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# Virtual currencies in the Eurosystem: challenges ahead

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Monetary Dialogue July 2018



Policy Department for Economic, Scientific and Quality of Life Policies

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## **Abstract**

Speculation on Bitcoin, the evolution of money in the digital age, and the underlying blockchain technology are attracting growing interest. In the context of the Eurosystem, this briefing paper analyses the legal nature of privately issued virtual currencies (VCs), the implications of VCs for central bank's monetary policy and monopoly of note issue, and the risks for the financial system at large. The paper also considers some of the proposals concerning central bank issued virtual currencies.

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## EXECUTIVE SUMMARY

1. This paper examines the impact of Virtual Currencies ('VCs') on central banks in the Eurosystem.<sup>1</sup> As our approach makes clear, economic accounts of the nature and functions of money are essential to any description of VCs and monetary policy, but this briefing paper focusses specifically on the legal aspects of VCs, money and monetary policy.
2. The paper is divided into three sections. In Section 1, we define VCs, explain some of their salient technical and economic features, and summarise their legal and regulatory treatment to date. VCs bear similarities to, but are distinguishable from, existing financial instruments including cash, bank deposits, and e-money. VCs are a species of financial hybrid that defies straightforward placement in established categories, and exacerbate 'border problems' between the regulated and unregulated space and between national jurisdictions. VCs are the product of a libertarian political project that is antagonistic towards central banking but harbour technological innovations which may be beneficial to the broader economy and monetary system. Most regulators have taken a 'watch and wait' approach to avoid stifling beneficial information. We recommend vigilance and coordinated action at the European level.
3. We draw a basic distinction between privately issued VCs and VCs issued by central banks. While they may share some technical features, these two classes of VCs raise some unique issues and will be treated separately in sections 2 and 3 respectively.
4. Many privately issued VCs pose a direct and intentional challenge to the monetary system and to central banks. In our view, however, privately issued VCs do not currently pose any serious risks to central banks' money creation role in the Eurosystem. Further, we do not think that any VC currently in the market is likely to qualify for 'money status' in the near future. This justifies the ECB, the NCBs and national regulators maintaining a watch and wait strategy. However, this assessment is subject to change as the market in VCs matures and central bankers and regulators must monitor and respond proactively.
5. In our view, VCs do raise a number of issues of relevance to the Eurosystem. VCs (i) highlight difficult conceptual problems in the concept of 'money' and its relation to currency and non-currency payment systems; (ii) raise questions as regards the definition of securities, as many VC tokens likely fall under national and European definitions of the term but present a new class of digital security ('crypto assets'); (iii) raise questions about the legal conceptions of immaterial objects as objects of property law that have implications for VC tokens' legal categorisation (whether as 'money', 'securities', 'commodities', or anything else).
6. Further, VCs could create risks to the stability of the financial system if VC markets continue to grow at the current pace and continue to interact and entangle with the regulated financial system. This might occur (i) through regulated entities taking part in VC-based activities directly, (ii) unregulated entities offering mainstream financial services via VCs, (iii) regulated

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<sup>1</sup> As explained by Lastra in Chapter 7 of *International Financial and Monetary Law* (Oxford University Press, 2015), the European System of Central Banks (ESCB) is the central banking system of the European Union. The ESCB has a dual structure with the European Central Bank (ECB) at the centre, headquartered in Frankfurt, and the National Central Banks (NCBs) at the periphery. The ECB and the NCBs of the Member States whose currency is the euro constitute the Eurosystem, a term which since the Lisbon Treaty (2009) is now part of the primary law of the ESCB. Monetary policy is one of the basic functions of the European System of Central Banks according to article 127(2) of TFEU. Article 3 TFEU states that "[t]he Union shall have exclusive competence [for] monetary policy for the Member States whose currency is the euro" and Article 282(1) TEU makes it clear that the competence for the Union's monetary policy rests in the Eurosystem.



entities lending to investors exposed in the VC market, (iv) regulated entities structuring regulated financial products on underlying VC assets. In particular, under (ii), there is a chance that the VC-based shadow payments system could grow to systemically important size. Further, the unregulated nature of VCs, and the dominance of quasi-anonymous VC schemes, raises challenges in terms of Anti-Money Laundering ('AML'), Countering the Financing of Terrorism ('CFT') and tax evasion.

7. If the VC market continues to grow, central banks such as the ECB may face challenges in their monetary policy role as a large category of money-like payment instruments would be out of their oversight and control.
8. Central bank issued VCs ('CBVCs') have recently been proposed by a number of central banks in Europe and beyond. These proposals are motivated by a number of reasons, including (i) replacing cash as directly accessible central bank money, (ii) increasing the efficiency of central bank clearing and settlement functions, and (iii) augmenting central banks' monetary policy toolkit.
9. Financial regulation generally follows crises. In our view, it would be preferable for regulators at the European level to act before any VC-based crisis in order to shape the VC market as it evolves and so avoid disruption in the (regulated) financial economy or the real economy. This might include (i) banning certain classes of VC outright, (ii) imposing regulations on the issue and governance of others, and (iii) launching applications of the same underlying technology in order to displace private VC schemes.
10. While it is imperative to avoid stifling innovation in the financial services industry, we do think that VCs require a pro-active regulatory response and that certain VCs could warrant prohibition now or in the future. Regulatory tools such as the creation of 'sandboxes' provide a middle road and have been used successfully in a number of jurisdictions. Ideally, a harmonised European approach to the regulation of VCs is desirable to prevent regulatory arbitrage by market participants and a 'race to the bottom' by national regulators.

## 1. GENERAL INFORMATION

Since the launch of Bitcoin in 2009, Virtual Currencies ('VCs') utilising Distributed Ledger Technology ('DLT'), particularly 'blockchain' data structures, have moved into mainstream awareness and onto the regulatory agenda. While VCs were not, in the early years, considered much of a risk to either the financial or the real economy or to monetary policy, developments in 2017 have heightened central banks and regulators' sense of vigilance. These events were (i) Bitcoin's (brief) rise to nearly US \$20,000 per bitcoin, and (ii) the unprecedented volume of early venture capital raised in Initial Coin Offerings ('ICOs') outside the regulated financial services industry.<sup>2</sup> At the time of writing, **1,604** VCs were listed on one prominent website, with a nominal total market capitalisation of **US \$419 billion**.<sup>3</sup> These are startling numbers because they have risen from zero since the launch of Bitcoin in 2009, because a massive explosion in number and value has occurred in the past three years, and because, despite significant volatility in the VC markets, these figures continue to grow.

The development of the VC market to date has largely been a matter of private initiative, often motivated by a techno-libertarian ideological outlook that stresses the private creation of money and adopts a skeptical position towards state interference in economic arrangements generally, which translates into a skeptical position towards central banks in particular. More recently, however, central banks around the world have begun to explore the affordances of DLT as a source of new tools in monetary policy.

Questions exist about VCs' status, their role in the Eurosystem, and the proper approach for regulators and central bankers to take. To date, most regulators have adopted a 'watch and wait' strategy as the market develops<sup>4</sup> in order not to stifle beneficial innovation and bearing in mind that this is a cross-border phenomenon. Certain jurisdictions have been more pro-active than others. The US Securities and Exchange Commission ('SEC'), for example, has adopted a pro-active but fairly permissive strategy focused on applying the requirements for the valid issue of securities to these new financial instruments; regulators in China and South Korea, on the other hand, have placed moratoria on ICOs.<sup>5</sup> Thailand recently approved a Decree on digital assets.<sup>6</sup> Generally, the first wave of regulatory action has been to warn consumers and to apply existing regulations to VCs. In the next wave, we expect to see express regulation of VCs (and their related technologies) directly through various means.<sup>7</sup>

In this section, we define VCs and the technology on which they rest, differentiate VCs from more familiar financial instruments such as cash, book-money, and e-money, and set out the features that differentiate VCs from each other in legally relevant ways, bearing in mind that it is more accurate to talk about 'crypto assets' instead of 'crypto currencies'. Further, we introduce the 'border problems' that VCs may raise as alternative financial instrument, issued by new kinds of entities, which exist in a

<sup>2</sup> See D.A. Zetschke, R.P. Buckley, D.W. Arner, and Linus Föhr, 'The ICO Gold Rush: It's a Scam, It's a Bubble, It's a Super Challenge for Regulators' (European Banking Institute Working Paper Series 18/2018), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3072298](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3072298). Bitcoin (see <https://bitcoin.org/en/>) and Ether (<https://www.ethereum.org/>) are of particular importance.

<sup>3</sup> See <https://coinmarketcap.com/>, as at 11 May 2018. This figure changes daily.

<sup>4</sup> See Dell'Erba, Marco, Initial Coin Offerings. A Primer. The First Response of Regulatory Authorities (July 7, 2017). Available at SSRN: <https://ssrn.com/abstract=3063536>.

<sup>5</sup> See e.g. <http://www.cbrc.gov.cn/chinese/newIndex.html> (translation available at <https://www.coindesk.com/chinas-ico-ban-a-full-translation-of-regulator-remarks/>).

<sup>6</sup> Emergency Decree on the Digital Asset Businesses B.E. 2561 (2018) (2561, 13 May), Government Gazette. Vol. 135 Part 33a. p. 43-70. The Decree was published in the Government Gazette on 13 May 2018 and came into force on 14 May 2018.

<sup>7</sup> See e.g. the Maltese Virtual Financial Assets Bill 2018, <https://parlament.mt/13th-leg/bills/bill-no-044-virtual-financial-assets-bill/>.

virtual realm that challenges regulatory frameworks based on territorial jurisdiction. Finally, we explain the ideological project that has driven the creation and early growth of VCs.

## 1.1. Definition and Focus

Broadly defined, VC tokens are digital representations of value. VC tokens are used by some people as a means of payment for goods and services, but many people use them primarily as a store of value that more approximates a speculative asset than a unit of money. Others again function like vouchers for access to software or other goods or services at a future date. Other VC tokens are used not as a representation of value but as the placeholder or storage medium for some other information. We will not consider these non-financial/monetary use cases in any detail. Further classes of VC token may emerge in the future, but we consider that most innovations could be captured through the creation of sub-categories within these three.

Although we use the term ‘VC’, we do not accept that any VC should necessarily be called a ‘currency’. Where it is necessary to distinguish the individual unit of a VC from the totality of software and human organisation that creates and maintains it, we refer to the individual unit of a VC as a ‘VC token’ as distinct from a ‘VC scheme’.

The literature is moving to distinguish, in particular, between (i) VCs called ‘currencies’ because they are intended to function as such, (ii) VCs more similar to traditional ‘securities’ or ‘crypto-assets’ and (iii) VCs more similar to vouchers or customer loyalty schemes (‘utility tokens’). The borders between these categories are often permeable, and VCs potentially raise some basic questions in the definition of money, currency, securities, and commodities themselves. Definitions are important, but difficult, because these legal categories sometimes overlap or ‘stack’ in their economic use; for example, traditional money systems used commodities as the token of the monetary unit, whereas modern ‘fiat’ systems use paper banknotes as the token of the monetary unit.

As further discussed below, it is not desirable to place VCs into legal categories at the outset. Legal categories are not merely descriptive of reality, but prescribe what objects are legally cognisable, often by means of a *numerus clausus*. The assignment of an object to one category (or none) initiates a whole cascade of further legal consequences. For example, the Japanese courts have ruled that bitcoins are not cognisable as ‘things’ capable of ownership under the Japanese Civil Code, with consequences for the insolvency of a major VC exchange.<sup>8</sup> A recurring theme in our analysis is that many VCs straddle the traditional legal categories and possibly reveal conceptual problems with those categories. In other words, legal categorisation is a second step that should only be taken once a descriptive apprehension of the subject-matter is gained.

Our analysis focuses on VCs that function (or could function) in a manner of systemic relevance to the Eurosystem, in respect both of central banks’ role in the creation and management of money and in their oversight of the financial and monetary system. However, so far VCs—understood as crypto assets (not currencies)—are characterised in national legal terms in the Eurosystem, as we further explore in Section 2.

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<sup>8</sup> See <https://www.bbc.com/news/technology-33816664>; the relevant provision is Article 85: <http://www.japaneselawtranslation.go.jp/law/detail/?id=2057&vm=04&re=02>. Several European codifications take a similar approach to the definition of ‘things’.

### 1.1.1. VCs and existing financial instruments

VCs resemble currency in that they are (typically) exchanged ‘peer-to-peer’ in a decentralised manner rather than through the accounting system of a central institution.<sup>9</sup> To date, generally non-cash payment systems use some kind of central clearing, while Bitcoin was presented as an ‘electronic cash’ system. But VCs are distinguished from **currency** (i.e. cash, consisting of banknotes and coins) (i) in that they are created, transferred, and stored digitally rather than physically, (ii) in that they are issued by a private entity rather than a central bank or other public authority, and (iii) in that they are not ‘legal tender’.

Some VCs like Bitcoin resemble commodities, including commodity-based currency systems like the gold standard, bimetallism (gold and silver) and even the par value regime or gold-USD standard adopted by the original IMF Articles of Agreement,<sup>10</sup> in that supply is limited and by definition subject to great volatility and potential speculation if the demand far exceeds supply. On the other hand, a commodity like gold has an intrinsic value<sup>11</sup> and a physical representation, while VCs are virtual realities. The only commodity in a VC like bitcoin is a ‘chain of digital signatures’, i.e. a record of transfers of value that looks much like an account ledger.<sup>12</sup>

VCs resemble cashless, account-based payment systems such as ‘book-money’<sup>13</sup> or bank deposits, because they are electronic representations of value issued by a private entity. But VCs differ from book-money because no system of reserve is necessarily in place in any VC scheme, and because there is no central bank to act as lender of last resort. In fact, VCs are not necessarily the liability of any person, whereas book money (bank deposits) is, by definition, the liability of a commercial bank.

VCs also approximate electronic money<sup>14</sup> and private payment systems such as PayPal insofar as they are digital representations of value that are issued by private entities and move outside the more traditional intermediaries of the payment system (i.e. commercial banks). But PayPal credit and electronic money are both denominated in a ‘sovereign fiat’ unit of account and, again, are by definition the liability of a known (and licensed) entity. Innovations in payment systems like M-Pesa in Kenya are different from the notion of VCs in that they rely also on fiat money and are rooted in obligational relationships. VCs understood as alternatives to currency are not fiat money and are not legal tender, nor are they based on fiat money in this way.

<sup>9</sup> To date, most non-currency payment systems use some kind of central accounting and clearing system, with the exception of some e-money systems that store value locally on a ‘smart’ card or device. On currency-based, account-based, and note-based payment systems, see J.S. Rogers, ‘The New Old Law of Electronic Money’ (2005) 58 *SMU Law Review* 1253, available at

<https://lawdigitalcommons.bc.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1039&context=lsfp>. According to FATF, ‘Virtual Currencies Key Definitions and Potential AML-CFT Risks’ (2014) <http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf> (p.4): “virtual currency is a digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status in any jurisdiction”.

<sup>10</sup> The value of currency of each participating member was defined in terms of gold or alternatively in terms of the US Dollar of 1 July 1944, which had a fixed gold value equal to USD 35.

<sup>11</sup> Indeed one of the reasons for the collapse of the par value regime was there was a private market in addition to the public gold-USD standards and the value of gold in the private market kept on increasing from the 1940s to the 1970s when the Bretton Woods par value regime was finally abandoned. See e.g., Lastra (2015), *International Financial and Monetary Law*, chapter 12.

<sup>12</sup> See <https://bitcoin.org/bitcoin.pdf>.

<sup>13</sup> ‘Book-money’ (often derived from German *Buchgeld*) refers to bank deposits that function, in an account-based payment system such as a giro, as quantum of ‘money’.

<sup>14</sup> As defined in the *E-money Directive (2000/46/EC)* and the *Second E-money Directive (2009/110/EC)*.

In the ‘world of alternatives’, that is alternatives to money/currency, alternatives to credit/finance (such as peer-to-peer lending platforms and crowdfunding) and alternatives to payments/exchange, VCs sit somewhere in between the alternatives to money and the alternatives to payments/exchange, while exhibiting features of securities (‘crypto assets’). This complex characterisation does not fit easily with established legal concepts.

VCs are, thus, distinguishable from the conventional types of financial instrument in a number of ways, but particularly by (i) their use of DLT (in particular blockchain data structures) to facilitate peer-to-peer exchange; (ii) their issuance by an entity outside the traditional monetary system of central banks, commercial banks, and licensed financial intermediaries; (iii) their denomination in a novel unit of account rather than a fiat monetary unit.<sup>15</sup> We have set out a comparison of the most important features in Annex I.

### 1.1.2. Distributed Ledger Technology

DLT is a relatively new, and rapidly evolving, approach to recording and sharing data across multiple data stores.<sup>16</sup> A distributed ledger is a database for storage of data (including programs) that is replicated over a peer-to-peer network and that enables multiple parties to share the database and modify data (i.e. effect transactions) in a safe and secure way even if they don’t know or trust each other.<sup>17</sup> DLT came into the spotlight with the 2009 launch of Bitcoin on the world’s first operational ‘blockchain’. A blockchain is a form of DLT data structure that (i) records transactions across a distributed network of computers, (ii) combines data about the subject-matter of the transaction (including previous transactions) with data about the transferee and transferor in a ‘block’ such that these blocks form a ‘chain’, (iii) uses cryptographic means to prevent tampering with the chain, and (iv) relies on nodes in the network to verify transactions, often through some kind of game-theory informed incentive mechanism.

Not everything that matches the description of a ‘VC’ utilises this kind of data structure. There are also digital representations of value that are kept in centralised ‘accounts’ and circulate within the game-world of a Massive Multiplayer Online Role-Playing Games (‘MMORPGS’) such as Linden Labs’ *Second Life*. So-called Linden Dollars (‘L\$’), for example, are the currency of a significant economy<sup>18</sup> which interacts with the ‘real’ economy in various ways.<sup>19</sup> These ‘VCs’ have some historical connection to VCs by association—for example, the insolvent VC exchange Mt Gox began its life as a MMORPG-related exchange. L\$ are not, in our view, significant to the Eurosystem, however; they do, however, serve as a useful counter-point when considering the interaction between other ‘virtual’ and financial systems with the ‘real world’ financial system.

<sup>15</sup> See BIS Committee on Payments and Market Infrastructures, ‘Central bank digital currencies’ (March 2018), <https://www.bis.org/cpmi/publ/d174.pdf>; European Banking Authority, *EBA Opinion on ‘virtual currencies’*, EBA/Op/2014/08, 12.

<sup>16</sup> See World Bank Group, *Distributed Ledger Technology (DLT) and Blockchain* (FinTech Note No. 1/2017), <http://documents.worldbank.org/curated/en/177911513714062215/pdf/122140-WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf>. While every blockchain is a DLT, not every DLT is a blockchain. See Philip Treleaven, Richard Gendal Brown and Danny Yang, “Blockchain technology in Finance” (2017) *Computer* 50 (9) 14.

