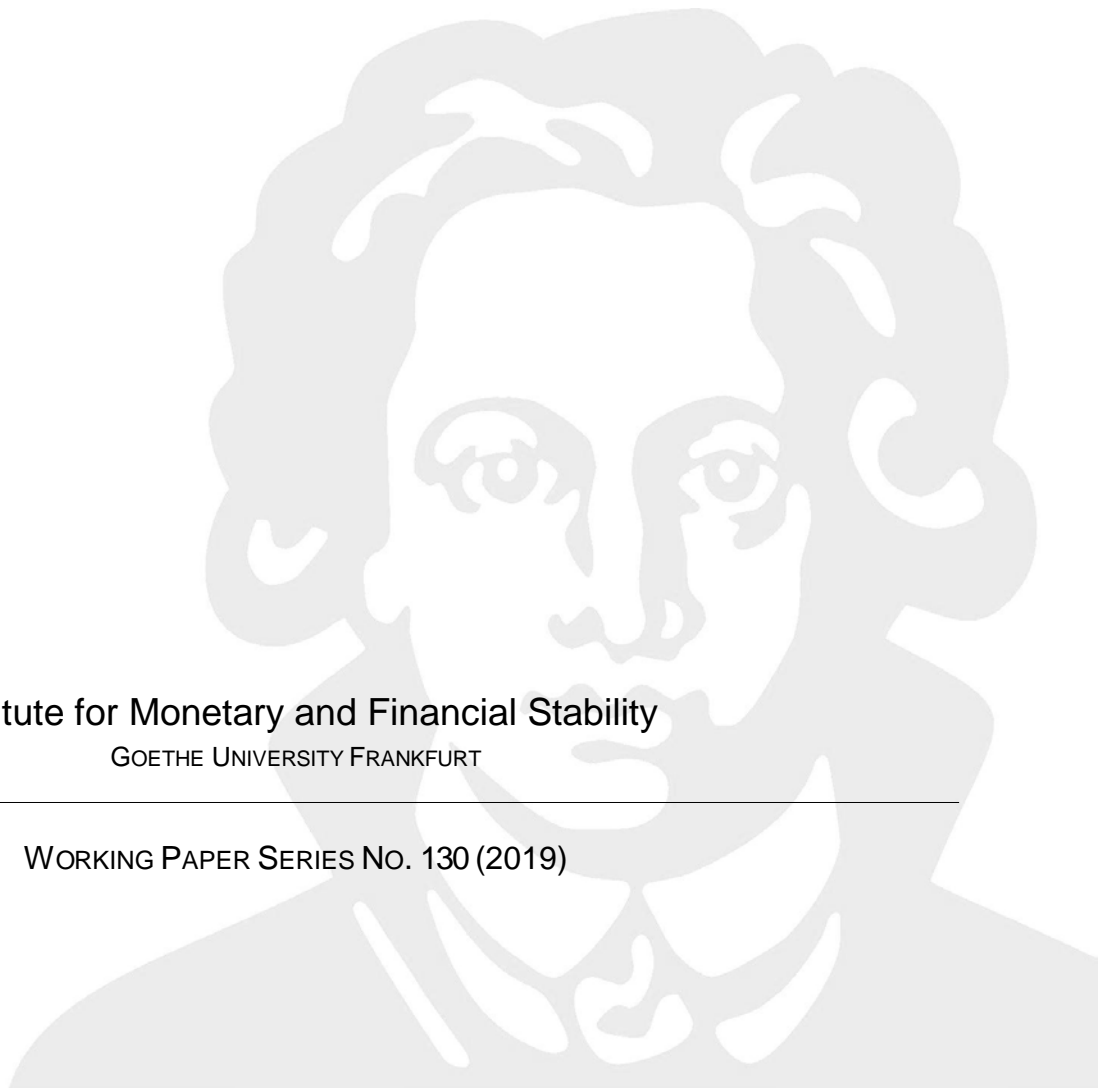


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Regulating Virtual Currencies

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Regulating Virtual Currencies¹

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Distributed ledger technology especially in the form of publicly coordinated validation networks such as Ethereum and Bitcoin with their own monetary circles provide for a revealing litmus test for current financial regulatory schemes. The article highlights the interrelation between distributed coordination and the emission of virtual currency to make sense of the function of the new monetary phenomenon. It then argues for the regulation of financial services on the ground of the technology to ensure integrity standards. In this respect, it is useful to gear the development of a regulatory scheme towards the existing financial regulatory principles. However, future measures of the regulators must take the distributed nature of the platforms into account by relying on a “regulated self-regulation” of the community. Finally, the article focuses on the shortcomings of the current EU regulatory regimes, especially the regulation frameworks regarding financial services, payment services and electronic money.

I. Introduction

Distributed ledger technology especially in the form of publicly coordinated validation networks such as Ethereum and Bitcoin provide for a revealing litmus test for current financial regulatory schemes. On the one hand, the validation apparatuses constitute infrastructures for “people to agree on a particular state of affairs and record that agreement in a secure and verifiable manner”² on a transnational scale. Put differently, distributed ledgers open up algorithm-based forums for the expression of private autonomy in a broad variety of practical application such as property registries³ or self-enforcing online dispute resolution platforms⁴. On the other hand, the distributed decision-making relies on the distribution of virtual currency as an incentive mechanism. This new monetary phenomenon, which is functionally interrelated

¹ This article is based on my doctoral thesis “Regulierung der Blockchains – Hoheitliche Steuerung der Netzwerke im Zahlungskontext” published by Mohr Siebeck, Tübingen, 2018.

² *Wright/De Filippi*, Decentralized Blockchain Technology and the Rise of Lex Cryptographia, p. 4 et seq.

³ *Fairfield*, 88 S. Cal. L. Rev. (2015), 805 et seq.

⁴ *Ortolani*, 36 Oxford J. Legal Studies (2016), 595, 611 et seq.

to distributed coordination in blockchains and other publicly accessible distributed ledgers, raises a variety of questions regarding currency-based regulatory instruments.

