and requirements for issuers, service providers, and trading platforms that deal with crypto-assets, with the goal of promoting investor protection, market integrity, and financial stability. The territorial scope of the regulation is broad, and it is intended to apply to all crypto-asset service providers that operate within the EU regardless of whether they are based inside or outside the EU. Since crypto-assets pose many of the same risks of financial instruments, the regulation is inspired by MiFID II, the Prospectus Regulation, the Market Abuse Regulation, the Payment Services Directive and the Electronic Money Directive. Nevertheless, the framework established in MiCA tries to be proportionate and promote innovation by not being as demanding as the above-mentioned financial legislation. The goal of the Digital Operational Resilience Act is to ensure that financial institutions, including banks and investment firms, have robust operational resilience in place to withstand and recover from cyber-attacks and other disruptive events. The proposal aims to achieve this by establishing common requirements for risk management, incident reporting, and testing and monitoring of critical systems and services. The proposal of a pilot regime for market infrastructures based on distributed ledger technology aims to provide a framework for the testing and development of DLT-based market infrastructures, such as trading platforms and settlement systems. The pilot regime would allow market infrastructures to operate under a limited period of exemption from certain regulatory requirements, such as those related to capital and liquidity requirements, while they test and develop new DLT-based systems. The goal is to encourage innovation in the financial sector while maintaining appropriate levels of consumer protection and regulatory oversight.

After the policymaking and legislation processes, the implications of the European Supervisory Authorities and the case law of the European Court of Justice will be the main driving force of influence over the DLT industry and crypto-asset markets. For instance, the meaning of the term “purely decentralized models” and the policy on “non-fungible” tokens and digital collectibles will be determined by the decisions of the institutions that are mentioned above.

DeFi projects with purely decentralized models that rely only on smart contracts are not within the scope of MiCA since its provisions would not apply if there is no legal or natural person to be held accountable. The main challenges in regulating blockchains are the permissionless nature and the operational autonomy of the network participants. Consequently, the European Commission prefers here to evade the potential enforcement issues on decentralized protocols, by regulating identifiable actors and service providers in the blockchain industry. Another controversial topic arises at this point to decide the criteria of having a decentralized nature. For this reason, it is essential to know when we are facing a decentralized protocol, so when MiCA does not apply to a DeFi project. But still, MiCA will have an impact on DeFi. The way of regulating “significant” e-money token issuers and the implication of periodic measures on e-money tokens will definitely have an impact on DeFi protocols and the governance of these protocols since the biggest decentralized autonomous organizations such as MakerDAO have a significant amount of so-called decentralized “stablecoin” DAI which is composed of a basket from different percentages of e-money tokens issued by centralized financial institutions.

Issuers of certain types of crypto-assets will be required to prepare a whitepaper that contains information about the issuer, the asset, and the risks and benefits associated with the asset. The whitepaper could be reviewed by the relevant public authority to ensure that it complies with MiCA's disclosure requirements. While the review process is intended to protect investors and ensure that issuers provide accurate and complete information, it could also lead to delays and additional costs in the development and deployment of new DLTs and decentralized applications.

Legal treatment on the mutation of a crypto-asset by time in terms of its legal classification according to the MiCA is still an important issue that should be addressed by the related policymaking institutions of the European Union.

The issuers of crypto-assets and crypto-asset service providers should take more environment-friendly consensus mechanisms into account since MiCA states a future measure against consensus mechanisms causing significant energy consumption. The ESMA should guide in this path by avoiding double burdens on companies.

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