<sup>17</sup> Garrick Hileman and Marcel Rauchs, *Global Blockchain Benchmarking Study* (Cambridge Centre for Alternative Finance 2017).

<sup>18</sup> In 2010, the *Second Life* economy peaked at about USD 500 million GDP:

<https://thenextweb.com/insider/2015/11/07/think-second-life-died-it-has-a-higher-gdp-than-some-countries/>.

<sup>19</sup> L\$ are directly purchased with USD using conventional payment channels such as credit card. L\$ are also tradable for USD and other VCs (including other in-game VCs) on exchanges. The USD:L\$ exchange rate fluctuates, but generally sits around 250:1. L\$ are bought and sold offline in so-called ‘real world trades’. From 2008, VAT has been charged on income (in L\$) from in-game assets purchased from Linden Labs by European customers — <http://secondlife.com/corporate/vat.php>.

## 1.2. Differentiation

VCs differ according to (i) the technical features chosen by developers and (ii) the way that VC tokens behave as economic objects in the market. Here we provide an overview of what are, in our view, the most important differentiators, and explain their legal and policy relevance. We treat technical and economic features together, as the choice of a technical parameter is not an economically neutral one. For example, the choice to limit the total number of bitcoins that will be created on the Bitcoin blockchain has two economic implications: first, it creates incentives for users to hoard bitcoins as speculative assets rather than spending them as a medium of exchange; secondly, if Bitcoin were to achieve monetary status within an economy despite this feature, it would eventually cause price volatility as the rigid money supply interacted with an expanding or contracting real economy.

The following list provides a high-level overview. We will return to the most important points in more depth in the course of our substantive analysis in the sections to follow, and we expand on each of these points in Annex II.

- Who issued the VC? Is the issuer public or private? How is the issuer organised and governed? (So far VC issuers have been overwhelmingly private entities. As a new category of financial entities, they fit poorly with traditional capital markets and prudential regulation).
- Is the VC software proprietary or open-source? How is the software developed and distributed? Who is responsible for e.g. security updates or responding to cyber-attacks?
- Where was the VC issued? How do existing national, regional, and international regimes of consumer protection, prudential regulation, capital control, tax evasion, anti-money-laundering, etc, apply to it?
- How does the VC operate in the market? What is its (i) intended and (ii) actual economic function?
- Who maintains the VC's ledger, and how? Does the VC utilise a 'trustless'/'permissionless' system or do some nodes have special authorisation to update the ledger? How does this affect the VC scheme's internal governance?
- Are users of the VC anonymous (pseudonymous) or identified?
- Is the VC backed with a reserve of real-world assets? Are VC tokens pure 'digital commodities' or do they represent (i) tangible commodity or (ii) a reserve of fiat currency?
- How does the VC interact with the real-world financial economy? Are VC tokens convertible, and if so how? What intermediaries are at the interface between the VC and the real-world economy?
- How do users hold and trade the VC? Do they hold VC tokens directly in a 'wallet' (e.g. computer storage device) or are 'their' tokens held by a fiduciary intermediary? Are trades recorded 'on-chain' in real time or are trades effected 'off-chain' followed by a settlement procedure?
- How is the volume of the VC supply determined? Are the decisions taken by humans or are they algorithmic? Are those algorithms subject to change? By whom? What factors are taken into account?



### 1.3. Border Problems

A metaphor of **border problems** guides our analysis. Goodhart and Lastra explore the two main borders in the aftermath of the 2008 Global Financial Crisis: (i) the border between regulated and unregulated entities, and between regulated and unregulated activities, and (ii) the border between national jurisdictions.<sup>20</sup>

When the border between the regulated and the unregulated is punctured, the regulated economy faces risks originating in the unregulated space. The border becomes problematic when (i) unregulated entities start engaging in regulated activities (such as an ICO that amounts to a securities issue) or (ii) regulated entities start engaging in unregulated activities (such as a regulated financial services provider trading in VCs or using VCs as the underlying asset of a regulated product, such as a collective investment scheme). Such border cross-overs increase the risk of contagion, for example when a liquidity crisis in the unregulated space affects a regulated entity's position in the regulated space.

Transactions in VCs constitute a new frontier of financial activity: VC schemes may constitute 'grey' currency issues, securities issues, and payment rails, for example, which operate in parallel to traditional (regulated) financial services. Much can be done to enforce this border by extending it. For example, the United States Securities Exchange Commission ('SEC') has taken a pro-active stance by treating many ICOs as the issue of securities despite their issuers' attempt to avoid engaging in a regulated activity at all.<sup>21</sup> US regulators have also been pro-active in applying certain banking regulations to VC-based payments providers.<sup>22</sup> In general, however, regulated activities are defined in legal instruments that typically predate the advent of DLT and VCs. Unregulated activities undertaken by unregulated entities can pose a challenge for regulators to the extent that they *ought* to be regulated on grounds such as investor protection, financial crime prevention, or to maintain monetary sovereignty (e.g. by applying anti-counterfeiting laws to alternative currency schemes<sup>23</sup>), but it is not straightforward to apply existing regulatory frameworks to them.

With regard to the second border problem, Goodhart and Lastra observe that the transnational nature of financial activity and the national basis of regulatory oversight can encourage sub-optimal outcomes. VCs are, again, by nature trans-jurisdictional and make national regulations more difficult to enforce. This compounds with the first border problem because, for example, there may not be a readily identifiable entity in any jurisdiction which can easily be brought under national jurisdiction.

These border problems are exacerbated by a third border—that between '**cyberspace**' and the '**real world**'. Some VC schemes purport to create a new form of business entity that operates in a non-jurisdictional space. Developers are working on automated, decentralised applications that replace traditional corporate structures in ways that disrupt conventional oversight models and pose real risks of corporate governance and market abuse. For example, 'The DAO' is a collective investment

<sup>20</sup> C.A.E. Goodhart and R.M. Lastra, 'Border Problems' (2010) 13(3) *Journal of International Economic Law* 705.

<sup>21</sup> See e.g. Securities and Exchange Commission, *Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO* (Release No. 81207, 25 July 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

<sup>22</sup> See e.g. US Department of Treasury Financial Crimes Enforcement Network, *Guidance: Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies* (FIN-2013-G001, 18 March 2013), <https://www.fincen.gov/sites/default/files/shared/FIN-2013-G001.pdf>.

<sup>23</sup> This was the fate of the 'Liberty Dollar' and 'E-gold'. For a libertarian critique, see Dowd, Kevin, *New Private Monies: A Bit-Part Player?* (June 17, 2014). Institute of Economic Affairs Monographs, Hobart Paper 174. Available at SSRN: <https://ssrn.com/abstract=2535299>.

vehicle structured as a ‘Distributed Autonomous Organisation’,<sup>24</sup> a kind of organisation supposedly without human organs, which came to prominence in 2016 when it was subject to a large-scale hacking attack.<sup>25</sup>

In a seminal article from the mid-1990s, Johnson and Post argued that, because modern computer-based communications systems cut across territorial borders, undermining the connection between legally significant online phenomena and physical locations, we need to develop laws adapted to a ‘space’ bounded by screens and passwords instead of geographical boundaries.<sup>26</sup> VCs underline the urgency of re-thinking axioms such as jurisdiction and territoriality to discover their contemporary relevance,<sup>27</sup> and call for a fundamental re-examination of legal conceptions such as ‘ownership’ and ‘possession’ in the context of immaterial assets such as VC tokens.<sup>28</sup> Some of these questions are novel, while others are long-standing.<sup>29</sup>

These three borders are important because they frame the strategy that has been taken by many regulators in the early days of the VC market, which has been to ‘watch and wait’ and to begin with the analogic application of existing regulations. However, many financial regulations presuppose (and are directed towards) financial intermediaries. While analogic reasoning and teleological interpretation can go some way to bringing new market practices and technologies under existing norms, and while their application to certain VCs will be easier than others,<sup>30</sup> this approach may be exhausted before an optimal regulatory position is reached.

For example, in a 2014 Opinion on VCs, the European Banking Authority (‘EBA’) recommended a ‘shielding’ approach until such time as a comprehensive European regime is established for regulating VCs. This approach accepts the fact that only risks that arise in the interaction between VC schemes and the regulated financial services sector can be mitigated; risks internal to VC schemes cannot. The containment aspect of the strategy consists in the EBA’s position that national supervisory authorities should discourage regulated entities from ‘buying, holding, or selling VCs, thereby “shielding” regulated financial services from VCs.’<sup>31</sup> Another regulatory measure is to reinforce the borders through voluntary compliance by constructing ‘sandboxes’ in which VC developers can innovate safely—and under the supervision of the regulator.<sup>32</sup>

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<sup>24</sup> See e.g. <https://www.economist.com/finance-and-economics/2016/05/19/the-dao-of-accrue>; <https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/>.

<sup>25</sup> It is controversial whether the event was a ‘hack’, but the majority of The DAO community seems to have taken the view that it was: see e.g. <https://www.coindesk.com/understanding-dao-hack-journalists/>.

<sup>26</sup> D.R. Johnson and D.G. Post, ‘Law and Borders—The Rise of Law in Cyberspace’ (1996) 48(5) *Stanford Law Review* 1367, 1370, 1378.

<sup>27</sup> See D.G. Post, ‘How the Internet is making jurisdiction sexy (again)’ (2017) 25(4) *International Journal of Law and Information Technology* 248.

<sup>28</sup> See Allen, Jason G, What’s Offered in an ICO? Digital Coins as Things (March 14, 2018). Available at SSRN: <https://ssrn.com/abstract=3140499>.

<sup>29</sup> It is a novel question how I ‘possess’ a bitcoin on a distributed ledger. Bitcoin, for example, is a ‘protocol for the allocation of permissions, which are denominated in bitcoins, and tied to system-specific addresses’, but it is unclear what these means for the private monetary law of any given jurisdiction: see R.J. Strauss and M.J. Cleary, ‘United States’ in Stuart Hoegner, *The Law of Bitcoin* (iUniverse 2015), 185. But the question how I ‘possess’ a corporate bond on Clearstream or a euro in my (electronic) bank account is not completely straightforward either: See e.g. J.H. Sommer, ‘Where is a Bank Account?’ (1998) 57(1) *Maryland Law Review* 1; P.G. Rogerson, ‘The *Situs* of Debts in the Conflict of Laws: Illogical, Unnecessary and Misleading’ (1990) 49 *Cambridge Law Journal* 441.

<sup>30</sup> For example, the application of payments services laws to intermediaries that hold VC tokens on behalf of users and process trades off-chain would appear to be more straightforward than to VC tokens held directly by users and processed only on-chain.

<sup>31</sup> European Banking Authority, *Opinion on ‘virtual currencies’* EBA/Op/2014/08 (4 July 2014), para [177].

<sup>32</sup> See e.g. <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx>.



The shielding approach is only as strong as the borders between regulated and unregulated activities and entities. Especially where new activities and entities spring up in cyberspace, bright lines are difficult to maintain. VCs present an acute 'cyberspace border problem' because they may not even have a readily identifiable issuing or controlling entity at all (as in the case of Bitcoin). As a distributed software application, Bitcoin will prove itself to be quite resilient against any direct regulatory efforts so long as a community of users exist who ascribe value to the application's functions.<sup>33</sup>

In our view, these border problems make regulation at the European level especially important. This brings into relief questions about the division of responsibilities and competences in the Eurosystem concerning the regulation and oversight of privately issued VCs and concerning the potential issuance of central bank issued VCs.

#### 1.4. The Politics of the Cryptocurrency Movement

The architecture of the modern monetary system and the political economy it expresses have evolved from the early-modern birth of central banking,<sup>34</sup> and the rise of VCs coincides with a dispersed but growing dissatisfaction with the existing monetary system. It is no coincidence that Bitcoin was launched in the immediate aftermath of the 2008 crisis, to which governments and central banks responded with unconventional monetary policies, or that Bitcoin embodies an express attempt to replace fiat money with a peer-to-peer payment system denominated in a digital token whose scarcity is algorithmically secured against political interference. The rise of VCs thus exacerbates a long-standing disagreement in macro-economic policy regarding the desirability of a flexible money supply and of the optimal degree of political influence over the creation of money.<sup>35</sup> The pendulum has shifted throughout history from flexibility to stability and from stability to flexibility when it comes to monetary and exchange rate policies. With regard to the latter the case for flexibility was forcefully made by Milton Friedman in a seminal contribution in 1953,<sup>36</sup> at a time in which exchange rate stability was the foundation of the IMF par value regime and has been, of course, a key rationale for the adoption of the euro. However, some argue that flexibility in exchange rate policy (in particular, the possibility of devaluing a national currency) could have been a useful policy instrument for some of the Eurozone Member States affected by the recent sovereign debt crisis had they kept their own national currencies. It is also interesting to observe that the preamble to the US Federal Reserve Act talks about the objective "to furnish an elastic currency", not a stable currency (even though subsequent revisions to the Act have added the objective of stability with the establishment of the Federal Open Market Committee in 1933).

Bitcoin is not regulated by any authority; the supply of bitcoins is based on an algorithm which structures its decentralized peer-to-peer transaction system.<sup>37</sup> This feature of Bitcoin (and many of its 'Altcoin' successors) is often praised within a broadly American libertarian interpretation of the Austrian School of economics, i.e. one that minimises the role of political decision-making in

<sup>33</sup> See e.g. Yves Mersch, *Virtual currencies ante portas* (39th meeting of the Governor's Club Bodrum, Turkey, 14 May 2018), <https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180514.en.html>.

<sup>34</sup> See Christine Desan, *Making Money: Coin, Currency, and the Coming of Capitalism* (OUP 2014). See also Lastra (2015), *International Financial and Monetary Law*, chapter 2.

<sup>35</sup> See Max Raskin and David Yermack, 'Digital Currencies, Decentralised Ledgers, and the Future of Central Banking' (NBER Working Paper 22238, May 2016), <http://www.nber.org/papers/w22238>, 1.

<sup>36</sup> See Milton Friedman (1953) *The case for flexible exchange rates, Essays in Positive Economics*, University of Chicago Press, Chicago.

<sup>37</sup> See Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' (2009), <https://bitcoin.org/bitcoin.pdf>; D.A. Dion, 'I'll Gladly Trade You Two Bits on Tuesday for a Byte Today: Bitcoin, Regulating Fraud in the E-Economy of Hacker-Cash' (2013) *University of Illinois Journal of Law, Technology & Policy* 165, 167.

determining the money supply, that posits money as something almost naturally occurring and politically neutral, emphasises commodity scarcity as a counter to inflation, and praises competition between currencies.<sup>38</sup>

Even more broadly, this ties in to an ideology in which human institutions (such as governments and central banks) are to be replaced by deterministic technological processes that provide a neutral and self-sustaining framework for individual flourishing.<sup>39</sup> The radical possibilities of this project are currently being compounded by the promise of Artificial Intelligence ('AI'). Bitcoin evangelists typically position themselves as underdogs and outsiders, 'cypher punks' who aim to transform society through the use of disruptive technologies rather than direct political mobilisation. The VC movement can thus be seen as the latest technological instantiation of a broader project called by some scholars the 'Californian Ideology'.<sup>40</sup> This is an eclectic ideology and its elements are not distributed homogeneously through the VC movement. In broad terms, however, it is the product of the collision and synthesis of neo-liberalism, counter-culture radicalism, and technological determinism. With all the internal contradictions that entails, the California Ideology combines a New Left anti-corporate ethos and faith in the Internet as a forum for new forms of community with a conservative libertarian faith in the ability of information technologies to facilitate voluntary exchange between individuals outside the sphere of state control. Needless to say, the libertarian strand of this movement is inimical both to national and supra-national monetary policy and to conventional financial institutions and structures.<sup>41</sup>

While this is a significant aspect of the VC movement, it is important not give this ideological project too much credence. Actors with more conventional economic motivations are increasingly attracted to launch VCs or purchase VC tokens, and we expect these players to behave in more conventional ways. Further, DLT offers possibilities for governmental actors including NCBs and the ECB, as well. Taking the techno-libertarian manifestos at face value potentially distracts from the challenges and opportunities of DLT within conventional political, economic, and legal structures.

#### 1.4.1. The Political Economy of VC Schemes

Despite the libertarian rhetoric, VC schemes have a political economy, and a sociological picture of it is gradually emerging. An early Opinion by the EBA, for example, identified the following players involved in the creation and maintenance of a VC scheme: (i) users, (ii) merchants, (iii) VC exchanges, (iv) scheme governance authorities (often highly informal), (v) trade platforms, (vi) processing service providers, (vii) wallet providers/custodians, (viii) inventors, (ix) technical service providers, (x) information providers, and (xi) miners.<sup>42</sup> Events such as the Mt Gox insolvency<sup>43</sup> and the DAO 'hack'<sup>44</sup> illustrate that this political is substantially shaped by human decision-making.

<sup>38</sup> See e.g. C.A.E. Goodhart, 'The two concepts of money: implications for the analysis of optimal currency areas' (1998) 14 *European Journal of Political Economy* 407.

<sup>39</sup> See e.g. Primavera di Filippi and Benjamin Loveluck, 'The invisible politics of Bitcoin: governance crisis of a decentralised infrastructure' (2016) 5(3) *Internet Policy Review*; Sklaroff, Jeremy, Smart Contracts and the Cost of Inflexibility (September 18, 2017). University of Pennsylvania Law Review, Vol. 166, 2017. Available at SSRN: <https://ssrn.com/abstract=3008899>

<sup>40</sup> Richard Barbrook and Andy Cameron, 'The Californian Ideology' (1995) 1(3) *Code*, <http://www.metamute.org/editorial/articles/californian-ideology>.

<sup>41</sup> An idea of the literature influential on this demographic is gleaned from the reading list of the self-styled 'Satoshi Nakamoto Institute': See <http://nakamotoinstitute.org/literature/>.

<sup>42</sup> European Banking Authority, *EBA Opinion on 'virtual currencies'* (EBA/Op/2014/08, 4 July 2014), 13.

<sup>43</sup> See <https://www.reuters.com/investigates/special-report/bitcoin-gox/>.

<sup>44</sup> See <https://qz.com/730004/everything-you-need-to-know-about-the-ethereum-hard-fork/>.