Against the backdrop of recent monetary history, the rise of virtual currencies seems to be a further evolutionary step in an overarching privatisation or essentialisation process. However, from the regulators' perspective, the phenomenon diverges significantly from prior types of electronic money since virtual currencies are not emitted by corporate intermediaries. Moreover, they are an essential part of a new kind of trust infrastructure extending far beyond the financial sphere.⁵ Taking the abovementioned distributed nature of the decision-making into account, this article will introduce a potential regulation *modus* to address structural shortcomings and the emerging impacts of the networks on the financial ecosystem.

The article proceeds as follows: Section II will distinguish the existing variations of distributed ledgers from each other, so as to propose a classification for the further discourse. Section III will clarify the interrelation between publicly coordinated networks and the distribution of virtual currency as an incentive mechanism. Section IV will analyse the regulatory challenges resulting from the emergence of the new monetary phenomenon. Finally, Section V will show how the applicable EU law covers (of) distributed ledger technology in the financial sphere, revealing the current normative shortcomings.

II. What Distributed Ledger Technology Is

Satoshi Nakamoto's "Bitcoin: A Peer-to-Peer Electronic Cash System"⁶ can be considered the birth of distributed ledger technology in the form of a specific application – a public and permissionless payment network. The paper proposes a "purely peer-to-peer version of electronic cash [that] would allow online payments to be sent directly from one party to another without going through a financial institution"⁷. The transaction registry, which is referred to as the blockchain, is maintained by a consensus protocol – a piece of software used by every participant in the validation procedure to synchronize the distributed ledger.⁸ Thus, on a

⁵ *Werbach*, 33 Berkeley Tech. L.J. (2018), 487.

⁶ *Satoshi Nakamoto*, Bitcoin: A Peer-to-Peer Electronic Cash System, 2008, available at <https://bitcoin.org/bitcoin.pdf>.

⁷ *Satoshi Nakamoto*, *supra* note 6, p. 1.

⁸ *Fairfield*, Wash. & Lee L. Rev. (2015), 35, 36.

conceptual level, a local corporate intermediary must not be trusted since the participants themselves coordinate the system by applying the respective protocol. Additionally, every transaction is recorded in a chronological database by the network of computers and is completely transparent to everybody.⁹ The Satoshi Nakamoto consensus machine constitutes the most disruptive arrangement of a distributed coordination system as the database is not only publicly available to everybody, but, the validation procedure is also totally permissionless and allows access by every potential user.

However, the ecosystem has already formed variations of the initially proposed idea of a completely distributed decision-making platform. Some arrangements such as the Ripple network restrict the access to the validation procedure to selected entities, which opens up the opportunity to unfold influence on the infrastructure.¹⁰ Accordingly, those systems are designed as consortium platforms to provide cost-efficient cross-border transactions between intermediaries.¹¹ The transaction data may be restricted to an arbitrary extent or be fully transparent to the public.

In conclusion, the coordination arrangements of the different versions of distributed ledgers can be broadly classified by using the following parameters:

- scope of permission regarding the validation procedure and
- scope of transparency regarding the recorded transaction data

which leads to any type of distributed coordination system between the poles of a

(1) fully public distributed ledger with a consensus mechanism accessible by anyone in the world without limitations, such as the Bitcoin blockchain,

(2) consortium distributed ledgers controlled by a corporate intermediary arbitrary defining the scope of read and write permissions to preselected entities.

The article will make use of these archetypes of distributed ledgers as reference objects in the further discussion about a potential regulatory scheme regarding the use of the technology in the financial sphere, especially for payment purposes.

⁹ *Werbach*, 33 Berkeley Tech. L.J. (2018), 487, 503.

¹⁰ *Evans*, *Economic Aspects of Bitcoin and Other Decentralized Public-Ledger Currency Platforms*, p. 16.

¹¹ *Werbach*, 33 Berkeley Tech. L.J. (2018), 487, 491, 498 et seq., 509.

III. Interrelation Between Virtual Currencies and Distributed Coordination

The emergence of Bitcoin as the first publicly coordinated validation network is strongly connected to the narrative of a new monetary phenomenon, which was later referred to as “virtual currency”¹². This is not surprising (inasmuch) as that narrative was created by the founder himself who introduced the network as a “Peer-to-Peer Electronic Cash System”. However, the distribution of a virtual currency as a common characteristic is not only shared by self-declared distributed payment systems. Rather, this technical feature is functionally interrelated to publicly coordinated infrastructure in the form of an incentive mechanism.

Generally speaking, in absence of a trusted intermediary, the participants of the network have to ensure the consistency and accuracy of their ledger. The integrity of their coordination system would be jeopardized if the participants could manipulate the ledger in their own favour, for instance, if they could spend their virtual money twice (so-called “double-spending problem”). Even if most participants of the respective coordination system are trustworthy, an attacker could establish a large amount of fake network nodes to undermine the voting procedure (so-called “Sybil attack”).¹³ The consensus mechanism introduced by Satoshi Nakamoto was the first scalable solution to that coordination challenge.¹⁴

However, the validation procedure, which is called “proof of work” in the case of Bitcoin and most of the other distributed ledgers, requires the participants to solve cryptographic puzzles in the course of a so-called hash function. Thus, transactions can only be processed on the basis of a substantial amount of computing power which the participants have to provide to the respective network.¹⁵ This serves the purpose that the potential benefits of fraudulent behaviour are less than the costs which grow with the overall computational capacity of the network. Though, the consequence of this arrangement is that it requires an incentive mechanism that

¹² *European Central Bank*, Virtual currency schemes, 2012, available at <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf>; *European Central Bank*, Virtual currency schemes – a further analysis, 2015, available at <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf>; *European Banking Authority*, Opinion on „virtual currencies“, 2014, available at <https://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf>.

¹³ *Lampport et al.*, 4 ACM (1982), 382–401.

¹⁴ *Werbach*, 33 Berkeley Tech. L.J. (2018), 487, 501 et seq.