A more recent, comprehensive benchmarking survey by Hileman and Rauchs found that VCs introduced four new categories of financial industry player into the landscape: (i) exchanges, (ii) wallets, (iii) payments service providers, and (iv) miners. The most important players in this political economy are VC exchanges. These are the sites at which most users participate in the VC economy by purchasing VC tokens, either with other VC tokens or with units of *fiat* currency. As the channel of convertibility, these are probably the most important potential vector of financial contagion into the mainstream financial system. Europe had the largest number of exchanges, so appropriate regulation would seem to be particularly important here.<sup>45</sup> In particular, exchanges that hold VC tokens on behalf of their users and/or offer ancillary services are a priority, as they pose the greatest risk of market abuse and/or financial contagion.<sup>46</sup>

Hileman and Rauchs also found that the lines between these players were blurred, and that there was currently a trend of convergence towards 'universal' VC businesses.<sup>47</sup> Increasingly, this political economy is also involving traditional financial institutions, for example as investment funds look to VCs as assets or commercial banks establish banking relationships with exchanges. Some recent VC ventures also seem to be moving towards a higher degree of centralisation.<sup>48</sup> It is perhaps ironic that business models in the VC space tend to be gravitating towards a centralised and regulated model, when VCs such as Bitcoin were conceived counter to centralisation and (public) regulation.

## 1.5. Early Regulatory Responses

The first step in determining how VC schemes should be regulated is to answer the question how VC tokens themselves should be characterised under existing law. This has taken place mostly in the form of administrative decisions, and mostly in the context of securities law, with a particular focus on ICOs because these are massive fundraising events in which many retail and institutional investors take part. In addition, there have been a number of judicial decisions applying existing legal categories. Increasingly, we expect to see more legislative initiatives directed at different aspects of VC schemes.

First, there is a concentration of VC schemes in certain key jurisdictions.<sup>49</sup>

<sup>45</sup> Hileman, Garrick and Rauchs, Michel, 2017 Global Blockchain Benchmarking Study (September 22, 2017). Available at SSRN: <https://ssrn.com/abstract=3040224>, 31.

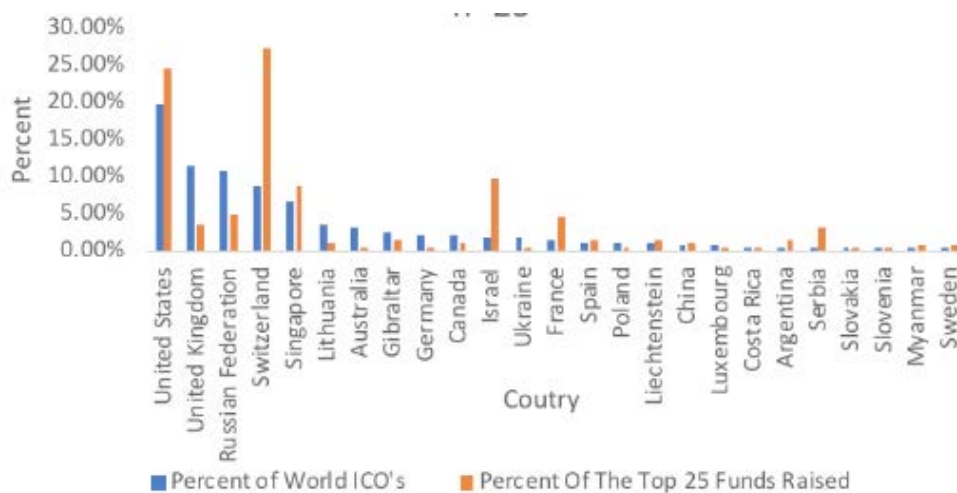
<sup>46</sup> Hileman, Garrick and Rauchs, Michel, 2017 Global Blockchain Benchmarking Study (September 22, 2017). Available at SSRN: <https://ssrn.com/abstract=3040224>, 26, 29 and following.

<sup>47</sup> Hileman, Garrick and Rauchs, Michel, 2017 Global Blockchain Benchmarking Study (September 22, 2017). Available at SSRN: <https://ssrn.com/abstract=3040224>, 21, 23.

<sup>48</sup> For example, the largest ICO fundraising round so far is by 'EOS', which promises to be a platform provider (like Ethereum) on which developers can launch other applications (including VCs) with more efficient transaction processing. This efficiency is won by a greater concentration of power within specially authorised nodes: See <https://www.coindesk.com/eos-coming-anyone-can-figure-vote/>.

<sup>49</sup> This section draws on a recent study that reviewed the legal treatment of VCs in the top 25 jurisdictions in which VCs have been issued in ICOs: see Kaal, Wulf A., Initial Coin Offerings: The Top 25 Jurisdictions and Their Comparative Regulatory Responses (February 2, 2018). CodeX Stanford Journal of Blockchain Law & Policy (2018); U of St. Thomas (Minnesota) Legal Studies Research Paper No. 18-07. Available at SSRN: <https://ssrn.com/abstract=3117224>.

Figure 1: The top 25 jurisdictions by number of ICOs and volume raised in ICOs



Source: W.A. Kaal (2018)

Across these jurisdictions, Kaal characterised eight as allowing ICOs with no regulation, 12 as allowing ICOs with light regulation, four as allowing ICOs with heavy regulation, and one as banning ICOs. Regulations affecting ICOs ranged from instruments controlling the ICO process itself, to those regulating VCs generally, DLT generally, VC exchanges, setting out a compliance program for ICOs, to those regulating securities generally. Securities laws are the most common source of norms applied to VC token issues in ICOs. While many regulators have warned investors not to purchase VCs, few have attempted to prohibit them from doing so.

### 1.5.1. Administrative decisions

As explained earlier, most regulators have taken a watch and wait strategy, and most first steps have consisted in the analogue application of existing regulations.

As noticed earlier, the US SEC has been pro-active in applying securities regulations to emissions of and dealings with VC tokens and has determined that a number of prominent VC tokens are ‘securities’ under the Securities Exchange Act 1934. More recently, the SEC has announced its position that the tokens in the two largest VC schemes, bitcoins and ether, are not securities. This position is shared by the Commodities and Futures Trading Commission,<sup>50</sup> and now by at least one District Court.<sup>51</sup> Other US regulators, such as the Financial Crimes Enforcement Network, have been pro-active in applying AML measures under the Bank Secrecy Act 1970 to ‘administrators’ and ‘exchangers’ of VC tokens (but not to users).<sup>52</sup> Although it is clear that no VC satisfies the strict

<sup>50</sup> The U.S. Commodity Futures Trading Commission declared “virtual currencies to be a “commodity” subject to oversight under its authority”. See [http://www.cftc.gov/idc/groups/public/@newsroom/documents/file/background\\_virtualcurrency01.pdf](http://www.cftc.gov/idc/groups/public/@newsroom/documents/file/background_virtualcurrency01.pdf). In December 2017 the Chicago Mercantile Exchange and the Chicago Board Options Exchange (CME) launched Bitcoin future contracts. See e.g. <https://www.cnbc.com/2017/12/17/worlds-largest-futures-exchange-set-to-launch-bitcoin-futures-sunday-night.html>.

<sup>51</sup> See <https://uk.reuters.com/article/us-usa-cftc-bitcoin/virtual-currencies-are-commodities-u-s-judge-rules-idUKKCN1G132C>.

<sup>52</sup> See US Department of Treasury Financial Crimes Enforcement Network, *Guidance: Application of FinCEN’s Regulations to Persons Administering, Exchanging, or Using Virtual Currencies* (FIN-2013-G001, 18 March 2013), <https://www.fincen.gov/sites/default/files/shared/FIN-2013-G001.pdf>.

definition of a 'currency' because it is not legal tender in any jurisdiction, the latter implicitly treats VC tokens as having some 'monetary' property. Most recently, a county tax collector in Florida has announced that he will accept taxes in Bitcoin.<sup>53</sup> Actually this is not entirely accurate, as the payments will be converted into USD using an exchange, so the announcement does not mean very much beyond the implication of Bitcoin in a mainstream payments system.

Turning to the Eurozone, German *Bundesanstalt für Finanzdienstleistungsaufsicht* ('BaFin') has not reached a final position on the status of VCs. The BaFin has issued a binding decision on the classification of VC tokens in 2016, treating them as a 'unit of account' under s. 1(1) of the *Kreditwesengesetz*, analogous to foreign currencies and private media of exchange.<sup>54</sup> More recently, BaFin has advised that ICOs of VCs are subject to securities law according to the rights attached to the tokens, which must be assessed on a case by case basis.<sup>55</sup> The French *Autorité des Marchés Financiers* ('AMF') has taken the position that VCs are not readily categorised in French law, and has accordingly implemented a program to explore the scope of future regulation through (i) promoting best practices within the existing legislative framework, (ii) extending the scope of legislation to classify VCs as securities, and (iii) propose *ad hoc* legislation. The AMF has also opined that VC-based derivatives require authorisation. As Dell'Erba observes, France is one of the only countries to date that has followed conventional consultation practices with regards to VCs.<sup>56</sup> The Spanish *Comisión Nacional del Mercado de Valores* (CNMV) takes the view that for the time being (until further EU harmonisation in this area is achieved), a case-by-case 'substance over form' approach is needed. The CNMV considers that a significant number of the operations structured as ICOs should be treated as offerings of transferable securities, since they give rise to rights similar to those of traditional securities and, thus, should be subject to the legal framework applicable to securities in the EU, including MIFID II, the Prospectus Directive and the Alternative Investment Funds Directive.<sup>57</sup> The Bank of Lithuania has taken the position that securities and AML laws apply to VC schemes and has discouraged investors from purchasing VC tokens. Financial institutions in Lithuania are required to insulate their VC-related activities from their other activities.

ESMA has recently adopted new product intervention measures on the provision of contracts for difference (CFDs) and binary options, including *inter alia* leverage limits on cryptocurrencies.<sup>58</sup>

The UK Financial Conduct Authority ('FCA') has taken the position that VCs may be regulated as securities according to the rights acquired with the VC token, as determined on a case by case

<sup>53</sup> <http://www.seminoletax.org/forms/bitcoin-announcement.pdf>.

<sup>54</sup> BaFin, *Virtual Currencies* (28 March 2016), [https://www.bafin.de/EN/Aufsicht/FinTech/VirtualCurrency/virtual\\_currency\\_node\\_en.html](https://www.bafin.de/EN/Aufsicht/FinTech/VirtualCurrency/virtual_currency_node_en.html).

<sup>55</sup> BaFin, *Supervisory classification of tokens or cryptocurrencies underlying 'initial coin offerings' (ICOs) as financial instruments in the field of securities supervision* (Advisory Letter Ref. No. WA 11-QB 4100-2017/0010), [https://www.bafin.de/SharedDocs/Downloads/EN/Merkblatt/WA/dl\\_hinweisschreiben\\_einordnung\\_ICOs\\_en.pdf;jsessionid=47741C233E9A50ED71B9B1596A01F0B5.2\\_cid290?\\_\\_blob=publicationFile&v=2](https://www.bafin.de/SharedDocs/Downloads/EN/Merkblatt/WA/dl_hinweisschreiben_einordnung_ICOs_en.pdf;jsessionid=47741C233E9A50ED71B9B1596A01F0B5.2_cid290?__blob=publicationFile&v=2).

<sup>56</sup> Dell'Erba, Marco, *Initial Coin Offerings. A Primer. The First Response of Regulatory Authorities* (July 7, 2017). Available at SSRN: <https://ssrn.com/abstract=3063536>, 22.

<sup>57</sup> See Joint press statement by CNMV and Banco de España on "cryptocurrencies" and "initial coin offerings" (ICOs) of 8 February 2010 at <http://www.cnmv.es/Portal/verDoc.axd?t={6f310cc7-6b39-4405-a8f7-70d2b1e682d1}> which distinguishes between 'security tokens' and 'utility tokens' and Statement published by the CNMV on 8 February 2018, "CNMV considerations on cryptocurrencies and ICOs addressed to market professionals" at <http://www.cnmv.es/Portal/verDoc.axd?t={62395018-40eb-49bb-a71c-4afb5c966374}>. We are grateful to CNMV President Sebastián Albellá and CNMV Director Raquel García Alcobilla for helpful comments as regards the work of the CNMV in this area.

<sup>58</sup> See <https://www.esma.europa.eu/press-news/esma-news/esma-adopts-final-product-intervention-measures-cfds-and-binary-options>.



analysis. The FCA has acknowledged a lack of jurisdiction where a VC scheme is launched overseas, and that certain financial uses of DLT could circumvent existing regulations.<sup>59</sup>

The Swedish Financial Supervisory Authority four prospectuses with regard to certificates linked to crypto-currencies in 2015, 2016, 2017 and in May 2018 (all XBT Provider AB). The latest prospect concerns not only bitcoin and Ethereum, but also LiteCoin, Bitcoin Cash, Ethereum Classic, Ripple, Neo and “a basket of combination of these”.<sup>60</sup> None of these new certificates have yet been traded with. The latest approved prospect has been passported to the UK.

The Swiss Financial Market Supervisory Authority (‘FINMA’) has promulgated guidelines according to which VC tokens will be treated as securities where it satisfies the relevant definitions in Swiss law. According to paragraph 3.3 of the ICO Guidelines published by the Swiss Financial Market Supervisory Authority (FINMA): “The issuing of tokens that are analogous to equities or bonds can also result in prospectus requirements under the Swiss Code of Obligations. FINMA has no direct responsibility in this area but expects ICO organisers to themselves clarify these requirements. According to the draft Financial Services Act (FinSA) prospectus requirements will become part of supervisory law (Art. 37 Draft FinSA). The Swiss Code of Obligations and FinSA provide for a number of different exceptions and exemptions”.<sup>61</sup>

Further afield, the Central Bank of the Russian Federation initially took a critical view of VCs, but has since determined that regulation would be premature and has taken a very permissive approach to ICOs, VCs, and DLT. In early 2018 the Ministry of Finance introduced a Digital Assets Regulation Bill which would define various aspects of the VC economy. The Monetary Authority of Singapore issued guidance in 2017 stating the approach of treating VC tokens as securities if they are linked to an ownership or security interest. The Australian Securities and Investment Commission is currently determining whether the Corporations Act 2001 (Commonwealth) (which governs corporations law and many aspect of capital markets law) applies to VCs, for example as ‘managed investment schemes’. The Commission has instituted an ‘Innovation Hub’ to keep track of the market and help innovators navigating the regulatory landscape.

### 1.5.2. Judicial decisions

Like these administrative decisions, the thrust of many early judicial decisions has been to bring VC schemes under securities law. However, we can also observe a tendency to accept the claim that VC tokens are a means of payment, in the early decisions at least.

In the early decision of the US District Court (E.D. Texas) in *Securities and Exchange Commission v Trendon T. Shavers and Bitcoin Savings and Trust*, Case No. 4:13-CV-416 (6 August 2013), the court had to decide whether payments of bitcoins could constitute an ‘investment of money’ to determine whether bitcoin-denominated investments were ‘securities’ under US law.<sup>62</sup> The court found that it was ‘clear that Bitcoin can be used as money’ as it could be used to purchase goods or services, notwithstanding that it was not legal tender. The court stressed the fact that bitcoins were exchangeable for ‘conventional currencies’ such as USD and euro: ‘Therefore, Bitcoin is a currency or form of money, and investors wishing to invest in BTSC provided an investment of money.’ This decision should not be read as an endorsement of Bitcoin’s bid for money status, as the main thrust of

<sup>59</sup> See Financial Conduct Authority, ‘DP17/3: Discussion Paper on distributed ledger technology’ (April 2017), <https://www.fca.org.uk/publication/discussion/dp17-03.pdf>, 23.

<sup>60</sup> <https://gahlweb.s3-eu-west-1.amazonaws.com/uploads/prospectus-english-1-76717fe2cb7cb583b1d56db4ee095a12.pdf>.

<sup>61</sup> <https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/>.

<sup>62</sup> i.e. to satisfy the first limb of the test in *SEC v. W.J. Howey & Co.*, 328 U.S. 293, 298-99 (1946).

the decision was to treat investments in the fund as ‘securities’. More recently, a District Court judge has ruled that VC ‘can be regulated by CFTC as a commodity. Virtual currencies are “goods” exchanged in a market for a uniform quality and value.’<sup>63</sup>

In its 2015 decision in *Skatteverket v David Hedqvist*, Case C-264/14, the Court of Justice of the European Union (‘CJEU’) held that certain exchange transactions between fiat currency and Bitcoin were *prima facie* liable to VAT, but exempt under Art. 135(e) of the *VAT Directive 2006/112/CE* as ‘transactions... concerning currency, bank notes and coins used as legal tender’. The Court held that the VAT was intended to ‘alleviate the difficulties connected with determining the taxable amount and the amount of VAT deductible which arise in the context of financial transactions’. These difficulties, it said, could also arise in transactions involving VCs; to deny the exemption would ‘deprive it of part of its effect’. What is noteworthy about this judgment is that the Court refused to exempt the transactions under Art. 135(d), which covers transactions ‘concerning deposit and current accounts, payments, transfers, debts, cheques and other negotiable instruments.’ The VC, it said, was ‘a contractual means of payment’ and could not be regarded as a ‘current account or a deposit account, a payment or a transfer.’ It further differentiated the VC tokens from ‘debts, cheques and other negotiable instruments’ and instead characterised it as a ‘direct means of payment between the operators that accept it.’ It thus treated bitcoins as ‘analogous to other convertible currencies as regards their use in the real world.’<sup>64</sup> It would have been possible for the Court to achieve the same result under the exemption in Art. 135(f), which covers transactions ‘in shares, interests in companies or associations, debentures and other securities’. This was perhaps based on an error in the Court’s apprehension of how bitcoins are actually used; bitcoins are not generally used as a medium of exchange at all but as a speculative store of value, and should have been treated as such.

As already mentioned, one Japanese court has ruled<sup>65</sup> that bitcoins are incapable of ownership because they do not satisfy the legal definition of a ‘thing’, as Japanese law defines things as (i) tangible, spatio-temporal entities that can (ii) be made subject to one’s exclusive control. This left the company’s creditors with damages claims rather than claims based in ownership. (This is implicitly at odds with the regulatory position taken by the US SEC that bitcoins and ether are akin to ‘commodities’). The question is important because about 200,000 bitcoins are still in the possession of the company; as the USD price of bitcoins has increased significantly since the exchange filed for insolvency, at current valuations all the company’s debts (calculated at the date of insolvency) could be paid with a large surplus to return to shareholders.<sup>66</sup>

### 1.5.3. Legislative acts

Certain US states have passed or are in the process of passing laws that regulate one or the other aspect of DLT in ways that may be of relevance to VCs. Delaware corporate law now specifically recognizes blockchain maintenance of corporate records provided that those records are converted into clearly legible paper form within a reasonable time and that securities registers kept in this manner are used to prepare the list of shareholders or record share transfers. The law removes the mention of ‘officers’ in charge of the securities register or records ‘maintained’ by the corporation and instead provides for records ‘administered by or on behalf of the corporation’ to ensure that DLT can

<sup>63</sup> *CFTC v Patrick K. McDonnell and Cabbagetech Corp d/b/a Coin Drop Markets*, Case 1:18-cv-00361-JBW-RLM, 3 June 2018.