¹⁵ *Abramowicz*, 58 Ariz. L. Rev. (2016), 359, 371 et seq.; *Werbach*, 33 Berkeley Tech. L.J. (2018), 487, 502.

encourages the participants to provide their computational resources to the network so that it reaches an adequate level of integrity in order to function as a trustworthy coordination system. In fact, an effective joint management of common infrastructure (such as the public coordination platform described here) cannot rely on an altruistic motivation of the community but must be based on game-theoretic approach.¹⁶

That is where the emission of virtual currencies comes into play, even though their capacity to serve as store of value may be limited against the backdrop of the substantial exchange rate volatility.¹⁷ The distribution of virtual money serves as a reward for the contribution in the course of the coordination procedure which allows the participants to cover their maintenance costs for the expensive hardware and to generate revenue.¹⁸ Furthermore, the reward function determines the parameters of how units of account enter the monetary circle without a central bank. However, the functional interaction between distributed coordination and virtual currency supply is ambivalent even in the case of Bitcoin as pointed out by Werbach: “Bitcoins are thus both the output and input of the system. One could equally well describe Bitcoin as a trust infrastructure designed to support a digital currency, or a digital currency designed to support a trust infrastructure.”¹⁹ Put differently, the respective user is the one who adjusts the focus either on the payment function or on another application on the grounds of the more general coordination function of the network. Nevertheless, the emergence of a new monetary phenomenon raises a broad spectrum of regulatory questions which this article will highlight in the following section.

IV. Emerging Regulatory Issues

In order to ascertain the regulation issues associated with virtual currencies, the following section will distinguish between the coordination function of distributed ledgers and potential financial applications on the basis of the technology (Section 1). Then, potential subjects of

¹⁶ *Kulms*, 51 *Pravo i privreda* 4–6 (2014), 288, 297 et seq.; *Abramowicz*, 58 *Ariz. L. Rev.* (2016), 359, 371 et seq.

¹⁷ *European Central Bank*, *Virtual currency schemes – a further analysis*, 2015, supra note 12, p. 23 et seq.; see also the consumer warning issued by the *European Banking Authority*, *Opinion on „virtual currencies“*, 2014, supra note 12.

¹⁸ *Kulms*, 51 *Pravo i privreda* 4–6 (2014), 288, 298 et seq.; *Werbach*, 33 *Berkeley Tech. L.J.* (2018), 487, 504; *Abramowicz*, 58 *Ariz. L. Rev.* (2016), 359, 376 et seq.

¹⁹ *Werbach*, 33 *Berkeley Tech. L.J.* (2018), 487, 504.

legal measures will be identified considering the boundaries for conventional regulatory schemes (Section 2). Finally, the potential perils following from the governance structure of the networks will be explored (Section 3).

1. Distributed Ledger Use Case Neutrality

As mentioned above, distributed ledgers provide a forum for the expression of private autonomy in a transnational context. Even though distributed ledgers of the category (1) have to be based on a monetary circle as an incentive mechanism, it is essential to emphasise that on a conceptual level they provide a coordination system which can be used for a broad variety of applications. Therefore, they should not be regulated in a way that pushes the technology into specific use cases.²⁰ This could be the result of an indifferent regime based on the assumption that distributed ledgers of the category (1) are payment systems per se and shall be regulated as such. The regulatory instruments must relate to the specific context of use.²¹ This is true for distributed ledgers of the category (2) as well. Of course, the normative standards for payment systems should only apply to those arrangements if they are utilised for this purpose by corporate intermediaries. Applying the strict rules to market contexts outside the financial sphere would not only lead to the unreasonable prohibition of an emerging innovative ecosystem but to an irrelevant and arbitrary regulatory approach.

2. Regulated Self-Regulation and the Boundaries for Conventional Regulatory Schemes

The layer structure of distributed ledgers is comparable to the architecture of the internet.²² In regard to the latter, the regulators are distinguishing between the conceptual, technical level of the internet which is primarily arranged by private organisations such as the ICANN²³ on the one hand, and the level of user interaction within internet services such as communication

²⁰ *Fairfield*, 88 S. Cal. L. Rev. (2015), 805, 869; *Reyes*, 61 Vill. L. Rev. (2016), 191, 194, 203, 221 et seq.

²¹ *Fairfield*, 88 S. Cal. L. Rev. (2015), 805, 869.

²² *Shcherbak*, 7 EJLS (2015), 45, 87.

²³ See for this arrangement *Schultz*, 10 Yale J. L. & Tech. (2007), 151, 173 et seq.; *Viellechner*, *Transnationalisierung des Rechts*, S. 141 et seq.

platforms which is addressed by mandatory regulations (e.g. copyright law and provisions against hate speech) in the respective jurisdiction on the other hand.²⁴

A similar approach can be applied to enforce statutory requirements regarding category (2) ledgers since those platforms are governed by central providers such as the platform RippleNet is governed by Ripple Labs, Inc.²⁵ In the case of category (1) ledgers like Bitcoin, the situation is quite different since there are no trusted central intermediaries responsible for the infrastructure.²⁶ Instead, the participants themselves maintain and synchronise the ledger by applying the respective consensus protocols on their computers. This distributed governance structure of the technology results in a challenge for regulators since conventional “command and control” schemes to enforce normative requirements are limited to some extent. Put differently, the regulators are faced with the new phenomenon of a distributed service. Moreover, against the backdrop of the anonymity of the coordination systems, spheres of responsibility cannot be determined.

However, the conclusion should not be that Bitcoin and other distributed coordination systems ought to be recognised as unregulated technologies.²⁷ This view would ignore the fact that distributed ledger technology must be considered as governed in many respects, especially in the form of a substantial private ordering²⁸. The emergence of such private sets of rules in the online sphere was already described at the end of the 20th century in the debate over “the law of cyberspace”.²⁹ With regard to distributed ledgers, this private ordering is subdivided in the governance by the algorithm-based infrastructure and the governance of this infrastructure arranged by the community of developers.³⁰

²⁴ *Viellechner*, Transnationalisierung des Rechts, S. 109 et seq.

²⁵ *Armknrecht et al.*, in: Trust and Trustworthy Computing 2015, 163, 163 et seq.

²⁶ *Shcherbak*, 7 EJLS (2015), 45, 87.

²⁷ See id.

²⁸ See for these rule-making processes by private actors *Schwarcz*, 97 Nw. U. L. Rev. (2002), 319, 324 et seq.