<sup>64</sup> *Skatteverket v David Hedqvist*, Case C-264/14, para [42] and para [12].

<sup>65</sup> <https://www.japantimes.co.jp/news/2015/08/06/national/crime-legal/bitcoins-lost-in-mt-gox-debacle-not-subject-to-ownership-claims-tokyo-court-rules/#.WxetcamLlzk>.

<sup>66</sup> See e.g. Justin Sabin and Bruce Suzuki, ‘The Magic of Mt. Gox: How Bitcoin is Confounding Insolvency Law’ (28 November 2017), <http://bankruptcycafe.com/the-magic-of-mt-gox-how-bitcoin-is-confounding-insolvency-law/>.

be used for these purposes.<sup>67</sup> Reforms in Arizona and Nevada ensure that market participants can use DLT for purposes of corporate record-keeping and contracting, for example by stipulating expressly that blockchain-based transactions count as 'digital signatures' for legal purposes.<sup>68</sup>

The Gibraltar Financial Services (Distributed Ledger Technology Providers) Regulations 2017<sup>69</sup> address DLT, VCs, and VC exchanges. This is a facilitative, principles-based instrument that seeks to encourage financial innovation using DLT while ensuring standards by closing up the perceived regulatory gap.

One of the most impressive legislative projects to date is a bundle of legislation in Malta.<sup>70</sup> The Maltese Financial Services Authority has prepared a Virtual Financial Assets Bill ('VFA Bill'), which is currently being debated in Parliament. The aim of the Bill is to create a regulatory framework applicable to ICOs as well as entities offering services, such exchanges, in relation to digital assets falling outside scope of the existing financial regulation, when such activity is carried out in or from within Malta. The objective underlying the VFA Bill is to create a framework that supports the innovation and new technologies for financial services in the area of VCs, whilst ensuring effective investor protection, financial market integrity and financial stability.

The objectives of financial regulation are achieved through minimum transparency requirements applicable to ICOs and governance, conduct and prudential requirements applicable to persons involved in VC activity. This regulation is based on the high-level principles enshrined in existing EU financial services legislation in relation to the provision of investment services, financial markets and prevention of market abuse. Furthermore, the VFA Bill and underlying framework aims at implementing the 5<sup>th</sup> anti-money laundering directive with regard to virtual currencies.

The VFA Bill was published in the *Government Gazette of Malta*<sup>71</sup> together with two corresponding bills, the Malta Digital Innovation Authority Bill ('MDIA Bill') and the Innovative Technology Arrangements and Services Bill ('ITAS Bill'). The objective of the MDIA Bill is to provide for the establishment of an authority to be known as the Malta Digital Innovation Authority, to support the development of technology innovation, and exercise regulatory functions regarding technology arrangements including distributed or decentralised ledger technology. The aim of the ITAS Bill is to provide for the regulation of designated innovative technology arrangements, as well as of designated innovative technology services. Overall the aim of the three Bills is that of ensuring a higher degree of consumer protection in this field.

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<sup>67</sup> See <http://www.nortonrosefulbright.com/knowledge/publications/155384/delaware-provides-legal-clarification-for-blockchain-maintenance-of-corporate-records-the-view-from-canada>.

<sup>68</sup> See <https://legiscan.com/AZ/text/HB2417/id/1497439>.

<sup>69</sup> *Gibraltar Gazette 4401* (12 October 2017).

<sup>70</sup> We are grateful to Christopher P. Buttigieg of the Malta Financial Services Authority and to Pauline Lanzon of the Central Bank of Malta for furnishing us with helpful information about the Maltese legislative program in this regard.

<sup>71</sup> No. 19,994 on 22 May 2018.



## 2. PRIVATELY ISSUED VIRTUAL CURRENCIES

In this section, we discuss the issues raised by privately issued VCs in the context of the Eurosystem. Again, not everything called a ‘Virtual Currency’ is accurately called a ‘currency’ at all. VCs generally fall into four main use cases: (i) use as speculative digital assets, (ii) use as media of exchange, (iii) use as payment rails (e.g. for fiat to fiat payments), and (iv) non-monetary uses (e.g. ‘notarial’ recordkeeping of intellectual property ownership or personal identity).<sup>72</sup> In the context of these use cases, we discuss (i) the direct challenge to central bank control over the money supply posed by VCs intended to operate as ‘currencies’; (ii) the potential for VCs negatively to impact the financial system, and (iii) the potential impact of VCs on central bank monetary policy.

Some uses obviously correspond to legal categories—a VC token used as a speculative asset obviously resembles a ‘security’, and a VC used as a medium of exchange obviously resembles a ‘currency’, for example. However, the task of characterisation is complicated because (i) the relevant legal categories are indeterminate, especially in the context of supranational law, (ii) many VC tokens show hybrid features, and (iii) VC tokens may be used differently than intended by their issuer. In this section, we aim to provide a clearer basis for approaching legal categorisation. Not only is this important to guide national and European regulators as they apply existing regulations to VCs and their issuing or controlling entities; it is also necessary to identify blind spots in national and European regulations themselves.

### 2.1. The Direct Challenge

A number of private VCs position themselves as direct competitors to the traditional monetary system. Bitcoin, for example, was intended to pose a direct challenge to the Eurosystem in both its money supply and monetary policy role by providing an alternative form of currency to central bank liabilities (circulating as currency) and commercial bank liabilities backed with fractional reserves of central bank money (circulating as book-money in non-cash payment systems).

#### 2.1.1. A question of credibility

This challenge is *prima facie* credible to the extent that digital payment instruments are more increasingly more convenient than physical currency for a wide range of transactions; in many Member States, the use of cash is observed to be in decline. If VC-based payment systems were used to the exclusion of cash and book-money, VCs could take whole economies outside the conventional monetary system, which would in turn erode both commercial banks’ role in the monetary system and central banks’ power over the money supply and monetary policy.<sup>73</sup> This would affect the Eurosystem’s core regulatory tasks of maintaining systemic stability, maintaining efficiency and security in payment systems, and implementing monetary policy.

On the other hand, it is fairly clear that VCs are not currently being used as a medium of exchange (or means of payment) in nearly sufficient quantities to pose a credible direct threat. The startling growth of Bitcoin and other VCs suggests that there is some demand for VC-based payments. However, in our view, this demand is driven more by an appetite for non-traditional speculative assets than by a desire for money outside the conventional monetary system. This appetite is perhaps driven by the immense liquidity in the capital markets at present, as a result of unconventional monetary policy

<sup>72</sup> See Hileman, Garrick and Rauchs, Michel, 2017 Global Blockchain Benchmarking Study (September 22, 2017). Available at SSRN: <https://ssrn.com/abstract=3040224>, 8, 35, 105.

<sup>73</sup> Bank for International Settlements Committee on Payments and Markets Infrastructures Markets Committee, *Central Bank Digital Currencies* (March 2018), 7.

tools such as Quantitative Easing ('QE'). Indeed, despite the startling growth in the number (and nominal market capitalisation) of VCs, it appears that most VCs are being used not as currency substitutes at all.

Bitcoin transaction numbers have fallen in recent months, from about 400,000 per week in late 2017 (when prices peaked at close to US \$20,000) to about half that in March 2018.<sup>74</sup> This is very small in comparison to other payment systems like Visa, which processes some 65,000 transactions per second.<sup>75</sup> The recent drop in Bitcoin transactions perhaps also suggests that many of these transactions are in the nature of financial trades rather than retail or wholesale payments, which is consistent with our view that most users do not in fact use their bitcoins as a medium of exchange but rather as a digital asset that they hope will appreciate in value to yield speculative gains.

Although it is not everything,<sup>76</sup> a thing's function as a medium of exchange is probably the most important factor in determining a thing's money status. This is precisely the function in which Bitcoin, in particular, performs most poorly, and no conventional VC performs very well at all.<sup>77</sup> This is likely to remain the case for a number of inherent technical reasons:

- VC payments are generally slow compared to conventional electronic payment systems. Bitcoin is orders of magnitude slower than traditional payment systems; other (newer) VCs are significantly faster than Bitcoin but still much slower than e.g. Visa, e-money payments, or even commercial bank transfers using modern transfer systems.
- There is a limited supply of bitcoins (and many other VCs), and generally there is no equivalent to a central bank which can coordinate the supply of VC tokens to the needs of the economy transacting in them. This incentivises holding as a speculative asset over use as a medium of exchange.
- Permissionless blockchains generally use a massive amount of computing power and energy per transaction. One recent study estimates that Bitcoin uses as much energy as certain countries (2.55 gigawatts and growing) although it powers a tiny economy.<sup>78</sup> In other words, Bitcoin's qualification as a currency would entail a global environmental disaster under current conditions.

The importance of these technical limitations is revealed by current market developments. One response is to add 'layers' to the Bitcoin technology stack. For example, wallets and exchanges that process transactions off-chain increase the efficiency and transaction speed of a permissionless VC like Bitcoin. However, they do this only by adding features of centralisation and intermediation to a (supposedly) decentralised and disintermediated payment system. In so doing, they depart from the core ethos of the crypto-currency movement and exacerbate the need for regulatory control as they create parallel financial institutions in a shadow payments system. Ironically, one of the layers to be built on the Bitcoin stack might even be physical tokens. One company is now issuing 'smart' banknotes for digital assets.<sup>79</sup> Bitcoin notes are already available in Singapore.<sup>80</sup> These 'banknotes' are physical (so-called 'cold-storage') devices for private keys associated with a number of Bitcoin tokens.

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<sup>74</sup> <http://fortune.com/2018/03/02/bitcoin-price-transaction-volume/>.

<sup>75</sup> <https://usa.visa.com/dam/VCOM/global/about-visa/documents/visa-facts-figures-jan-2017.pdf>.

<sup>76</sup> See generally Geoffrey Ingham, *The Nature of Money* (Polity 2004).

<sup>77</sup> Ripple, which provides an RTGS system, has issued VC tokens but operates quite differently and does not claim to displace currency in retail payments in the monetary system.

<sup>78</sup> Alex de Vries, 'Bitcoin's Growing Energy Problem' (2018) 2(5) *Joule* 801. See further <https://digiconomist.net/bitcoin-energy-consumption>.

<sup>79</sup> <https://tangem.com/>.

<sup>80</sup> <https://news.bitcoin.com/bitcoin-smart-banknotes/>.

They are similar to e-money stored locally on a ‘smart card’ or other device, but the value of the store is not in fiat money but Bitcoin, and they are designed not for electronic transfer but physical exchange. Their existence actually speaks to the inefficiency of the Bitcoin system for transferring value electronically.

However, these failings may be avoided by other VCs in the future. Transaction speed and efficiency is a hotspot of innovation in the VC developer community, and any given VC’s status would have to be reassessed if it started to act more like money. In other words, despite our functional-empirical rejection of the direct challenge, the Eurosystem must take VCs seriously, monitor the VC market closely, and model various contingencies in order to intervene in a timely and effective manner.

### 2.1.2. An open back door

When addressing the credibility of the direct challenge, it is important to separate (i) the conceptual reasons why a given VC is not ‘money’ (or could not replace conventional money) and (ii) the empirical reasons why a given VC has not acquired money status (or has not acquired it yet). In our view, there is significant disagreement and indeterminacy in the concept of ‘money’ that makes it difficult to reject the direct challenge on conceptual grounds, even if the answer is (still) fairly clear on empirical grounds. We expand on this theme in Section 2.3, below.

Without begging questions, in our view the concept of money must look at a token’s legal status and economic functions, which traditionally include (i) a commonly accepted medium of exchange, (ii) a unit of account, (iii) a store of value and standard of deferred value and (iv) means of payment.<sup>81</sup> Of these, the functions as a medium of exchange and means of payment seem to us to be the most important for the purposes of our discussion. Indeed, ‘money’ and ‘payment systems’ are conceptually connected; money seems to be something that emerges from a payment system, whether that is a payment system that uses physical tokens (e.g. currency) or other representations of value (e.g. account based payment systems). Thus, while we think it is clear on empirical grounds that neither Bitcoin nor any other VC has (yet) acquired money status, the conceptual back door remains open to changes in the operation of the VC market.

## 2.2. VCs as a Vector of Financial Contagion

Whether considered as money-like or as security-like, a VC may pose a risk of contagion in the ‘real world’ financial system because it could spread liquidity problems into the latter. The risk of financial contagion follows on from our border metaphor; as ECB Vice-President Yves Mersch said in a recent interview, ‘bridges’ between the virtual world and the real world can be a vector for contagion. A collapse in the virtual world can drain liquidity from real world financial institutions, which could become a concern for central banks as the system’s lenders of last resort.<sup>82</sup>

In our view, contagion is most likely to spread through (i) growth of the VC-based payment system to systemically relevant proportions, or (ii) exposure to VC assets whose volatility could spread liquidity problems to the regulated sector. Though the literature on contagion is rather extensive, and a lot has been published in the context of the Great Financial Crisis and its aftermath,<sup>83</sup> not much has been

<sup>81</sup> See e.g. Arthur Nussbaum, ‘Monetary Conceptions in Law’ (1937) 35(6) *Michigan Law Review* 865, 867. See Lastra (2015), *International Financial and Monetary Law* (OUP), p.12, paragraph 1.30.

<sup>82</sup> See Yves Mersch, ‘Virtual or virtueless? The evolution of money in the digital age’ (Official Monetary and Financial Institutions Forum, London, 8 February 2018), <https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180208.en.html>.

<sup>83</sup> See inter alia, Adriano Lucatelli, *Finance and World Order—Financial Fragility, Systemic Risk and Transnational Regimes* (Westport Connecticut: Greenwood Press, 1997), 70–4; European Central Bank, ‘The Concept of Systemic Risk’ (2009)

written to date about the risk of contagion of VCs.<sup>84</sup> But any risk can grow to systemic proportions when its negative impact extends beyond an individual institution, affecting or threatening to affect other institutions, potentially creating a disruption in the monetary system and associated problems in the real economy. The most important developments to watch, therefore, are (i) the size of the VC payments system and (ii) the degree of entanglement between the VC payments system and existing economies.

### 2.2.1. Contagion from the shadow payments system

It can be argued that there are three kinds of payment systems currently in operation: (i) currency (banknotes representing central bank liabilities, with legal tender status), (ii) deposit account transfer systems (e.g. cheque and giro payment systems by which commercial bank liabilities are transferred from one ledger to another), and (iii) **note transfer systems** (e.g. written debt instruments issued by commercial banks without legal tender status). As Rogers correctly argues, e-money should probably be regarded as a modern form of (iii) rather than as something categorically novel.<sup>85</sup>

If VCs do not (yet) pose a direct threat to the primacy of traditional money, but if regulators are unwilling (or unable) to exclude VCs from the European payments ecosystem, they will continue to function as payment systems (albeit not very good ones, or ones that make crime, financial crime, and tax evasion more difficult to investigate and prosecute). The default choice, then, is for VCs to form part of a more complex payments system in which VCs compete with traditional money. The question then becomes one of the terms on which private VCs should be allowed to exist and operate.

Awrey and van Zwieten draw attention to the fact that every payments system has both a liquidity function and a storage function. Failures in both can cause problems for the wider financial system and for the real economy. Systemic risk is heightened by the possibility that VC-based payment providers bundle their payments services with other financial services, in particular by operating a kind of fractional reserve policy to create a supply of money-like payment instruments on the basis of a reserve of VC assets that are not even guaranteed by the technical limitations on the VC itself.

The conventional tools for regulating payment service providers—portfolio restrictions, private third-party insurance, the mandatory outsourcing of storage functions to regulated entities (i.e. commercial banks), and the use of fiduciary ring-fencing mechanisms—are all directed towards problems with the storage function. These tools do not, however, address systemic liquidity risks.<sup>86</sup>

Although unregulated activities performed by unregulated entities are theoretically encapsulated from the regulated financial system, the VC economy is not wholly self-contained. A 2017 study of VCs found that two-thirds of payments in 2016 were from fiat to VC; fiat to fiat payments via VC accounted for 27% of payments, and VC to VC payments only 6%. The apparent diversity in the VC

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Financial Stability Review of the European Central Bank, December 2009, 134; Steven L Schwarcz, 'Systemic Risk' (2008) 97 *Georgetown Law Journal* 193; Jean-Claude Trichet, President of the European Central Bank, Systemic Risk, Clare Distinguished Lecture in Economics and Public Policy at the Clare College, University of Cambridge (10 December 2009); John B Taylor, Professor of Economics, Senior Fellow at the Hoover Institution, Stanford University, Dinner Keynote Speech at the Conference on Financial Innovation and Crises, Federal Reserve Bank of Atlanta: Systemic Risk and the Role of Government (12 May 2009); Anna Gelpern, 'Financial Crisis Containment' (2009) 41 *Connecticut Law Review* 1051; Erik F Gerding, 'Code, Crash, and Open Source: The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis' (2009) 84 *Washington Law Rev* 127; Amir E Khandani, Andrew W Lo and Robert C Merton, 'Systemic Risk and the Refinancing Ratchet Effect' (2009) Harvard Business School, Working Paper 10-023.

<sup>84</sup> For a recent analysis on systemic implications see Saule T. Omarova, "New Tech v. New Deal: FinTech as a Systemic Phenomenon" (2018) Working Paper (on file with the authors).

<sup>85</sup> See J.S. Rogers, 'The New Old Law of Electronic Money' (2005) 4 *SMU Law Review* 1253, 1254.

<sup>86</sup> See Dan Awrey and Kristin van Zwieten, 'The Shadow Payment System' (2018) 43(4) *The Journal of Corporation Law* 102.

market is also partly illusory. Bitcoin plays a foundational role, as does Ether. Many VCs are only purchasable in Bitcoin or Ether, and VCs running on the Ethereum platform require Ether to run.<sup>87</sup> The price of other VCs is, accordingly, not insensitive to price of these two VCs. Thus, while the VC economy has grown at a startling pace and shows signs of further growth, it is difficult to cash out (especially if there were a crisis, e.g. precipitated by unfavourable regulation or discovery of security problems).

Awrey and van Zwieten therefore suggest a separation of storage and liquidity functions. The VC shadow payments system represents a new frontier in institutional design and regulation which may require more hands-on regulatory intervention. Matters cannot be left to private contractual agreement and/or industry self-regulation, they argue, because of some structural features of the VC market, in particular because many early VC payments services providers (i) are unknown, or lack well developed corporate personality, capacity, and governance systems, and (ii) are techno-libertarian in outlook, and possibly convinced that they are operating in a space that is (and should remain) free of national (or supra-national) regulation. This may change as more conventional players enter the space, but in the meantime even up-to-date payments regulations such as the Second Payments Services Directive (EU) 2015/2366, which gives wide latitude to the industry to design institutional features and minimise systemic risks, may not be appropriate to the VC payments industry.

### 2.2.2. Contagion from risky digital assets

The risk of contagion also rests on the possibility that regulated entities have assumed positions that expose them to VC price fluctuations either by (i) purchasing assets themselves, (ii) lending to investors who have purchased VC assets, or (iii) structured regulated products such as derivatives on the basis of an underlying VC asset.

The basis of the risk of contagion is the well-known and extraordinary volatility of the price of VC tokens. For example, the first Quarter of 2018 saw VC tokens lose value almost across the board; Bitcoin, in particular, fell from record heights in late 2017 of almost US \$20,000 to their value at the time of writing of around US \$7,000. The conventional approach is to regulate systemically important entities, provide publicly supported protections for activities within the regulated space, and allow unregulated entities to fail. But the border is porous, and so this strategy is not always straightforward.

At present, mainstream financial institutions in Europe have been rightly cautious about exposing themselves to the VC market. But the boundary between the protected and unprotected parts of a payment system, and the existence of greater regulatory constraints on the protected part, incentivises a cycle of flows into the unregulated part of the system during expansions. In order to pursue business opportunities, those in the regulated sector will seek to open up connected operations in the non-regulated sector to catch opportunities there. Conversely, in times of crisis, we expect flows out of the unregulated sector which could cause significant liquidity problems for entities operating in that space. To date, VC-based payment companies have experienced difficulty in establishing and maintaining relationships with conventional banks and payment networks. Given the record profits that have been made in VC speculation, however, this position is susceptible to change. Last month, Barclays established a banking relationship with a major US-based VC exchange,

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<sup>87</sup> So-called 'gas' is a measurement of the computational processing power needed to perform an action on the Ethereum platform; but there is no token for 'gas', so units of gas are paid in units of Ether. See e.g. <https://ethereum.stackexchange.com/questions/3/what-is-meant-by-the-term-gas>.



Coinbase.<sup>88</sup> This will make it easier for UK-based individuals and firms to purchase VCs with GBP directly. One analyst has been quoted to the effect that '[t]here is a wall of institutional money just waiting for the right conditions to enter the market.'<sup>89</sup> VC-based derivatives, in particular, seem to be a beachhead for forays by regulated entities into the VC space. Structuring products such as derivatives could cause a regulated entity to become exposed based on underlying asset; investors and their lenders could also be exposed if they leverage their acquisition of VC assets.

The EBA has recommended that national authorities discourage credit institutions, payment institutions, and e-money institutions from buying, holding, or selling VCs.<sup>90</sup> The EBA's seminal 2014 Opinion sketched out a full suite of regulations for VCs (based on the VC market at the time). The Opinion evaluated such a full suite as too expensive proportionate to the risk then posed by VCs, and suggested an approach of containment and active monitoring by default. As the VC payments sector grows, it will demand regulation—especially as (i) more retail customers are exposed to VC assets, (ii) more conventional financial institutions are exposed to VC assets, and (iii) the number of *de facto* intermediaries (such as wallet and exchange providers) grows.

In our view, it is essential that regulators within the Eurosystem take pro-active steps to ensure that the VC-based shadow payment system is not allowed to grow to a size, or a degree of entanglement with conventional payment networks, such that it could pose a credible risk of contagion. One question in this regard is whether the Eurosystem should focus on protecting the system *from* VCs, or whether it also has to play a role in protecting users' interests *within* the VC economy.<sup>91</sup> The more retail investors become exposed in the VC market, and the more this exposure could affect their 'real world' position (e.g. their ability to repay a mortgage or save for retirement), the more important it would seem.

## 2.3. Conceptual Challenges

Perhaps the main challenge in regulating any new technologically-mediated financial practice is to bring it within the legal system's existing categories. Once an adequate picture of a VC's technical and economic features has formed, it is necessary to classify the **VC token as a legal object**. Once it has been classified as a legal object, it must be determined which type of legal object it is. Often, the only approach (in advance of legislative initiative) is to do one's best to include the new artefacts and practices within the current definitions through analogical application.<sup>92</sup> Generally, this standard mode of legal development is adequate. The approach can, however, be exhausted before a satisfactory regulatory framework has been achieved, and we perceive this risk to be particularly high in the context of VCs.

### 2.3.1. The problem of *res digitales*

As mentioned earlier, before VC tokens can be characterised as anything else, they need to be characterised as objects of property rights. Recent commentators in French law, for example, have labelled bitcoins as '*objets juridiques non identifiés*'.<sup>93</sup> This is an accurate interim assessment, but is not

<sup>88</sup> See <https://www.reuters.com/article/us-crypto-currencies-barclays/bitcoin-exchange-reaches-deal-with-barclays-for-uk-transactions-idUSKCN1GQ2JD> (accessed 23 April 2018).

<sup>89</sup> Philip Stafford and Hannah Murphy, 'City of London agonises over jumping on crypto bandwagon' (*Financial Times*, 25 May 2018), <https://www.ft.com/content/391d15ae-5f47-11e8-9334-2218e7146b04>.

<sup>90</sup> <http://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf>.

<sup>91</sup> See Philipp Hacker, 'Corporate Governance for Cryptocurrencies? A Framework for Stability and Decision Making in Blockchain-Based Monetary Systems' (November 22, 2017), 6. Available at SSRN: <https://ssrn.com/abstract=2998830>.

<sup>92</sup> See e.g. F.H. Easterbrook, 'The Law of the Horse' [1997] *University of Chicago Legal Forum* 207.

<sup>93</sup> See Myriam Roussille, 'Le Bitcoin: Objet Juridique Non Identifié' (2015) 159 *Banque & Droit* 27.

a stable long-term position for any legal system. If VC tokens could not be legally owned at all, there would be an unacceptable divergence between the legal system and economic expectations.<sup>94</sup> Every legal system somehow accommodates VC tokens, but the method of accommodation differs from jurisdiction to jurisdiction, and this opens up room for regulatory divergence.

For example, legal systems based on a Pandectist reading of the Gaiian *Institutes* define ‘things’ capable of ownership as tangible objects only.<sup>95</sup> This has traditionally raised problems such as the characterisation of company shares or electricity for the purposes of property law. There are solutions to these problems, but the ‘systemic cost’ of those solutions is often ignored. In any case, VC tokens present a potentially hard case. Japanese law, which also follows such a definition, denied that bitcoins could be objects of property rights in Japanese law, which has had implications for a multi-billion dollar insolvency proceeding over a major VC exchange. Similar issues could potentially arise in Europe, which could make the European insolvency landscape more complex and create incentives for forum shopping.

Whether they are considered to be money and/or securities, VC tokens are a class of digital, immaterial objects whose existence and growing economic importance brings some conceptual problems in the structure of European legal systems into relief. We might call them ‘*res digitales*’ in contrast to *res corporals* and *res incorporales*.<sup>96</sup> Despite their economic importance, immaterial objects are not well accounted for in the property law of any European legal system. We have not yet had a European-level discourse on the categorisation of immaterial objects, and in many jurisdictions there is not even a linguistic framework for describing and categorizing them for internal purposes.<sup>97</sup> In our view, it should be a priority for NCBs and the ECB to encourage the rational treatment of VC tokens in European legal systems, as this could provide a stumbling block to the effective regulation of VCs in Europe.

### 2.3.2. Money or securities?

The foregoing has contributed to the fact that legal definitions of money have generally focused nowadays on banknotes’ and coins’ **physical** properties for the purposes of legal categorisation. VCs do not raise entirely novel problems in this regard, however. Also problematic is the conceptual position of book-money, i.e. the commercial bank liabilities that form the bulk of the broad money supply. It is necessary for monetary law to explain how bilateral obligations can circulate as a medium of payment. The problem is merely sharpened in the context of VCs schemes like Bitcoin, in which the tokens are not the obligation of anyone at the time of emission.

Thus, the next conceptual problem is encountered when asking ‘Is a bitcoin (or any other VC token) a unit of “money” or a security?’ Categorisation entails important consequences for a token’s status under capital markets, prudential, and tax regulations, for example; the transfer of a VC token on a blockchain from one public key to another public key will have different tax implications depending on whether it is treated as a unit of currency or as a security. Just as importantly, the distribution of competence within the Eurosystem and within the national regulatory systems of Member States is determined according to these definitions.

<sup>94</sup> See Shawn Bayern, ‘Dynamic Common Law and Technological Change: The Classification of Bitcoin’ (2014) 71 *Washington & Lee Law Review Online* 22, 34.

<sup>95</sup> See G.L. Gretton, ‘Ownership and its Objects’ (2007) 71 *Rechts Zeitschrift* 802, 821.

<sup>96</sup> See e.g. Przemyslaw Palka, ‘Virtual property: towards a general theory’ (European University Institute Law Department PhD Thesis, 2017), available at <http://cadmus.eui.eu/handle/1814/49664>.

<sup>97</sup> Christian von Bar, *Gemeineuropäisches Sachenrecht Band I* (Beck 2015), 311, 314-315. Translation by the authors.

As we described above, much of the early regulatory response to VCs has been to bring ICOs under the legal regimes applicable to the issue of securities. Given our judgment that many VCs currently function as securities, this is an appropriate response. What we have called utility tokens, for example, are not securities in the traditional sense, and the SEC has recently announced the view that the two most important VC tokens, bitcoins and ethers, are more in the nature of digital commodities.<sup>98</sup> We discuss a few complications in the European securities law context below. On the other hand, we have seen that certain authorities, including the CJEU, have deemed certain VCs to be more akin to currencies, and that some national regulators have given credence to VCs' payment function, which renders them at least money-like.

In general, we recommend that regulators take a functional approach rather than conducting only formal analyses,<sup>99</sup> not least because such a functional approach allows regulators working in divergent national legal systems to aim towards a more consistent European approach. But such a functional approach should, in our view, be followed up with a conceptual analysis of the basic categories, at least when those categories begin to diverge from the social and technological context they purport to describe and which they are designed to regulate.

### 2.3.3. Differing conceptions of money

Lawyers and economists have traditionally approached money from different starting points. Lawyers conventionally look to whether a medium of exchange is 'legal tender' in the jurisdiction, i.e. whether subjects are required to accept it as final payment for debts ('means of payment'). This definition is accepted to be narrower than economic definitions of money, but lawyers' concerns are narrower, and have traditionally centred on the procedural question of what counts as a final settlement of legal obligations.<sup>100</sup>

Economists, on the other hand, have generally taken a broader approach taking also into account the process of money creation via the banking system and the recognition of bank deposits as the largest part of money supply (M1).<sup>101</sup>

The functional approach makes it possible to see money-ness as more of a spectrum than a binary property, and to accept various forms of 'money' operating side by side in an economic system. The empirical circle is usually squared with the principle of monetary sovereignty by pointing to the hierarchical relationship between different forms of money implicit in the practice of fractional reserve banking and central banks' ultimate control over the money supply and lender of last resort role.<sup>102</sup>

In our view, an integrated legal and economic definition is desirable. In the first instance, the strict legal approach must give way to the reality that payment systems change over time, that currency is less important as a medium of exchange than it was in the past, and that the bulk of the money supply exists only as demand deposits on commercial bank ledgers.<sup>103</sup> If cash were to disappear from a country's payment system, that society would not suddenly become 'moneyless';<sup>104</sup> any definition

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<sup>98</sup> <https://www.reuters.com/article/cryptocurrencies-ether/us-sec-official-says-ether-not-a-security-price-surges-idUSL1N1TG1TF>.

<sup>99</sup> See Shawn Bayern, 'Dynamic Common Law and Technological Change: The Classification of Bitcoin' (2014) 71 *Washington & Lee Law Review Online* 22, 33.

<sup>100</sup> See for e.g. F.A. Mann, *The Legal Aspect of Money* (5<sup>th</sup> Edition, Oxford University Press 1992), 5.

<sup>101</sup> See Arthur Nussbaum, 'Basic Monetary Conceptions in Law' (1937) 35(6) *Michigan Law Review* 865, 868.

<sup>102</sup> See Stefanie Bell, 'The role of the state and the hierarchy of money' (2001) 25 *Cambridge Journal of Economics* 149.

<sup>103</sup> See Henry Sidgwick, 'What is Money?' *The Fortnightly Review*, January-June, 1879.

<sup>104</sup> See Karl Olivecrona, *The Problem of the Monetary Unit* (Macmillan 1951).



of money committed to this conclusion is, in our view, unsustainable. As Proctor rightly notes, ‘as the available means of payment multiply, the meaning of “money” must broaden.’<sup>105</sup>

The contribution from law to economics, on the other hand, is in part to explain how the thing used as the money-token exists and behaves as an object of legal commerce (see section 2.3.1, above). This is straightforward in the case of cash, which has a physical manifestation; it has become increasingly tricky as money has ‘dematerialised’ over the past century with the use of increasingly advanced information communications technology in payment systems—first the introduction of the telegraph, then computerised record-keeping, then the Internet, and now DLT.<sup>106</sup> In the latter part of the twentieth century the function of money as store of value was increasingly recognised by lawyers and economists as one of its key foundations, leading to the widespread adoption of laws that gave primacy to the price stability mandate of independent central banks.<sup>107</sup>

Rather than taking a dogmatic approach to VCs’ money status, we think it is preferable to ask how VCs fit into (and/or change) the existing payment ecosystem. The three types of payment system (currency, bank accounts, and bank notes) are used to create both ‘narrow’ money (i.e. currency and electronic central bank liabilities), generally created by public central banks, and ‘broad’ money (i.e. bank liabilities) the preponderance of which is created by private commercial banks. The question then becomes whether any given VC should be considered part of the broad money supply, or whether it should be kept insulated from even the economic definition of money despite its use as a money-like instrument in a payment system.

The currency we now use takes the form of bearer securities.<sup>108</sup> Fundamentally, therefore, it seems to us that something can be a security **and** be money at the same time; some securities (but not others) circulate as a medium of exchange in a payment system, just as some tangible commodities (but not others) circulate as a medium of exchange, and those that so circulate seem to acquire ‘money status’.

#### 2.3.4. The abandoned middle ground

Economic conceptions of money are not homogeneous. Theories generally fall into two broad strands. Orthodox or commodity theories of money stress (i) the historical use of commodities (paradigmatically precious metal) as the token of the monetary unit and (ii) the bottom up creation of money systems by economic agents’ use of a commodity to ease the burdens of barter exchange. Heterodox or credit theories of money, on the other hand, stress (i) the importance of legislative fiat giving tokens (whether metal, paper, or digital) the status of money and (ii) top down creation of

<sup>105</sup> Charles Proctor, *Mann on the Legal Aspect of Money* (6<sup>th</sup> Edition, Oxford University Press 2005), 9.

<sup>106</sup> See D.W. Arner, J.N. Barberis, and R.P. Buckley, ‘The Evolution of Fintech: A New Post-Crisis Paradigm?’ (1 October 2015, University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62), available at SSRN: <https://ssrn.com/abstract=2676553>.

<sup>107</sup> Antonio Sainz de Vicuña, advocates an ‘institutional theory of money’, in which money is not limited to ‘cash’, but encompasses a dematerialized concept (called ‘scriptural money’, which includes demand deposits with credit institutions). This is based on the small proportion of money physically represented in banknotes and coins, as compared with the generalized use of the banking system for holding money and for payments. The wide acceptance and use by society of scriptural money is based on an institutional framework of two pillars: (i) an independent central bank that ensures the stability of the purchasing capacity of money and its sound use as means of payment, and (ii) a legislative framework that supports such independence, the solvency and liquidity of credit institutions, and the reliability of scriptural money as means of payment See Antonio Sainz de Vicuña, ‘An Institutional Theory of Money’ in M. Giovanoli and D. Devos (eds), *International Monetary and Financial Law: The Global Crisis* (2010) 517. Antonio Sainz de Vicuña, ‘The Concept of Money in the XXI<sup>st</sup> Century’, in a paper presented at the MOCOMILA meeting in Tokyo on 1 April 2004 stated: ‘A currency is trusted by society and markets, when there is an institutional framework that ensures preservation of purchasing capacity, ie price stability. Money is then defined as the dematerialised “commodity” produced and managed by central banks that serves the function of store of value.’

<sup>108</sup> See <https://www.bankofengland.co.uk/banknotes/scottish-and-northern-ireland-banknotes>.

money within constituted politico-legal order, for example by the state's decree that certain tokens and not others are 'legal tender' for all payment of all debts, including tax payments to the state. In these theories, the guarantee that a token can be used to pay one's obligations to the state gives money a stable value because we all owe obligations to the state.

Commodity theories are conceptually sophisticated but tend to proceed from abstract assumptions about the nature of economic transactions that are not always empirically robust. They lend themselves well to mathematical modelling, but are criticised by credit theorists as being falsified by the historical, anthropological, and sociological evidence. Credit theories have the virtue of being generally better supported by extrinsic evidence, and are generally more attractive to lawyers as they stress the role of law and constituted political authority in the creation of money. Indeed, the commodity theory does not provide the best explanation of the money system we actually have, in which paper and electronic tokens of no intrinsic value are given money status by legislative fiat; our system is probably better explained by credit theories of money that emphasise the role of the state.

Current efforts to theorise the place of VCs in the monetary landscape are confounded by the path-dependency of these established schools of thought. As Goodhart observes, the theory about optimal currency areas (such as the Eurozone) is based on orthodox commodity theories, in particular the notion that optimal currency areas are formed by the needs and efficient preferences of market participants. The Eurosystem, however, rather proves that currency integration is often a matter of top-down political will rather than spontaneous market convergence, and strong populist objection to euro shows that it is a top-down rather than bottom-up phenomenon.<sup>109</sup> On the other hand, state-centric credit theories of money leave us with little to say about the tokens that circulate within a private payment network such as a VC scheme.

In effect, there is a kind of lost middle ground, namely **private credit theories of money**. Theorists committed to the idea that communities can create money through their own choice and action are generally committed to a commodity theory of money that does not explain the use of tokens with no intrinsic value; theorists committed to the idea that worthless tokens can be endowed with value by a community and circulate as 'real' money are generally committed to a state-centric view that excludes the possibility of private fiat currencies. In consequence, many VC advocates tend to position VC tokens as 'commodities' with some kind of intrinsic value in virtue of their algorithmically-determined scarcity. This position has potentially been bolstered by the recent SEC ruling that bitcoins and ethers are not securities, and are more like commodities, under US law.<sup>110</sup> But that generally misses the point that even commodities only become money when they are given that status (whether through custom or legislative fiat), in virtue of which they acquire an exchange value separate to their use-value. As Elster correctly observed a century ago, 'money is created in the same instant in which the good ends its conceptual existence.'<sup>111</sup> In our view, VCs make it necessary to ask why, if payment systems give rise to money, private payment systems do not give rise to money (or at least something money-like)?<sup>112</sup>

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<sup>109</sup> See C.A.E. Goodhart, 'The two concepts of money: implications for the analysis of optimal currency areas' (1998) 14 *European Journal of Political Economy* 407, 417.