²⁹ *Johnson/Post*, 48 Stan. L. Rev. (1996), 1367, 1379 and *Post*, 43 Wayne L. Rev. (1996), 155, 167: “The law of the Internet’ thus emerges, not from the decision of some higher authority, but as the aggregate of the choices made by individual system operators about what rules to impose, and by individual users about which online communities to join”.

³⁰ *De Filippi/Loveluck*, The invisible politics of Bitcoin: governance crisis of a decentralised infrastructure, 5 Internet Policy Review (2016), 1 et seq.

The regulators can address the governance mechanisms through a co-regulation regime between the private actors arranging the networks and state authorities (so-called “regulated self-regulation”³¹). The postulate of such a scheme should be the implementation of regulatory specifications into the respective protocols (so-called “regulation-through-code”).³² The proposed approach presumes the cooperation between state regulators and the self-governmental bodies representing the specific community, such as the Bitcoin Foundation. The European Banking Authority put forward a comparable approach in its statement on virtual currency, introducing a so-called “scheme governance authority”.³³ The establishment of such an entity, which is accountable to the regulator, would need to be a mandatory requirement for a virtual currency scheme in order to be regulated as a financial service and to be allowed to interact with existing regulated financial services. Furthermore, it would be required to comply with the normative requirements as stated by the supervisory authorities.³⁴ However, it must be considered that most of the networks are already governed by the community of developers who exercise significant control over the respective distributed ledger, and by the validators who must implement all proposed protocol changes.³⁵ Therefore, it might be more preferable for the regulator to interact with existent governance bodies than to drive a parallel institutionalisation process forward.

Finally, the ecosystem of services based on the distributed ledger technology is an additional area for governmental measures. Perils resulting from the technical modalities of the coordination systems can be addressed through the regulation of the service providers at least to some extent as shown in the following. In this respect, the regulator can rely on traditional regulatory instruments to govern the intermediaries.

³¹ *Hoffmann-Riem*, Selbstregelung, Selbstregulierung und regulierte Selbstregulierung im digitalen Kontext, in: Fehling (Hrsg.), *Neue Macht- und Verantwortungsstrukturen in der digitalen Welt*, 2016, S. 27 et seq.

³² *Reyes*, 61 *Vill. L. Rev.* (2016), 191, 227.

³³ European Banking Authority, *Opinion on “virtual currencies”*, 2014, supra note 12, p. 39 et seq.

³⁴ European Banking Authority, *Opinion on “virtual currencies”*, 2014, supra note 12, p. 39.

³⁵ *Kulms*, 51 *Pravo i privreda* 4–6 (2014), 288, 300 et seq.

3. Adapting Financial Regulatory Principles

The normative structure of the existing financial regulation serves as a model for the state in regard to future measures. This is because payment services based on distributed ledgers result in a similar risk structure. Therefore, the distinction between traditional payment methods such as electronic or scriptural money and virtual currencies is not justified in most cases.

a) Preventing the Risk of Money Laundering and Terrorism Financing

In particular, this is the case in respect of the regulatory provisions against money laundering and terrorism financing. The anonymity of transactions on the basis of distributed ledger technology results in a challenge to determine the identity of the persons involved.³⁶ Regulators cannot directly address providers to enforce KYC requirements, at least in regard to distributed ledgers of the category (1). Additionally, the participants of the respective network are able to transfer virtual currencies directly without trusted intermediaries, which leads to further difficulties of a non-face-to-face identification.³⁷ It bears noting that supervisory authorities cannot rely on a conventional paper trail against this background so that other identification mechanisms must be developed.

An essential regulatory instrument in this regard is the distributed ledger itself as a record-keeping mechanism which is inherent in the system of virtual currencies.³⁸ However, it must be noted that, in general, no personal data is being kept in the databases, but only alphanumeric characters.³⁹ Consequently, the significant hurdle is to identify the entities who stand behind the respective transactions documented in the distributed ledger.⁴⁰ The takedown of Silk Road in 2013 by US law enforcement authorities has demonstrated the practicability of such an approach.⁴¹

³⁶ *Financial Action Task Forces*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, p. 11, available at <http://www.fatf-gafi.org/media/fatf/documents/reports/Guidance-RBA-Virtual-Currencies.pdf>.

³⁷ *Financial Action Task Forces*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, supra note 36, p. 9.

³⁸ *Reid/Harrigan*, in: *Security and Privacy in Social Networks 2013*, p. 197 et seq.

³⁹ *Brito/Castillo*, *Bitcoin*, p. 7 et seq.

⁴⁰ *Reid/Harrigan*, in: *Security and Privacy in Social Networks 2013*, p. 197.

⁴¹ *Böhme et al*, 29 *J. Econ. Perspect.* (2015), 213, 231.

As pointed out by the FATF, regulators should apply a risk-based approach to mitigate the above-mentioned perils even if they decide not to regulate virtual currencies with respect to other regulatory aspects, such as consumer protection or network security.⁴² Against the background of the transnational scope of the technology and the ecosystem of services on the basis of distributed ledger technology, governmental bodies must cooperate on an international level to achieve a coherent regulatory scheme. The standard-setting process of the FATF provides an example for a successful approach in this regard.⁴³ This means in the first place that financial institutions providing distributed ledger systems and virtual currency exchangers must be obliged to assess the money laundering and terrorism financing risks and apply appropriate measures to prevent or mitigate those risks.⁴⁴ Those intermediaries are indispensable for the functioning of the distributed ledger ecosystem.⁴⁵ They provide gateways to the regulated financial system so that KYC requirements can be enforced in regard to the respective distributed ledger at least to some extent by applying regulatory standards to those entities.⁴⁶ Personal data generated in the sphere of responsibility of intermediaries who offer services in connection to virtual currencies, can be used to identify the persons involved in suspicious activities on the distributed ledger. In contrast, the prohibition of a virtual currency could drive transactions on the respective platform underground so that no effective governmental control could take place at all.⁴⁷

Finally, the described regulatory scheme could be jeopardised by the providers of so-called “mixing services”. As noted above, distributed ledgers of the category (1) are characterised by a fully transparent history of every transaction in the system which opens up the opportunity to track users by connecting single transactions to profiles. Providers of mixing services aim to prevent this approach by covering up the trail between the source of the funding and the

⁴² *Financial Action Task Forces*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, supra note 36, p. 11.