<sup>110</sup> See <https://www.reuters.com/article/cryptocurrencies-ether/us-sec-official-says-ether-not-a-security-price-surges-idU5L1N1TG1TE>.

<sup>111</sup> Karl Elster, "'Kaufkraft' und 'Geltung' des Geldes' (1920) 115 *Jahrbücher für Nationalökonomie* 243, 247.

<sup>112</sup> See S.P. Altmann, 'Zur deutschen Geldlehre des XIX Jahrhunderts' in *Die Entwicklung des deutschen Volkswirtschaftslehre im XIX Jahrhundert, Festgabe für Schmoller* (Leipzig 1908), 33, cited and translated in H.S. Ellis, *German Monetary Theory 1905—1933* (Harvard University Press 1936), 25.

### 2.3.5. Monetary competition

Despite these fundamental disagreements, it is fair to say that, from an economic perspective, various forms of ‘money’ coexist in a hierarchy, in which a central bank is generally accepted to sit at the apex in our monetary system as presently constituted.<sup>113</sup> This has been the case since the political settlement between private money creation and public authority in the 17<sup>th</sup> century, leading to the creation of the Bank of England—a model which has since been exported to many other jurisdictions.<sup>114</sup> Commodity theorists and credit theorists explain this fact in different ways, and evaluate it differently. In particular, some commodity theorists disapprove of central banks’ position at the top of the hierarchy and advocate a form of monetary competition. These ideas have also found purchase among VC advocates who see the entry of VCs into the payments (and possibly monetary) system as an opportunity to force competition even against the political power that bolsters central banks’ position at the top of the hierarchy. Thus, VCs potentially break in through the conceptual back door.

The first point to make is that the state monopoly over money creation is weaker than some textbook accounts suggest. As stated above, the vast majority of the broad money supply is created by private commercial banks taking deposits and/or making loans; broad money’s link to public authority is through commercial banks’ holding of fractional reserves of central bank money (cash and central bank accounts) and the central bank’s role as lender of last resort to commercial banks in crisis. (Again, on some strict legal definitions, this broad money is not ‘money’ at all—but, as we have discussed above, such a definition is hardly practical and is increasingly difficult to defend.) The replacement of cash as the main medium of payment increases this trend.

F.A. Hayek’s theory of the denationalisation of money and free competition between private issuers of money is particularly important.<sup>115</sup> Hayek advocated the free choice in currency, opening up the provision of currency to competition from both the private sector and from foreign issuers of currency. According to Hayek, the value of the currencies could be related to a ‘rule’ (different from a monetary base) such as convertibility to a basket of commodities.<sup>116</sup> In a system of free banking, there would be no need for a central pool of reserves, as an individual commercial bank would keep its own reserves, and be responsible for the convertibility of its own - note and deposit-liabilities.<sup>117</sup>

<sup>113</sup> See Stefanie Bell, ‘The role of the state and the hierarchy of money’ (2001) 25 *Cambridge Journal of Economics* 149.

<sup>114</sup> See generally Christine Desan, *Making Money: Coin, Currency, and the Coming of Capitalism* (Oxford University Press 2015), Chapter 1.

<sup>115</sup> See F.A. Hayek, *Denationalisation of Money: The Argument Refined—An Analysis of the Theory and Practice of Concurrent Currencies* (3<sup>rd</sup> Edition, IEA 1990). Hayek prefaces his essay at p. 13 with the observation that it is ‘hopeless’ to search for politically feasible solution to ‘what is technically the simplest problem, namely to stop inflation.’

<sup>116</sup> Hayek’s proposals were clearly defined in *Denationalization of Money* in 1976, though his concern about this subject goes back to 1937 (*Monetary Nationalism and International Stability*), or even before, as one of his students at the London School of Economics, Vera Smith, published in 1936 *The Rationale of Central Banking*, paying special attention to the role of note-issuing. Hayek’s argument was “refined” (according to his own words) in 1978, *Denationalization of Money, the Argument Refined*, becoming more radical, envisioning private fiat monies; and redefined in 1986 (“Market Standards for Money”), with a more realistic view on the impracticability of some aspects of his proposals, at least in a near future.

<sup>117</sup> The free banking proposals however raise major economic issues and complex problems, in terms of stability, sufficiency and other factors, which exceed the scope of this study. An additional difficulty in assessing the practical success of these theories is the lack of sufficient evidence supporting their arguments. For a comprehensive study of the free banking cases, see K. Schuler, “The World History of Free Banking: An Overview”, in Kevin Dowd (ed.), *The Experience of Free Banking* (London: Routledge, 1992). However, the often cited historical experience of Scotland, from 1716 to 1845, widely surveyed by White, was not that stable and successful, according to Goodhart (1988, above note 2, pp. 51-52). Among other representatives of the new generation of the free banking school, the work by White, Glasner and Selgin has been significant. See L.H. White, *Free Banking in Britain: Theory, Experience and Debate 1800-1845* (Cambridge: Cambridge University Press, 1984) and *Competition and Currency. Essays on Free Banking and Money*, (New York: New York University Press, 1989). As defined by White (1984, p. 1), ‘free banking’ is ‘the system under which there are no political

The development of virtual currencies, such as Bitcoin, is after all a modern example of competition in the provision of currency. As discussed earlier, a key motivation for this 'crypto-currency' is to place the process of money creation beyond the reach of central banks, thus challenging their monopoly of currency issue and provided alternative (some argue cheaper and more efficient) means of exchange and payment than those offered by banks and card companies.<sup>118</sup> However, the simplicity of the algorithm behind the computer system at the heart of Bitcoin (a fixed formula to control the supply of Bitcoins) contrasts with the complexity of economic policy-making and human behaviour, not to mention the inherent vulnerabilities of Bitcoin and the need to comply with anti-money laundering legislation and other rules governing payments made adopting this new math-based currency.<sup>119</sup>

As noted, the VC movement is strongly influenced by libertarian ideas about spontaneous private ordering and a scepticism towards state control generally, which translates to scepticism about central bank monetary policy. On this view, privately issued VCs should successfully compete with the existing monetary system or at least provide a diverse 'market' of private currencies to which individuals and firms can turn as an alternative.

In this context, it is important to note that central banks' role is currently the subject of a crisis of societal legitimacy, as non-majoritarian institutions in an increasingly populist political environment.<sup>120</sup> In Europe, populist resistance to central bank independence is also aligned with anti-European movements. VCs are thus intervening in European politics at a particularly delicate time.

While the idea of monetary competition is a respectable intellectual position, and while there is already a great diversity in the money supply, these private monies still fall within the umbrella of the official monetary system. Mature, if not completely effective, oversight and control is exercised by institutions invested with public authority, including central banks, prudential regulators, and capital markets regulators. The entire volume of broad money is *prima facie* taxable. In our view, a proliferation of unsanctioned private currencies antagonistic to this system would be inimical to the Eurosystem and parasitic on the states in which their users reside, to the extent that users attempt to insulate their VC transactions and holdings from regulation and taxation.

## 2.4. VCs as 'securities' in the European context

The next problem is that the definition of securities is less straightforward than it appears, especially in the European context where the term is defined differently in different languages, against the background of national legal systems. As Castellano notes, the concept of securities is itself complex, implying aspects of investment, negotiability, and value. But different legal systems use different terms (e.g. *valuers mobiliers/titres financiers*, *Wertpapiere*, securities). The definition of each national term is coloured not only by the etymology of the term chosen, but also by the unique history and

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restrictions on the business of issuing paper currency convertible into full-bodied coin'. See also G. Selgin, *The Theory of Free Banking* (Totowa, N.J.: Rowman & Littlefield, Totowa, 1988) and D. Glasner, *Free Banking and Monetary Reform*, (Cambridge: Cambridge University Press, 1989).

<sup>118</sup> For a currency that is not backed by any central authority, Bitcoin's value lies in people's confidence to use it. But trust is built over time. As reported in the FT of 26 February 2014, following fears of \$400m theft after Bitcoin's oldest exchange - Mt Gox - went dark, some Bitcoin advocates said that they are building the towers and bridges of tomorrow's finance, and that they put themselves at risk in doing so. See FT 26 February 2014, "Bitcoin pays price of building new financial order". See also "Our flawed financial system is reflected in Bitcoin" by Wolfgang Münchaut, Financial Times, 3 March 2014 and "Bitcoin needs to grow out of its obsessive adolescence" by John Gapper, Financial Times, 13 March 2014.

<sup>119</sup> For a recent discussion of some of the problems associated with Bitcoin see inter alia, 'It is time to take the Bitcoin bubble seriously' by John Authers, Financial Times, 12 December 2013; 'Bitcoin is more than a currency for speculators' by John Gapper, Financial Times, 6 February 2014; and 'Beware the mania for Bitcoin, the tulip of the 21<sup>st</sup> century' by Jean-Pierre Landau, Financial Times, 17 January 2014.

<sup>120</sup> See Charles Goodhart and Rosa Lastra, 'Populism and Central Bank Independence' (2017) *Open Econ Rev* (forthcoming).

systemic structure of the legal system in question. This is especially the case in the codified Civilian jurisdictions on the Continent, which generally place a high value on axiomatic fundamental principles and systemic coherence.

Different jurisdictions also take different approaches to the defining what, exactly, the term refers to. For example, US law provides an open catalogue of securities, structured around the economic distinction between debt securities and equity securities, which emphasises securities' nature as 'negotiable investments'. The contours of this economic approach have been fleshed out by judicial development of the extensive but non-exhaustive list, for example the well-known *Howey* test.<sup>121</sup>

In the UK, by contrast, the Financial Services Act 2000 emphasises the transferability of securities, in line with the harmonised European approach. The relevant statutory instruments provide a list of securities which authorised regulatory agencies may amend as appropriate. French law provides for the definition of securities through a list of the main forms of *titres financiers*.<sup>122</sup> The European Markets in Financial Instruments Directive 2004/39/EC ('MiFiD') defines 'transferable securities' as equity securities, debt securities, and a residual category.

Although there is a common conceptual core to all of these definitions, the national terms all denote a different (i.e. narrower or broader) set of financial instruments actually circulating in the market, and all have a different position within the law of obligations and the law of property of their own national legal order. Castellano notes that, in the European context, even harmonised definitions such as those found in MiFiD, the Market Abuse Directive 2003/6/EC, and the Prospectus Directive 2003/71/EC appear susceptible of different interpretations among Member States. As such, the linguistic and conceptual divergences between national legal systems are the root of a series of problems that focus attention on the role of legal harmonisation and standardisation, fostered respectively by EU policy-makers and International Organisation of Securities Commissions ('IOSCO') standard-setters.<sup>123</sup>

In our view, the majority of VCs are more properly characterized as speculative assets than as tokens of currency, and should be regulated as such. Further, the application of statutory definitions to any given VCs is entirely possible within the canon of interpretation of any given European legal system. However, the differences between the definitions themselves, and the differences between national legal systems' canons of interpretation, give rise to the possibility of substantial divergences opening up in the regulation of any given VC token within Europe—even under existing harmonized securities law. This in turn increases the risk of jurisdictional arbitrage and makes the European-level regulation of VCs as 'crypto-assets' more important.

## 2.5. Regulating a Revolution

The Eurosystem is effectively called upon to 'regulate a revolution' in the design and delivery of financial services.<sup>124</sup> This is not confined to VCs, but VCs are representative of many of the regulatory challenges raised by FinTech. In our view, this raises a number of main challenges for NCBs, the ECB, and other regulatory bodies. In this section, we discuss the need to define regulatory tasks clearly

<sup>121</sup> *SEC v. W.J. Howey Co.*, 328 U.S. 293 (1946).

<sup>122</sup> G.G. Castellano, 'Towards a General Framework for a Common Definition of "Securities": Financial Markets Regulation in Multilingual Contexts' (2012) *XVII Uniform Law Review* 449, 463, 466, 467.

<sup>123</sup> G.G. Castellano, 'Towards a General Framework for a Common Definition of "Securities": Financial Markets Regulation in Multilingual Contexts' (2012) *XVII Uniform Law Review* 449, 471, 475.

<sup>124</sup> See D.A. Zetschke, R.P. Buckley, D.W. Arner, and J.N. Barberis, 'Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation' (2017) 23 *Fordham Journal of Corporate and Financial Law* 31, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3018534#](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3018534#).



within the multilateral Eurosystem, the need to address VCs potential for facilitating financial crime and tax evasion, and the need to assess the scope for 'regulatory technology' in addressing the risks posed by VCs and other financial technology innovations by market participants.

### 2.5.1. Defining regulatory tasks

Perhaps one of the major difficulties facing the Eurosystem in the context of VCs is the definition of regulatory tasks. ECB President Draghi's position (in the Q&A session of the last meeting of the Committee Economic and Monetary Affairs) is that it is not part of the ECB's role to regulate VCs such as Bitcoin, and that the ECB would lack the competence to prohibit or regulate VCs such as Bitcoin.

In his answer, President Draghi took a functional approach, by first asking what material risks VCs pose to economy based on (i) size, (ii) user acceptance, and (iii) impact on the real economy. All three, he opined, indicated that it was 'premature' to consider Bitcoin as a means of payment, and therefore premature to regulate VCs as such; the ECB would need to consider the matter further with the benefit of analysis and discussion. Generally, he said, the ECB's main focus was on cyber-risks associated with VCs rather than on the systemic challenges posed by VCs themselves.<sup>125</sup>

As we have noted, strict legal definitions of money often take legal tender status as their point of departure and stress the physical nature of bank notes and coins as physical moveable objects. Thus, for the purposes of the law of property, money is often treated as a tangible moveable property. This excludes commercial bank book-money from the core of the legal definition of money, which is difficult from an economic perspective, since bank deposits are the major part of the money supply (M1) and the fact that banks are engaged in the process of private money creation provides a monetary rationale for banking regulation. Equally, central bank reserves need definition within the legal framework but this is rendered difficult given the composition of such reserves and in recent years the growth of sovereign wealth funds in some jurisdictions.

It is necessary for the ECB and the NCBs of the Eurosystem, for the regulatory and supervisory agencies involved in the regulation of crypto assets/VCs in the Eurosystem, and for other NCBs and competent institutions within the ESCB/EU at large to identify their respective roles in relation to VCs as the space evolves, and to ensure that there are no gaps.

The problem would appear to be one of how to keep tabs on the changing landscape without dedicating a disproportionate amount of resources to the task. In our view, it is essential that the different NCBs and regulatory agencies work together with the ECB to share knowledge and analyses of VCs as the market evolves. The reports and whitepapers currently published by some NCBs and national regulatory agencies as well as by the IMF and BIS are, in our view, a helpful development.<sup>126</sup>

<sup>125</sup> Live EP Committee on Economic and Monetary Affairs Monetary Dialogue with Mario Draghi, President of the ECB on 25.09.2017, in response to question by Cora van Nieuwenhuizen at 20:00 onwards, available at <https://ec.europa.eu/avservices/video/player.cfm?ref=1143771>.

<sup>126</sup> See e.g. BIS Committee on Payments and Markets Infrastructures Markets Committee, *Central Bank Digital Currencies* (March 2018), <https://www.bis.org/cpmi/publ/d174.pdf>; Dong He *et al*, *Virtual Currencies and Beyond: Initial Considerations* (IMF Staff Discussion Note SDN/16/03, January 2016), <http://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>; Dong He, *Monetary Policy in the Digital Age* (June 2018) *Finance and Development* 13, <https://www.imf.org/external/pubs/ft/fandd/2018/06/central-bank-monetary-policy-and-cryptocurrencies/he.pdf>; Robleh Ali, John Barrdear, Roger Clews, and James Southgate, 'The economics of digital currencies' (2014) Q3 *BoE Quarterly Bulletin* 276; Robleh Ali, John Barrdear, Roger Clews and James Southgate, 'Innovations in payment technologies and the emergence of digital currencies' (2014) Q3 *BoE Quarterly Bulletin* 262; Paolo Siciliani, 'Competition for retail deposits between commercial banks and non-bank operators: a tw-sided platform analysis' (BoE Staff Working Paper No 728, May 2018), <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/competition-for-retail-deposits-between-commercial-banks-and-non-bank-operators.pdf?la=en&hash=79C52E7C196677080CA3D1FA2F9ADEC1187BFB5B>.

### 2.5.2. Financial Crime and Tax Evasion

An important, specific challenge is to ensure that financial innovations do not provide new means for financial crime and tax evasion. VCs could provide payment rails that circumvent Know Your Customer ('KYC') and Anti-Money Laundering ('AML') measures. Traditional KYC and AML measures are aimed not at criminals directly, but at financial intermediaries; by disintermediating financial services, VCs deprive these measures of their subject.

More generally, VC payments are (to a greater or lesser extent) anonymous, which makes detection, detection, investigation, and prosecution of ordinary crimes more difficult. This is evident in the use of VCs for illicit activities including fraud, narcotics, child pornography, arms dealing, and terrorism in recent years.

Examples such as the 'Silk Road' marketplace show that anonymity is not complete, and that law enforcement measures can still be effective to identify individuals and discourage illicit online activity. However, these measures are generally *ex post* investigative measures taken under some police power rather than *ex ante* measures taken by financial regulators. They are not, in our view, a suitable replacement for KYC and AML procedures.

VCs may also help to facilitate tax evasion by providing 'virtual tax havens'.<sup>127</sup> This underscores the direct challenge VCs pose to national sovereignty, as they may undermine the tax base even while their users enjoy the benefits provided with tax revenues. In light of recent public scandals and the public dissatisfaction with corporate tax evasion, and to the extent that the money supply relies on the sale of government debt underwritten by governments' power to tax, the tax implications of VCs should be recognised as having potentially systemic importance.

### 2.5.3. The Role of Regulatory Technology

Regulatory Technology ('RegTech') is the use of new Information and Communications Technology ('ICT') in monitoring, reporting, and compliance. To date, most innovations in RegTech have been the result of players in the financial industry creating digital tools to enhance their compliance and reduce the costs of compliance. However, technology also allows regulators to take a more proportionate risk-based approach where access to and management of data enables more granular and effective supervision of markets and market participants, promising better outcomes and lower costs.

Andy Haldane, Chief Economist of the Bank of England, presented in 2014 the vision of a real-time flow of financial data in an information system as we measure weather systems and Internet traffic.<sup>128</sup> While progress to date has been incremental, some commentators argue that we are approaching a paradigm shift in financial regulation as the volume of financial transactions and data increase (for example as algorithmic trading by 'data driven agents' increases) and as the financial markets become still more globalised.<sup>129</sup> In our opinion, RegTech tools will be an essential component in the regulatory response to VC and associated developments, such as 'smart contracts' (i.e. self-executing code that embodies and in some cases purports to displace the traditional agreement between counterparties).

<sup>127</sup> See Omri Marian, 'Are Cryptocurrencies Super Tax Havens?' (2013) 112 *Michigan Law Review First Impressions* 38.

<sup>128</sup> Andy Haldane, 'Managing Global Finance as a System' (Speech at Maxwell Fry Annual Global Finance Lecture, Birmingham University, 29 October 2014).

<sup>129</sup> D.W. Arner, Janos Barberis, and R.P. Buckley, 'FinTech, RegTech, and the Reconceptualisation of Financial Regulation' (2017) 37(3) *Northwestern Journal of International Law and Business* 371, 378.

In our view, the Eurosystem should play an active role in encouraging RegTech solutions that help to coordinate the monitoring of VC-based financial activity across the European Union and the Eurozone. For example, as the IMF's Christine Lagarde recently argued, it may be necessary to 'fight fire with fire' by exploring regulatory applications of blockchain technology to maintain oversight of VC-based activity.<sup>130</sup>

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<sup>130</sup> Christine Lagarde, 'Addressing the Dark Side of the Crypto World' (IMF Blog, 13 March 2018), <https://blogs.imf.org/2018/03/13/addressing-the-dark-side-of-the-crypto-world/>.



### 3. CENTRAL BANK ISSUED VIRTUAL CURRENCIES

In this section, we consider some of the challenges raised by the notion of VCs issued by central banks themselves ('CBVC').<sup>131</sup> In recent months, a number of central banks in Europe and across the world have published analyses of the reasons for and against issuing such VCs and shape they might take. The prospect of central bank issued VCs raises particular questions in the ESCB and in the Eurosystem. In this section we discuss (i) the reasons for which central banks might wish to issue a DLT-based VC, (ii) the design features that central banks would consider when deciding what kind of CBVC to issue, and (iii) the distinct issues raised by CBVC in the Eurosystem context.

Yermack and Raskin stress that competition between official currency and private money is not new, whether in the form of commodities performing monetary functions or, more commonly, foreign currency. As outlined above, there is a school of thought within macro-economics which evaluates monetary competition of this sort as a salutary influence on the monetary system, for example by imposing a market-based form of discipline on central banks.<sup>132</sup> Part of the relevance of CBVC is the impact on a long-running macro-economic debate between advocates of free banking and advocates of a 'narrowing' of the money supply through a reduction of the systemic role of commercial banks money creators through deposit taking and lending. Although the impact of a CBVC on the monetary system as it stands would differ according to the design features of the CBVC, in general it is fair to see proposals for CBVC as a tool for central banks to 'fight fire with fire', using modern ICT (probably including DLT) to address the direct challenge posed by privately issued VCs by increasing the functionality of central bank money and bolstering public confidence in central bank money.

#### 3.1. Reasons for CBVCs

We perceive three main reasons why central banks might choose to launch a VC scheme fall into two main categories, each with different motivations and each with different implications.

The first, and most obvious reason, is that the use of cash is declining in many jurisdictions as electronic payment methods have become more safe and convenient. This is evident, for example, in the Swedish Riksbank e-krona project.<sup>133</sup> Sweden leads the world's economies in the replacement of cash with digital payment systems, including the 'Swish' platform. As individuals and firms cannot generally hold accounts with the central bank, cash is the only way that they can hold central bank liabilities. To the extent that it is considered desirable for individuals and firms to have direct access to central bank liabilities, there are good reasons for central banks in economies leading the way to cashless payment systems to issue VC tokens directly accessible to the public. However, as the BIS Markets Committee notes, this need should be considered well in light of the available retail payment

<sup>131</sup> The term 'central bank digital currency' ('CBDC') is more established in the literature, but we use VC in keeping with the terms of reference.

<sup>132</sup> Max Raskin and David Yermack, 'Digital Currencies, Decentralised Ledgers, and the Future of Central Banking' (NBER Working Paper No. 22238, May 2016), 8.

<sup>133</sup> See Sveriges Riksbank, <https://www.riksbank.se/en-gb/financial-stability/payments/e-krona/the-e-krona-projects-first-interim-report/>. "One reason why the Riksbank wants to investigate the possibility of introducing an e-krona is that the use of cash in Sweden has been declining steadily over a long period of time. At the same time, the Riksbank has the statutory task of providing Sweden with banknotes and coins, households are using cash less and less and the private sector is reducing the general public's access to, and the usability of, notes and coins. This means that ultimately, private agents may determine the access to central bank money and payment methods. In addition to the Riksbank's obligation to supply cash, the starting point for this project is the Riksbank's task of maintaining price stability and promoting a safe and efficient payment system in a new digital environment". See [https://www.riksbank.se/globalassets/media/rappporter/e-krona/2017/handlingsplan\\_ekrona\\_171221\\_eng.pdf](https://www.riksbank.se/globalassets/media/rappporter/e-krona/2017/handlingsplan_ekrona_171221_eng.pdf); and 'The Riksbank's e-krona project: Report 1 (September 2017), [https://www.riksbank.se/globalassets/media/rappporter/e-krona/2017/rappport\\_ekrona\\_uppdaterad\\_170920\\_eng.pdf](https://www.riksbank.se/globalassets/media/rappporter/e-krona/2017/rappport_ekrona_uppdaterad_170920_eng.pdf).

products offered by the private sector,<sup>134</sup> and, depending on how it were introduced, a CBVC could potentially cause systemic problems for the monetary system by negatively affecting the desirability of commercial bank book-money.

The second reason is that central banks currently provide extensive settlement and clearing services for commercial banks, and a CBVC could be used to increase the efficiency of this service with significant costs savings.<sup>135</sup> In a similar vein, this type of CBVC could be used to increase central banks seigniorage, which in a modern context is the difference between interest earned on securities acquired in exchange for bank notes and the costs of producing and distributing those notes.

The third reason relates to extending central banks' monetary policy toolkit. In particular, CBVC could potentially solve the 'zero lower bound' ('ZLB') problem to encourage spending in the economy during periods of downturn.<sup>136</sup> A central bank's liabilities define the quantity of so-called base money in circulation, and the interest rate on central bank money defines monetary policy because the primary tool used by central banks is the interest rate on central bank reserves. This tool is exhausted when the interest rate nears zero, leading central banks to unconventional policy tools such as QE where the central bank purchases assets (with newly created central bank money) to stimulate spending and investment. A CBVC could remove the ZLB problem because negative interest rates could be payable on CBVC tokens. A CBVC could also provide an alternative to traditional QE by making it possible for central banks to inject liquidity into the monetary system not by purchasing securities but by directly increasing the balance of retail CBVC accounts.<sup>137</sup>

These reasons are all subject to the usual disagreement on political and macro-economic grounds. Some people will favour the idea of directly accessible central bank liabilities in times of crisis, for example, while others will stress the risk that demand for CBVC would drive a flight away from traditional forms of money. It is difficult to discuss these issues in the abstract, so we will now move on to the design considerations that will shape any CBVC proposal.

## 3.2. Design considerations unique to CBVC

As we have seen, those tasked with designing a VC scheme have a number of choices to make about the structure and operation of the scheme. In this section, we present the most important design choices specific to CBVCs. As in private VC schemes, these choices are not value neutral; they are informed by the central bank's motivations for considering the launch. The most important design choices relate to (i) access, (ii) anonymity, (iii) availability, and (iv) interest bearing characteristics. Other design features include the mechanism by which CBVC is transferred and whether quantitative limits are imposed on the acquisition and use of CBVC tokens.<sup>138</sup>

### 3.2.1. Access

The primary question concerning access is whether the CBVC is accessible by retail customers (individuals and firms) or only by financial intermediaries (commercial banks in particular). In the

<sup>134</sup> BIS Committee on Payments and Market Infrastructures Markets Committee, *Central bank digital currencies* (March 2018).

<sup>135</sup> See Max Raskin and David Yermack, 'Digital Currencies, Decentralised Ledgers, and the Future of Central Banking' (NBER Working Paper No. 22238, May 2016), 14.

<sup>136</sup> See Andrew Haldane, 'How Low Can You Go?' (Portadown Chamber of Commerce, Northern Ireland, 18 September 2015), <https://www.bankofengland.co.uk/speech/2015/how-low-can-you-can-go>.

<sup>137</sup> <https://www.economist.com/finance-and-economics/2018/05/26/central-banks-should-consider-offering-accounts-to-everyone?fsrc=scn/li/te/bl/ed/centralbanksshouldconsiderofferingaccountstoeveryonefreexchange>.

<sup>138</sup> BIS Committee on Payments and Market Infrastructures, 'Central bank digital currencies' (March 2018), <https://www.bis.org/cpmi/publ/d174.pdf>.

latter case, CBVC would be an extension of already ubiquitous central bank electronic money, i.e. reserves, and its chief purpose would be to operate a Real Time Gross Settlement ('RTGS') system.<sup>139</sup> A retail CBVC, on the other hand, would complement or supplant cash as a retail medium of exchange. This design feature therefore informs the central question of what the CBVC is designed to be: an extension of one of the existing forms of central bank money (i.e. cash and reserves) or a new, third form of central bank money.<sup>140</sup>

Another question is how users purchase CBVC tokens and convert them into traditional forms of money. If CBVC tokens can be purchased by individuals using book-money, this could precipitate a flight of capital from broad to narrow money, as retail customers liquidate their deposits with commercial banks for central bank money. A recent BIS discussion paper, for example, has warned that such an arrangement could precipitate runs on traditional lenders, and that the disruptive potential of interest-bearing CBVC would be greater if it competed with short term government debt and commercial bank liabilities. In the Eurozone context, this could exacerbate liquidity problems in the weaker Eurozone economies especially. Certain proposals, for example the models presented by Kumhof and Noone, envisage a CBVC token that may not be purchased with commercial bank liabilities, but only with qualifying securities, particularly government debt securities. CBVC tokens would not be guaranteed convertible back into book-money. This is one of the core principles of their proposal for a CBVC.<sup>141</sup>

### 3.2.2. Anonymity

Currently, central bank money available to retail users (i.e. cash) is anonymous, while that available to financial intermediaries (i.e. reserves) is not. Central banks considering a CBVC scheme have to consider the AML, CTF, and tax evasion implications of the scheme, which speak against an anonymous CBVC.<sup>142</sup>

### 3.2.3. Accessibility

The accessibility of a CBVC refers to whether it is accessible (i.e. can be acquired and transferred) by users at all times or only during business hours, for example. Currently, central bank reserves are only accessible during business hours, although this may change in light of the introduction of faster payment systems generally. Choices regarding this feature will be informed by the other design choices, particularly whether the CBVC is intended to provide a retail payment system or something more akin to an inter-bank RTGS system. To the extent that a CBVC scheme is designed to augment the central bank's monetary policy toolkit, this is another important point of comparison with central bank's settlement and clearance function and the ability of central banks to set interest rates.

<sup>139</sup> See Jack Meaning, Ben Dyson, James Barker and Emily Clayton, 'Broadening narrow money: monetary policy with a central bank digital currency' (Bank of England Staff Working Paper No. 724, 18 May 2018), <https://www.bankofengland.co.uk/working-paper/2018/broadening-narrow-money-monetary-policy-with-a-central-bank-digital-currency>.

<sup>140</sup> See Michael Kumhof and Clare Noone, 'Central bank digital currencies—design principles and balance sheet implications' (Bank of England Staff Working Paper No. 725, May 2018), 4, <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/central-bank-digital-currencies-design-principles-and-balance-sheet-implications.pdf>.

<sup>141</sup> Michael Kumhof and Clare Noone, 'Central bank digital currencies—design principles and balance sheet implications' (Bank of England Staff Working Paper No. 725, May 2018), 5.

<sup>142</sup> BIS Committee on Payments and Market Infrastructures, 'Central bank digital currencies' (March 2018), 9, <https://www.bis.org/cpmi/publ/d174.pdf>.

### 3.2.4. Interest bearing

Perhaps the most important choice in CBVC design is whether the CBVC token bears interest. For example, this informs the ability of the CBVC to address the ZLB problem. The notion of interest-bearing cash equivalents is novel, but in all use-cases except for a straightforward digital substitute for cash, an adjustable interest rate seems necessary to avoid undesirable disruptions to the broader monetary system.<sup>143</sup> Further questions follow with regards to how the interest rate is set.

### 3.2.5. Transfer mechanism

One question raised in the Swedish e-krona project is whether a CBVC payment system should (i) store value in a central register and transfer value between accounts by amending this register, or (ii) store value locally (i.e. in an app or on a card). In other words, should CBVC be an account-based or an (electronic) note-based payment system?<sup>144</sup> The e-krona project proposes a combination of these two models, as (ii) is more easily implemented in the short term (and may be more readily used by older citizens, for example), while (i) is more complex but offers greater possibilities over the long run, potentially including monetary policy tools.

The choice of design features will ultimately be a function of (i) the legal constraints provided by the Eurosystem framework, (ii) the macro-economic policy sought to be achieved by the adoption of a ECB issued VC. In the aggregate, they will have important implications for the future role of cash and central bank reserves in the monetary system, the policy tools available to central banks to pursue their legislative mandates, and the dynamics of interaction between components of the monetary system, particularly central banks, commercial banks, and fiscal authorities outside central banks.<sup>145</sup>

The traditional mode of money creation in our current monetary system is that commercial banks create money by lending and taking deposits but holding only a fractional reserve of central bank money. Critics do not trust commercial banks to play this role as money creators, and point to their track-record of causing boom-bust cycles in the economy. Some people will favour the idea of directly accessible central bank liabilities in times of crisis, for example, while others will stress the risk that demand for CBVC would drive a flight away from currency etc. And CBVC could be liable to political (including populist political) abuse. It is worthwhile pointing out that CBVCs are not the only development in the debate about money creation. The failed referendum in Switzerland on 10 June 2018 regarding the Vollgeld (sovereign money) proposals - that would have banned commercial banks from creating money through their lending operations - go to the root of the constitutional role of central banks as the monopoly providers of national currency. Under Vollgeld the amount of money injected in the economy would have been overseen by the central bank. As a proposal to abolish the 'fractional reserve banking', Vollgeld resembles the 100% reserve banking system advocated by Irving Fisher in the 1930s.<sup>146</sup>

The place of any proposed CBVC, and its impacts on the existing monetary system, depend on the concrete design features of the CBVC scheme. Bech and Garrat combine conventional taxonomies of

<sup>143</sup> Michael Kumhof and Clare Noone, 'Central bank digital currencies—design principles and balance sheet implications' (Bank of England Staff Working Paper No. 725, May 2018), 8.

<sup>144</sup> See J.S. Rogers, 'The New Old Law of Electronic Money' (2005) 4 *SMU Law Review* 1253.

<sup>145</sup> See Michael D. Bordo and Andrew T. Levin, 'Central Bank Digital Currency and the Future of Monetary Policy' (Hoover Institution Economics Working Paper 17104, August 2017), [https://www.hoover.org/sites/default/files/research/docs/17104-bordo-levin\\_updated.pdf](https://www.hoover.org/sites/default/files/research/docs/17104-bordo-levin_updated.pdf).

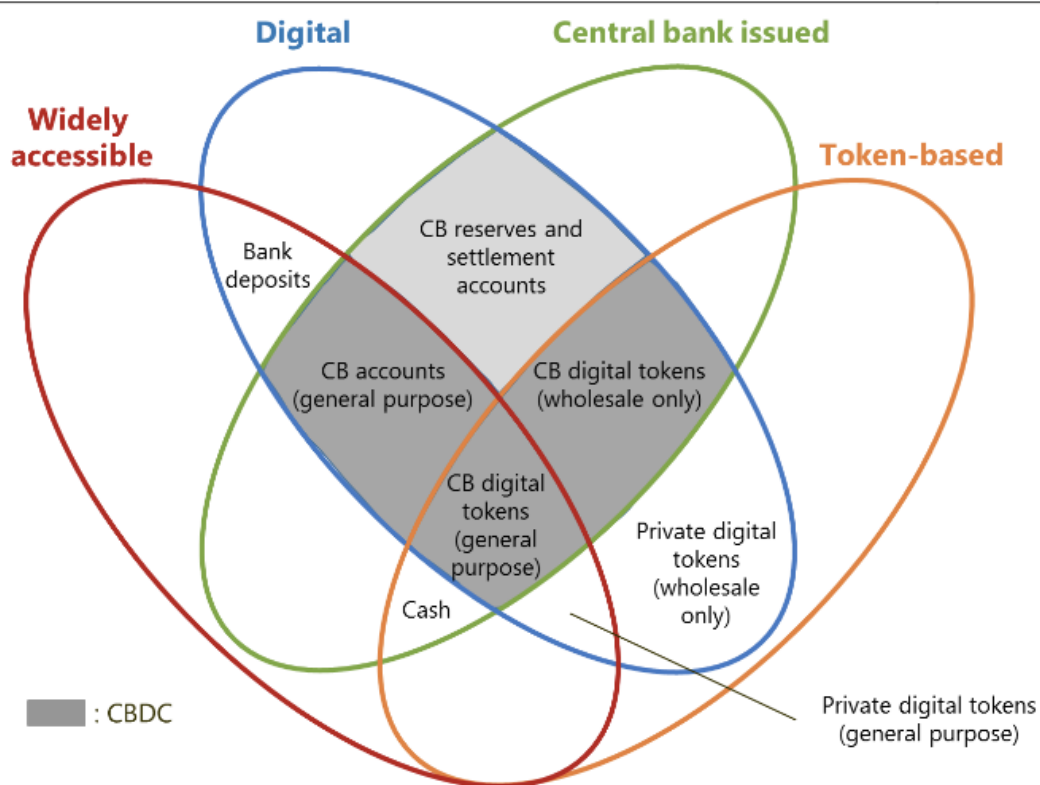
<sup>146</sup> For a brief account see "Radical reform: Switzerland to vote on banking overhaul", *Financial Times*, 29 May 2018. See also 'Money creation in the modern economy' by Michael McLeay, Amar Radia and Ryland Thomas of the Bank's Monetary Analysis Directorate, published in Bank of England Quarterly Bulletin, 2014 Q1 at <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2014/money-creation-in-the-modern-economy.pdf>.

money to yield the following diagram, structured around four properties: (i) issuer (central bank or other), (ii) form (electronic or physical), (iii) accessibility (universal or limited), and (iv) transfer mechanism (centralised or decentralised/peer-to-peer).<sup>147</sup> This provides a graphic framework within which CBVC schemes can be placed and compared.

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<sup>147</sup> M.L. Bech and Rodney Garratt, 'Central bank cryptocurrencies' (BIS Quarterly Review, 17 September 2017), [https://www.bis.org/publ/qtrpdf/r\\_qt1709f.htm](https://www.bis.org/publ/qtrpdf/r_qt1709f.htm).

Figure 2: The ‘money flower’



Source: Bech and Garrat (2017).