⁴³ See id.

⁴⁴ *Financial Action Task Forces*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, supra note 36, p. 8.

⁴⁵ *European Banking Authority*, Opinion on “virtual currencies”, 2014, supra note 12, p. 14; *Doguet*, 73 *La. L. Rev.* (2013), 1119, 1147; *Shcherbak*, 7 *EJLS* (2015), 45, 86; *Lerch*, *ZBB* 2015, 190, 204.

⁴⁶ *European Banking Authority*, Opinion on “virtual currencies”, 2014, supra note 12, p. 14; *FATF*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, supra note 36, p. 6.

⁴⁷ *Financial Action Task Forces*, Guidance for a Risk-Based Approach to Virtual Currencies, 2015, supra note 36, p. 9.

receivers' account on the distributed ledger.⁴⁸ However, participants who want to apply this prevention strategy have to rely on a trusted intermediary who can be addressed by regulatory measures.⁴⁹ Additionally, the use of mixing services is apparent to the supervisory authorities. Against that backdrop, regulators can blacklist virtual currency which was sent to a mixing service on a case-by-case basis to prevent the anonymisation tactics.⁵⁰ Blacklisted virtual currency could then be excluded from the financial system by prohibiting its use in means of payment.

b) New Phenomenon of Monetary Supply

The emergence of virtual currencies results in legal issues regarding the regulatory instruments to control the monetary supply. This follows from the current focus of the financial mechanism on the system of bank deposits which aim to regulate the solvability of financial institutions by limiting their lending activities via restrictive minimum reserve requirements.⁵¹ In contrast, virtual currencies operate outside the banking system since they do not have any physical counterpart with legal tender status.⁵² Put differently, the utilisation of distributed ledgers in the payment context results in the emergence of monetary circles running parallel to the governmental schemes. These monetary circles could be misused with the goal to undermine monetary policy measures, especially to bypass governmental capital control mechanisms.⁵³ Additionally, they could lead to inflationary tendencies if the market capitalisation reaches a significant scale. In the view of the European Central Bank, due to a report in 2015 virtual currencies could have a negative impact on monetary policy and price stability. However, they do not pose a risk for price stability, at least at the current stage since the monetary supply of the major virtual currencies is still very low.⁵⁴ The overall market capitalisation of all the listed

⁴⁸ *Böhme et al.*, 29 J. Econ. Perspect. (2015), 213, 221; *Möser et al.*, in: eCrime Researchers Summit (eCRS) 2013, p. 2.

⁴⁹ *Möser et al.*, in: eCrime Researchers Summit (eCRS), 2013, p. 4.

⁵⁰ *Möser et al.*, in: eCrime Researchers Summit (eCRS), 2013, p. 11 et seq.

⁵¹ *Omlor*, in: Staudinger, Vor § 244, recital A11 et seq.; see Article 19 Statutes of the ESCB.

⁵² *European Central Bank*, Virtual currency schemes, 2012, supra note 12, at 11.

⁵³ *Dwyer*, 17 J. Financ. Stabil. (2015), 81, 90 et seq.; *Hafke*, in: Liber Amicorum für Torsten Stein, p. 120; *Lerch*, ZBB 2015, 190, 198 et seq.

⁵⁴ *European Central Bank*, Virtual currency schemes – a further analysis, 2015, supra note 12, p. 26;

currencies is approximately EUR 181.5 billion.⁵⁵ In contrast, the capitalisation of the M1 aggregate in the Eurosystem was more than EUR 8.084 trillion in August 2018.⁵⁶ Consequently, the European central banks will keep monitoring the emission of virtual currencies and the development of their acceptance on the market.⁵⁷

Beyond those systemic considerations it is worth taking note – from an internal point of view – that even distributed ledgers of the category (1) include their own algorithm-based monetary policy. In the case of Bitcoin (“BTC”), a controlled emission scheme is part of the protocol which results in the distribution of approx. 75 BTC per hour at the current stage with a 50 percent reduction approx. every four years.⁵⁸ This corresponds to an inflation rate of 3.85 percent at the moment and total supply of 21 million BTC. Thus, the protocol not only provides a solution to incite the participants to take part in the validation procedure, but it also serves as a mechanism to regulate the monetary supply and to stabilise the value of the virtual currency to some extent.

This aspect is relevant for regulators since the stability of virtual currencies will become crucial if the connection to the real economy reaches a more substantial level. This would potentially impact payment system stability especially if transnational intermediaries on the financial market interconnected to the global banking system start to provide services on the basis of virtual currency schemes, or if the acceptance of virtual currencies in e-commerce significantly increases.⁵⁹ Moreover, as pointed out by the European Central Bank, virtual currencies could jeopardise financial stability if they become more widely used in the real economy and no structural developments are initiated to make virtual currencies inherently more stable.⁶⁰

c) Ensuring Consumer Protection

In the European Union, in the light of Article 12 TFEU, consumer protection requirements shall be taken into account in defining and implementing other Union policies and activities. In

⁵⁵ See <https://coinmarketcap.com>.

⁵⁶ See <http://sdw.ecb.europa.eu/reports.do?node=1000005717>.

⁵⁷ *European Central Bank*, Virtual currency schemes – a further analysis, 2015, supra note 12, p. 26.

⁵⁸ See https://en.bitcoin.it/wiki/Controlled_supply.

⁵⁹ *European Central Bank*, Virtual currency schemes, 2012, supra note 12, p. 27.

⁶⁰ *European Central Bank*, Virtual currency schemes, 2012, supra note 12, p. 26.

respect of the financial sphere it bears noting that banking deposits, which are the basis for the lending business of credit institutions, predominantly consist of the capital of consumers. This results in an increased sensitivity of the funds at the disposal of the institutions.⁶¹ In the case of virtual currencies the situation is comparable if the consumers do not directly interact on the respective distributed ledger but rely on financial services of corporate intermediaries who make use of the platform to provide money transfers. Under these circumstances, the consumers are exposed to the typical risk structure of payment systems as described by the European Central Bank, namely credit risks, liquidity risks, operational risks and legal risks.⁶²

To some extent, these perils are addressed by the governance mechanisms of the networks themselves, either by the protocol or by the market participants.⁶³ A technical feature of distributed ledgers of category (1) provide an illustrative example in this respect. As pointed out by the European Central Bank, payment systems are typically affected by a liquidity risk which is interrelated with the solvability of the financial institutions. The risk arises if an institute does not have the necessary funds or assets at its disposal when the obligation becomes due.⁶⁴ In contrast, such a negative scenario cannot materialise if a distributed ledger is being used as a payment infrastructure for the transaction since the parties can only initiate remittances with the funds at their disposal. In consequence, the participants do not need any clearing and settlement procedure which could lead to the aforementioned implications. However, this is only true if the parties are using the distributed ledgers directly without relying on the service of intermediaries who offer money transfers via the platform. The proposed Bitcoin Improvement Protocol 75 provides another example for a community-based approach to address the system's risk potential. The update introduces, inter alia, a wallet name system which is comparable to the domain name system. The update improves the usability of the system in as far as it allows the participants to label their Bitcoin wallets instead of using alphanumeric characters in order to receive payments.⁶⁵

⁶¹ *Humm*, Bankenaufsicht, S. 48; *Müller*, Bankenaufsicht, S. 18.

⁶² *European Central Bank*, The Payment System – Payments, Securities and Derivatives, and the Role of the Eurosystem, 2010, available at <https://www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf>.

⁶³ *Doguet*, 73 *La. L. Rev.* (2013), 1119, 1144 et seq.; *Lerch*, *ZBB* 2015, 190, 201.

⁶⁴ *European Central Bank*, The Payment System – Payments, Securities and Derivatives, and the Role of the Eurosystem, 2010, supra note 62, p. 115.

⁶⁵ *Torpey*, BIP 75 Simplifies Bitcoin Wallets for the Everyday User, *Bitcoin Magazine*, April 28, 2016, available at <https://bitcoinmagazine.com/articles/bip-simplifies-bitcoin-wallets-for-the-everyday-user-1461856604>.

However, even if consumers make use of the distributed ledger technology directly for payment purposes, they are exposed to a variety of disadvantages which should be addressed by the regulators: particularly, a lack of transparency and a substantial exchange rate volatility.⁶⁶ Additionally, the European Central Bank emphasises that the continuity of virtual currency schemes is not guaranteed. An abrupt stop in activities would leave the users with valueless units. This might not even be the consequence of bankruptcy, but any other reason such as the lack of profitability or fraud schemes.⁶⁷ Further implications follow from the anonymity of distributed ledgers. Users are only identified by their addresses which consist of alphanumeric characters as mentioned above.⁶⁸ This results in significant downsides because transactions are non-reversible in distributed ledgers so that consumers are unprotected against error or fraud resulting from the merchants or other actors.⁶⁹

V. Current EU Regulatory Landscape

In the following section, the article will focus on the existing regulatory landscape in the European Union, revealing legislative shortcomings in order to address the aforementioned risk structure. Although the current regulatory regimes meet the above-mentioned legal demands at least to some extent, the provisions are far from being uniform from an international point of view.

1. Germany's Approach to Banking and Financial Services Regulation

Certain financial services based on the distributed ledger technology such as the operation of a multilateral trading facility for virtual currencies are subject to the German Banking Act (KWG), at least from the point of view of the German supervisory authority ("BaFin") which would provide integrity standards in certain respects.⁷⁰ In the opinion of the BaFin, virtual

⁶⁶ *European Central Bank*, Virtual currency schemes – a further analysis, 2015, supra note 12, p. 4.; *European Banking Authority*, Opinion on "virtual currencies", 2014, supra note 12, risk drivers A03, A41, A43, A44, A45, A46, B23, D02, D03.

⁶⁷ *European Central Bank*, Virtual currency schemes – a further analysis, 2015, supra note 12, p. 22.

⁶⁸ See id.

⁶⁹ *European Banking Authority*, Opinion on "virtual currencies", 2014, supra note 12, p. 18.

⁷⁰ *Spindler/Bille*, WM 2014, 1357, 1361 et seq.; *Lerch*, ZBB 2015, 190, 200; *Hafke*, in: *Liber Amicorum für Torsten Stein*, S. 116 et seq.

currencies such as Bitcoin fall within the scope of the term “units of account” pursuant to section 1 (11) sentence 1 number 7 alternative 2 KWG, qualifying them as “financial instruments”.⁷¹ In consequence, virtual currencies are treated equally to shares, foreign exchanges or derivatives which are classified as financial instruments as well. This follows especially from the regulatory goal as expressed in section 6 (2) KWG. The provision states that the BaFin shall counteract undesirable developments in the lending and financial services sector which may endanger the safety of the assets entrusted to institutions, impair the proper conduct of banking business or provision of financial services or entail major disadvantages for the economy as a whole. Against this backdrop, pursuant to section 1 (11) sentence 1 number 7 KWG, certain financial services with foreign exchange or units of account fall within the scope of the regulatory regime. In the economic context the term “units of account” describes the function of money to act as “a standard numerical unit for the measurement of value and costs of goods, services, assets and liabilities”.⁷² At least to a certain extent, virtual currencies meet not only this requirement but the other traditional monetary functions as well so that they are comparable to foreign exchanges. Therefore, the scheme of the provision suggests that complementary currencies such as Bitcoin are within the scope of the regulatory regime. On the one hand, virtual currencies provide a medium of exchange and a unit of account even though they do not have any physical counterpart with legal tender status.⁷³ On the other hand, virtual currencies might not fulfil the store of value function due to their exchange rate volatility.⁷⁴ However, from a normative perspective, this cannot alone exclude virtual currency from the scope of the KWG since the regulatory goal is the prevention of undesirable developments in the financial sphere which can only be achieved if the supervisory instruments are applicable in the first place.

Nonetheless, some reject such an interpretation of the term “units of account” because virtual currencies are not officially recognised by the government as payment instruments.⁷⁵ This

⁷¹ See *Münzer*, BaFin Journal 01/2014, 26, 27.

⁷² *European Central Bank*, Virtual currency schemes, 2012, supra note 12, p. 10; see as well *Omlor*, in: *Staudinger*, Vor § 244, recital A32 et seq.

⁷³ *European Central Bank*, Virtual currency schemes, 2012, supra note 12, p. 11; see as well *Spindler/Bille*, WM 2014, 1357, 1361 et seq.; *Lerch*, ZBB 2015, 190, 200; *Hafke*, in: *Liber Amicorum für Torsten Stein*, S. 116 et seq.; *Kuhlmann*, CR 2014, 691, 695; *Sorge/Krohn-Grimberghe*, DuD 2012, 479, 484; *Schroeder*, JurPC Web-Dok. 104/2014, section 99.

⁷⁴ *Beck*, NJW 2015, 580, 585.

⁷⁵ *Sprengnether/Wächter*, RdF 2014, 114, 116; *Auffenberg*, NVwZ 2015, 1184, 1186 et seq.

opinion is based on a systematic point of view since foreign exchanges which are classified as financial instruments due to section 1 (11) sentence 1 number 7 alternative 1 KWG are official legal tender. Additionally, according to the grounds of the law, the Special Drawing Right (“SDR”) of the International Monetary Fund provides an example for a unit of account which is interrelated to a basket of major currencies.⁷⁶ Such an interpretation is supported by the Berlin Appellate Court (Kammergericht Berlin) judgement of 25 September 2018 (161 Ss 28/18) at least in regard to criminal law matters. The court stated that the operation of a multilateral trading facility for Bitcoins without authorisation is not punishable pursuant to section 54 (1) number 2, (2) KWG. According to the court, the virtual currency is not classified under the category “units of account” at least due to its lack of value stability and insufficient acceptance as a payment instrument on the market. Additionally, the Appellate Court may not apply the BaFin’s interpretation of the term “units of account” since this would violate the principle of legal certainty as described in Article 103 (2) Grundgesetz which states that an act may be punished only if it was explicitly defined by a law as a criminal offence before the act was committed. Consequently, the court rejects a punishable offence according to section 54 KWG. Without expressly mentioning this, the Berlin Appellate Court has addressed the fundamental problem, whether such a restrictive interpretation in the context of criminal law matters must be taken into account by supervisory authorities in order to be compliant with the principle of legal certainty. However, it must be noted that such an approach could result in limitations regarding the effectiveness of public administration jeopardising regulatory goals.⁷⁷ It remains to be seen whether the judgement results in a change of opinion regarding the scope of the German Banking Act.

Apart from this national consideration, it bears noting that financial services with virtual currencies are outside the scope of the Directive 2004/39/EC on markets in financial instruments since Annex I Section C of the Directive 2004/39/EC does not mention “units of account” as financial instruments so that the member states must not implement them into their national regulatory regimes. Thus, these businesses can be conducted outside the scope of the German regulator in all other member states of the European Union. Consequently, the EU

⁷⁶ BT-Drs. 16/4028, S. 55.

⁷⁷ See for the debate regarding the so called “Normspaltung” *Papakiriakou*, Das Europäische Unternehmensstrafrecht in Kartellsachen, 2002, p. 41 et seq.

legislator is now in a bind to address these shortcomings by providing a coherent framework and to avoid forum shopping.

2. Extended Scope of the Fifth Anti-Money Laundering Directive

In contrast, harmonisation is already brought forward by the Fifth Anti-Money Laundering Directive (EU) 2018/843 which entered into force on 9 July 2018. The directive put specific virtual currency businesses within the scope of the framework.

A virtual currency is defined as a “digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of payment exchange and which can be transferred, stored and traded electronically.”

The framework especially addresses providers engaged in exchange services between virtual currencies and fiat currencies as well as custodian wallet providers. The latter are entities that provide services to safeguard private cryptographic keys on behalf of its customers, to hold, store and transfer virtual currencies.

These entities will be required to carry out customer due diligence measures such as KYC mechanisms.

3. Shortcomings of the EU Payment Services and Electronic Money Regulation

In contrast to the US regulators who have amended existing laws regulating money services businesses to take virtual currencies into their scope, the EU payment services regulation still suffers from significant shortcomings.⁷⁸ Against the backdrop that virtual currencies are outside the scope of the EU payment services regulation, the European Parliament already recommends in its resolution of 26 May 2016 2016/2007(INI) “that the Commission draw up a comprehensive analysis of [virtual currencies] and, on the basis of this assessment, consider, if appropriate, revising the relevant EU legislation on payments, including the Payment Accounts

⁷⁸ See for the US regulatory regimes *Hughes/Middlebrook*, 32 Yale J. on Reg. (2015), 495 et seq.; *Burge*, 67 Hastings L. J. (2016), 1493 et seq.

Directive (PAD), the Payment Services Directive (PSD) and the Electronic Money Directive (EMD), in light of the new possibilities afforded by new technological developments including [virtual currencies] and [distributed ledger technology], with a view to further enhancing competition and lowering transaction costs, including by means of enhanced interoperability and possibly also via the promotion of a universal and non-proprietary electronic wallet.”

The shortcomings follow from the normative “anchor point” that the service providers’ operations must be related to “funds” which are defined as banknotes and coins, scriptural money or electronic money as defined in point (2) of Article 2 of Directive 2009/110/EC.⁷⁹ All these forms of money are at least interrelated to the physical counterpart with legal tender status. This applies to electronic money as well which is defined as “electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions as defined in number 5 of Article 4 of Directive 2007/64/EC, and which is accepted by a natural or legal person other than the electronic money issuer.” In contrast, virtual currencies such as Bitcoin are not monetary values represented by a claim on the issuer but a new monetary phenomenon with own units of account. Therefore, they neither fall within the scope of the statutory definition of electronic money nor scriptural money.⁸⁰ However, in respect to distributed ledgers of category (2), the transfer of a virtual currency may be classified as a “money remittance”, as defined in number (22) of Article 4 number (25) Directive (EU) 2015/2366, if the providers of the distributed ledger receive funds from a payer for the sole purpose of transferring a corresponding amount to a payee.

The limitations of the current scope of the European framework is grounded on the paradigm of the interconnection between electronic payment systems and legal tender which seems to address the European Central Banks fundamental monetary policy concern in respect to the regulation of electronic money – the need to preserve price stability and the need to preserve the unit-of-account function of money: “The risk of overissue would be limited by two factors which increase the costs of issuing electronic money, thereby limiting its supply: first, in a competitive environment, electronic money balances could be remunerated; second, and more importantly, a redeemability requirement could oblige the issuer to possess central bank

⁷⁹ See Article 4 number (25) Directive (EU) 2015/2366 and Article 2 number (22) Directive 2014/92/EU.

⁸⁰ *Omlor*, ZRP 2018, 85, 89; *Keding*, WM 2018, 64, 67; *Shcherbak*, 7 EJLS (2015), 45, 61.

money”.⁸¹ However, as shown above, it is exactly this redeemability requirement which excludes virtual currencies from the scope of the regulatory regime making any sovereign control in regard to the emission of that kind of complementary currencies impossible.

Regardless of whether specific virtual currencies will survive, the emergence of this new kind of technology illustrates the necessity for the shift in paradigm regarding the regulation of payment systems. The regulators can operate within the existing statutory frameworks to enforce financial standards to corporate intermediaries who base their payment services on the distributed ledger technology.⁸² In this respect, the US approach to extend the scope of the federal state provisions regulating money service businesses provides an example for the effective enforcement of regulatory standards, such as the application of licensure programs and minimum capitalization requirements.⁸³

VI. Conclusion

The distributed ledger technology provides for a new innovative form of community-based, transnational coordination. The disruptive technology can not only significantly increase the cost efficiency of global coordination infrastructure between corporate entities such as credit institutions.⁸⁴ Moreover, the distributed platforms are interesting options for central banks to create digital fiat systems as pointed out by the World Economic Forum.⁸⁵ Against that backdrop, the lively interest in the adaption of the technology shown by national governments is not surprising.⁸⁶

⁸¹ *European Central Bank*, Report on Electronic Money, 1998, p. 13, available at <https://www.ecb.europa.eu/pub/pdf/other/emoneyen.pdf>; see *Valcke et al*, The Evolution of Third Party Payment Providers and Cryptocurrencies, 2015, S. 51.

⁸² *Hughes/Middlebrook*, 32 *Yale J. on Reg.* (2015), 495, 521 et seq.; see *Kirby*, 93 *N.C. L. Rev.* (2014), 189, 211 et seq. regarding the regulation of virtual currency exchanges in their role as gatekeepers between the fiat system and the realm of distributed ledgers.

⁸³ *Hughes/Middlebrook*, 32 *Yale J. on Reg.* (2015), 495, 521.

⁸⁴ *Goldman Sachs*, Blockchain – Putting Theory into Practice, 2016, p. 44, available at <http://www.the-blockchain.com/docs/Goldman-Sachs-report-Blockchain-Putting-Theory-into-Practice.pdf>; *Wild et al.*, Technology: Banks seek the key to blockchain, *Financial Times Online*, 1 September 2015, available at <https://www.ft.com/content/eb1f8256-7b4b-11e5-a1fe-567b37f80b64>.

⁸⁵ *World Economic Forum*, The future of financial infrastructure – An ambitious look at how blockchain can reshape financial services, 2016, p. 22, available at http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf.

⁸⁶ See *Omlor*, ZRP 2018, 85, 85.

However, it should not be overseen that distributed ledgers have already left the safe sandbox environment which could justify the “wait-and-see” approach some time ago. This was not only illustrated by the hacking of the Japanese multilateral trading platform Mt. Gox in 2014 which led to the illicit removal of more than 744,000 Bitcoins and further customer funds⁸⁷ and the operation of global blackmarkets such as Silk Road that enabled the users to trade drugs, weapons and other illegal goods and services for virtual currency⁸⁸. Apart from those media-effective examples which impressively showed the emerging potential for negative externalities, the current distinction between traditional payment methods, such as electronic money and money transfers on the ground of the distributed ledger technology, is unreasonable since the forms of payment instruments result in a comparable risk structure. At least in the financial context, the regulators should focus on providing integrity standards to prevent consumer risks as well as money laundering and terrorism financing. Whilst the latter has been already addressed by the Fifth Anti-Money Laundering Directive, the former still suffers substantial shortcomings. Not only does the European regulatory framework on financial services exclude virtual currencies so that the provisions do not address exchanges in their essential role as gatekeepers between the fiat system and the monetary circles on the ground of distributed ledger technology. Further, the electronic money and payment service regulations have limited scopes which do not cover the new monetary phenomenon which may even result in a potential impact for price stability and payment system stability in the Eurosystem if the acceptance of virtual currencies in e-commerce reaches a substantial level. In order to effectively enforce financial integrity standards in the ecosystem of services based on the new technology, a reasonable first step is the extension of existing statutory frameworks as shown in US federal states.⁸⁹

However, regulators must keep in mind that a regulatory scheme for centralized infrastructure cannot address the new phenomenon of a distributed service but only businesses running on the basis of the technology. This was overlooked by California’s Department of Financial Institutions in June 2013 which addressed the Bitcoin Foundation with a cease-and-desist order

⁸⁷ See *Hughes/Middlebrook*, 32 *Yale J. on Reg.* (2015), 495, 524 et seq.

⁸⁸ *Financial Action Task Forces*, *Virtual Currencies – Key Definitions and Potential AML/CFT Risks*, 2014, p. 11 et seq., available at <http://www.fatf-gafi.org/media/fatf/documents/reports/virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>.

⁸⁹ *Hughes/Middlebrook*, 32 *Yale J. on Reg.* (2015), 495, 521 et seq.; *Kirby*, 93 *N.C. L. Rev.* (2014), 189, 206 et seq.

for operating a money transmission platform without authorisation.⁹⁰ Future measures must take the distributed nature of the platforms into account by relying on a “regulated self-regulation” of the community comparable to the interaction with other self-governance organisations, such as the ICANN.

⁹⁰ *Kirby*, 93 N.C. L. Rev. (2014), 189, 211.

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