### 3.3. CBVCs in the ESCB and Eurosystem

The main question that arises in the context of CBVCs in the Eurosystem is one of competence—of who is authorised to issue CBVC tokens. In 2017, certain officials within the Estonian government announced plans to launch an ‘Estcoin’ as a national VC pegged to the euro.<sup>148</sup> These plans were, however, disclaimed by the governor of the Estonian central bank, Ardo Hansson. The proposal met with stiff opposition from ECB President Draghi, who in September 2017 said that: ‘no member state can introduce its own currency... The currency of the euro zone is the euro.’<sup>149</sup> In light of this pushback from the ECB, recent reports are that the Estonian government is amending (but not abandoning) its plans for an Estcoin. Instead of a VC token issued to Estonians, the plan seems to be to issue tokens to members of the country’s e-Residency programme. Officials have been cited as saying that, while the planned Estcoin might still provide some payment services, it would not be a national cryptocurrency.<sup>150</sup>

President Draghi’s position seems, in our view, rightly to assume that a central bank issued VC would qualify as a ‘currency’, properly so called. The issue of currency in the Eurozone is regulated by Article

<sup>148</sup> See e.g. Kaspar Korjus, ‘We’re planning to launch Estcoin—and that’s only the start’ (*Medium*, 19 December 2017), <https://medium.com/e-residency-blog/were-planning-to-launch-estcoin-and-that-s-only-the-start-310aba7f3790>.

<sup>149</sup> <https://www.reuters.com/article/us-ecb-bitcoin-estonia/ecbs-draghi-rejects-estonias-virtual-currency-idea-idUSKCN1BI2BI>.

<sup>150</sup> <https://www.bloomberg.com/news/articles/2018-06-01/estonia-curbs-cryptocurrency-plan-that-drew-rebuke-from-draghi?srnd=cryptocurrencies>.



108 TFEU, which provides that the ECB has the exclusive right to issue euro banknotes. In our view, this would include 'e-euro' VC tokens. Under the aegis of the ECB, NCBs could have some delegated authority to issue CBVC, but not otherwise.

As Goodhart notes, the design of the Eurosystem attenuates the link between political sovereignty and fiscal authority, on the one hand, and money creation, on the other, to an unprecedented degree. It is generally considered desirable to insulate central banks from direct political pressure, but in the Eurosystem the institutions tasked with money creation and monetary policy have been removed to a 'federal' European level while the main political and fiscal powers remain at the level of the nation state.<sup>151</sup> Indeed, the fact that monetary unification has preceded political unification in Europe is a historically unprecedented.<sup>152</sup> We can see the tensions inherent in this novel settlement in the Estcoin question, and we expect further such tensions play out in the future. We would again underscore the importance of European-level coordination in this area. For currencies widely used in cross-border transactions, some of the risks raised by CBVCs (including instability of commercial bank deposit funding from a flight towards central bank liabilities) are more acute. BIS suggests that introduction of CBVC in one jurisdiction could adversely affect others, and that central banks should consider cross-border issues.

### 3.4. Central Bank VCs Issued in Third Countries

CBVCs issued outside the Eurozone also raise issues of relevance for the EU at large. One such question could arise in the context of VCs issued by governments that are unrecognised or that are subject to international sanctions. For example, the Venezuelan central bank issued a VC called the 'Petro' in early 2018.<sup>153</sup> Shortly after, US President Donald Trump signed an executive order banning purchases of the Petro on the basis that it was an attempt to circumvent sanctions.<sup>154</sup> For its part, the Venezuelan National Assembly declared the Petro illegal and declared all obligations entailed in the issue to be null and void.<sup>155</sup> In May 2018, Venezuela and the Palestinian Authority launched a bi-national bank with an initial injection of Petros.<sup>156</sup> President Nicolas Maduro has reportedly offered oil imports at a discount for purchases in the currency.<sup>157</sup>

VCS issued by unrecognised governments or by non-state (e.g. separatist or terrorist) actors could raise similar questions in the Eurozone. The use of VCs for illicit activities is well known.<sup>158</sup> The issue of VCs by known terrorist organisations or sanctioned states would present a clearer case for prohibition and raise questions of responsibility and competence within the Eurosystem.

<sup>151</sup> C.A.E. Goodhart, 'The two concepts of money: implications for the analysis of optimal currency areas' (1998) 14 *European Journal of Political Economy* 407, 410.

<sup>152</sup> See Barry Eichengreen, 'A more perfect union? The logic of economic integration' (Essays in International Finance No. 198, Princeton International Finance Section 1996), 12.

<sup>153</sup> See [http://www.elpetro.gob.ve/pdf/en/Whitepaper\\_Petro\\_en.pdf](http://www.elpetro.gob.ve/pdf/en/Whitepaper_Petro_en.pdf).

<sup>154</sup> <https://www.aljazeera.com/news/2018/03/trump-bans-purchases-venezuela-cryptocurrency-petro-180320094506428.html>.

<sup>155</sup> <http://www.asambleanacional.gob.ve/noticias/an-declaro-nula-la-emision-del-petro-y-todas-sus-obligaciones>.

<sup>156</sup> <https://ethereumworldnews.com/venezuela-palestine-fund-petro/>.

<sup>157</sup> [http://www.business-standard.com/article/markets/venezuela-offers-india-30-discount-on-crude-but-with-cryptocurrency-rider-118042900018\\_1.html](http://www.business-standard.com/article/markets/venezuela-offers-india-30-discount-on-crude-but-with-cryptocurrency-rider-118042900018_1.html).

<sup>158</sup> See e.g. <https://www.cfr.org/background/cryptocurrencies-and-national-security>.

## 4. CONCLUSIONS

1. This paper examined the impact of Virtual Currencies ('VCs') on central banks in the Eurosystem drawing a distinction between privately issued VCs and VCs issued by central banks. Although they generally share the use of DLT as a common feature, VCs are differentiated by technical features and economic function and will, accordingly, be characterised differently in legal terms. This requires granular assessment by central banks of the risks and opportunities presented by any given VC over time.
2. Many privately issued VCs pose a direct and intentional challenge to the monetary system and to central banks. But privately issued VCs do not currently pose any serious risks to central banks' money creation role in the Eurosystem. Further, we do not think that any VC currently in the market is likely to qualify for 'money status' in the near future.
3. VCs could create risks to the stability of the financial system if VC markets continue to grow at the current pace and continue to interact and entangle with the regulated financial system. The unregulated nature of VCs, and the dominance of quasi-anonymous VC schemes, raises challenges in terms of anti-money laundering ('AML') and tax evasion. Other traditional regulatory concerns, such as consumer/investor protection, avoidance of market manipulation and transparency are also at stake.
4. If the VC market continues to grow, central banks such as the ECB may face challenges in their monetary policy role as a large category of money-like instruments could be out of their oversight and control.
5. The policy of 'wait and see' is properly risk-oriented, but the need for action must be constantly re-evaluated in light of changing circumstances. Changes can be very rapid, so a certain level of preparedness is necessary on the basis of the precautionary principle. Furthermore, the cross border nature of VCs suggests the need for a harmonised European regulatory approach.
6. Central bank issued VCs ('CBVCs') raise questions about regulatory competence within the Eurosystem. Central bank issued VCs ('CBVCs') have recently been proposed by a number of central banks in Europe and beyond.
7. VCs require a pro-active regulatory response and that certain VCs could warrant prohibition now or in the future. Ideally, a harmonised European approach to the regulation of VCs is desirable to prevent regulatory arbitrage by market participants and a 'race to the bottom' by national regulators.

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## ANNEX I

Table 1: A comparison of different representations of value

	Issuer	Denomination	Token	Exchange	Liability of Issuer?	Exchange/ Fx?	Legal Tender?	Asset Backing?
Currency	Central bank (usually)	Fiat monetary unit	Physical (paper)	Peer-to-Peer	Yes	Yes	Yes	No
Currency (metal standard)	Central bank	Fiat monetary unit	Physical (paper)	Peer-to-peer	Yes	Yes	Yes	Metal commodities
Book Money	Private commercial bank	Fiat monetary unit	Digital	Centralised	Yes	Yes	No (Maybe in future)	Reserves/ cash/ Foreign cash
ECU	Private commercial bank	ECU	None	Centralised	Yes	Yes	No	No
Euro-dollar	Private commercial bank	USD	None	Centralised	Yes	Yes	No	Foreign cash reserves
E-money	Licensed E-(private) issuer	Fiat monetary unit	Digital	Centralised	Yes	Yes	No	Cash/Book Money
Paypal	Private payments provider	Fiat monetary unit	Digital	Centralised	Yes	No	No	Book Money
L\$	Linden Labs	L\$	Digital	Centralised	Yes	No (Maybe)	No	No
Foreign Cash	Foreign Central Bank	Foreign Fiat	Physical	Peer-to-Peer	Yes	Yes	No	No
Mobile Money	Telco Company	Fiat	Digital	Centralised	Yes (Cf E-money)	Yes	No	Cash/Book Money
Frequent Flyer Miles	Airline	'Miles'	Digital	None (Central'd)	Yes	No	No	No
Bitcoin	Unknown	'bitcoin'	Digital	Peer-to-Peer (in theory)	No	No (Maybe)	No	No
Local currency	Community association	Unique (e.g. 'Brixton £')	Varies	Peer-to-peer	No	No	No	No

## ANNEX II

In this annex, we expand on the factors listed in Section 1.2 to differentiate VCs according to their technical features and those features' economic implications.

### Who issued the VC?

So far, VC issuers have been overwhelmingly private entities. Entities that have issued VCs range from the unknown (e.g. Bitcoin) or more or less conventional businesses; most VCs are issued by knowable individuals in less conventional organisational structures.<sup>159</sup> As a new category of financial institution, these entities by definition fit poorly within traditional capital markets and prudential regulations, and often lack the organisational structure to organise the body of developers, investors, and consumers. More recently, VCs have been launched by more conventional legacy businesses.<sup>160</sup>

The private issue of so many VCs is significant because, to the extent that any VC actually functions like a 'currency', it poses a direct, implicit challenge to the traditional notion of national monetary sovereignty.<sup>161</sup>

The first publicly-issued VC was the Venezuelan 'Petro' in early 2018,<sup>162</sup> which many (including ourselves) interpret as a desperate attempt to establish an alternative means of payment in the context of a deteriorating economic situation in Venezuela. The Petro, however, is not legal tender and its legal status is controversial. More recently, the Marshall Islands announced the launch of the world's first legal tender sovereign VC (called 'SOV') in conjunction with a financial technology start-up.<sup>163</sup> Many central banks are exploring VC as an option for issuing central bank liabilities at the wholesale or retail level. We discussed some of these proposals in Section 3.

### Is the VC software proprietary or open-source?

The intellectual property arrangements surrounding a VC's operational software informs the VC scheme's governance structure (or lack thereof). A VC scheme created and maintained by a known corporate entity, for example, will evolve differently (and respond to periods of institutional stress) differently to a diffuse pool of open source developers. The VC space to date has been rife with governance issues, including so-called 'hard forks' by which the blockchain of a VC scheme is split into two versions, often precipitated by a security breach and often related to an ideological schism in the community.<sup>164</sup> In the emerging political economy of VC schemes, individuals such as influential developers may play a determinative but informal and undefined role. For example, software developers within an open-source VC scheme play an important role in the direction of the scheme, particularly in times of crisis, but their role is totally undefined and unregulated. Likewise, the owners and managers of a proprietary scheme exercise control but may not fit within established regulatory categories.

<sup>159</sup> Many prominent VCs have been issued Swiss foundations, for example. A lawyer who advised on the launch of some major VCs, has recently called his previous structuring advice 'stupid' and recommended more traditional corporate structures: <https://www.reuters.com/article/uk-swiss-crypto/top-swiss-cryptocurrency-lawyer-questions-stupid-ico-structure-idUSKBN1FB1TM>.

<sup>160</sup> See W.A. Kaal, 'Initial Coin Offerings: The Top 25 Jurisdictions and their Comparative Regulatory Responses' (University of St. Thomas Legal Studies Research Paper No. 18-07, 2 February 2018), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3117224#](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3117224#).

<sup>161</sup> See Rosa M. Lastra, *International Financial and Monetary Law* (Oxford University Press 2015), Chapter 1.

<sup>162</sup> See <http://www.elpetro.gob.ve/index-en.html>.

<sup>163</sup> See <https://www.sov.global/>.

<sup>164</sup> See e.g. <https://blockgeeks.com/guides/what-is-ethereum-classic/>.

**Where was the VC issued?**

As the regulation of VCs (and ICOs) evolves, certain jurisdictions will lead the way in balancing the interests of innovation with the need for regulation and preventing market abuses through continuing oversight. The jurisdiction of launch will therefore likely become a more important factor over time. In the Eurosystem context, this may interact with the single passport system and the principles governing the single market. Other jurisdictions may succumb to the temptation to ‘race to the bottom’ and some may even take a bad-faith approach to the trans-national risks posed by VCs.

**How does the VC operate in the market?**

As noticed, it is necessary to distinguish VC schemes based on how their tokens operate in the market: in our analysis, we speak of currency tokens, security tokens, and utility tokens, although the borders between these categories are neither fixed nor necessarily well-defined.

A large class of VCs are intended to operate as currency but tend actually to operate more like digital securities. For example, Bitcoin was expressly intended to replace sovereign fiat currency but, due to its volatility and slow transaction time, bitcoins are actually more of a speculative investment than anything else. Other VCs might be intended to operate as vouchers or securities but find themselves circulating as a medium of payment within a private payment community.

**Who maintains the VC’s ledger, and how?**

Much attention has been given to Bitcoin’s ‘trustless’ or ‘permissionless’ ledger. In ‘trustless’ blockchains, any node (i.e. computer participating in the network) can add a new block to the chain of transactions; there are no specially authorised nodes. The ‘double spend’ problem is solved by making transactions costly to verify (essentially by adding an arbitrary mathematical problem to the algorithm) and then rewarding ‘miners’ (who apply computing power to the solution of these puzzles) with tokens. This promises a system that can operate without any trusted central authority—a kind of self-sustaining information system. As Bitcoin was the first application of blockchain technology, a whole raft of so-called ‘Altcoins’ operate in this way, and the proof of work principle been adopted by the Ethereum Platform on which many other VCs are based.

Other important VCs, however, operate on blockchains that feature some element of centralisation. These blockchains give nodes different levels of permission and rely on certain nodes to verify transactions. The NEM<sup>165</sup> blockchain, for example, is permissioned, such that only pre-authorised nodes can change the chain according to a ‘proof of importance’ principle. This means that transactions can be processed much more efficiently, but it also entails (i) a greater degree of centralisation and (ii) a hierarchy of nodes, with implications for the political economy that grows up around the VC.

In our view, more conventional actors (such as legacy financial institutions) will likely prefer more centralised, permissioned applications of blockchain technology as they enter the VC market and/or develop their own DLT applications. We therefore expect to see more permissioned applications in the future, such as Ripple, which provides a ‘RTGS’ system for established commercial banks.<sup>166</sup>

**Are users of the VC anonymous (pseudonymous) or identified?**

Many VCs emphasise the ability for users to transact without making their true identity known, which has been popular especially in applications involving a mix of payment systems with elements of

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<sup>165</sup> See <https://nem.io/> (14<sup>th</sup> largest VC at time of writing).

<sup>166</sup> See <https://ripple.com/>.

foreign exchange trading. The so-called ‘public key’ which one uses on the Bitcoin protocol, for example, can be a pseudonym completely unconnected to one’s proper (legal) name. Other VCs such as Monero<sup>167</sup> claim to offer even greater anonymity for users. Others, such as Ripple - which is a real-time gross settlement system, currency exchange and remittance network created by the Ripple company - require users’ true identities.

The anonymity question is relevant for a number of reasons, especially its impact on Know Your Customer (‘KYC’) and Anti-Money Laundering (‘AML’) and Counter Terrorism Financing (‘CFT’) measures. It also informs the type of user attracted to the VC and the type of use they make of it. VCs’ early use in illicit transactions is well known.

However, every VC requires users to adopt some kind of identifier by which they are known and interact with other users, in the sense that each VC token is connected to an identity (‘public key’) within the information system. Although users can employ various cryptographic means to prevent their true identity and location being found, other users (including law enforcement agencies) can use measures to identify them. For example, the individual allegedly running the notorious ‘Silk Road’ darkweb site was found by the US Federal Bureau of Investigation in 2014.<sup>168</sup>

### **Is the VC backed with a reserve of real-world assets?**

Vcs may be purely digital tokens native to the blockchain on which they are recorded, or they may be digital tokens that represent real-world assets by recording their ownership on a blockchain. Bitcoin is unbacked by any kind of asset—not even the obligations of a legal person such as a bank or e-money issuer. The value of a bitcoin is self-referential in the sense that the value that is the subject matter of a bitcoin transaction is the recording of the transaction between two identities itself, i.e. a bitcoin is a ‘chain of digital signatures’. Others promise some kind of asset backing in order to provide added stability. The Petro is claimed in its whitepaper to be backed by Venezuela’s oil reserves, but this has been disclaimed by the country’s National Assembly.<sup>169</sup> A whole flurry of VCs have sprung up which purport to hold gold in reserve.<sup>170</sup> VCs such as Tether<sup>171</sup> promise to hold 1:1 reserves of USD to give users the desirable functions of DLT without the price volatility of other VCs. The question of asset backing relates to the legal characterisation of a VC token, holds important implications for its price stability, and informs the profile of user attracted to the VC scheme and the likely use-case of the VC.

### **How does the VC interact with the real-world financial economy?**

One of the most important questions is how the VC interacts with the ‘real’ financial economy (i) by design and (ii) in practice. For example, L\$ are only intended to circulate in the *Second Life* economy, but are also used to make offline payments or payments in other game-worlds via an exchange. Most VCs are intended to (and do in fact) transect the real-world economy more routinely. Important questions include how users purchase (or otherwise acquire) VC tokens, how they trade them for goods and services or for other VC tokens, and how they ‘cash out’ their VC tokens (i.e. for fiat money). In particular, these questions are important because they inform (i) how the VC is likely to be used (i.e. as a medium of exchange or as a speculative asset) (ii) a VC’s liquidity profile (especially in times of stress) and (iii) what kind of new financial intermediaries are likely to arise in the VC’s ecosystem. Another crucial set of questions relate to whether VC tokens are used as the underlying asset for more

<sup>167</sup> See <https://monero.org/> (9<sup>th</sup> largest VC at time of writing).

<sup>168</sup> See <https://www.wired.com/2014/09/the-fbi-finally-says-how-it-legally-pinpointed-silk-roads-server/>.

<sup>169</sup> See <http://www.elpetro.gob.ve/index-en.html>; <https://www.reuters.com/article/us-venezuela-election/venezuela-expels-u-s-envoys-in-response-to-sanctions-idUSKCN1IN27T>.

<sup>170</sup> See e.g. the list at <http://www.goldscape.net/gold-blog/gold-backed-cryptocurrency/>.

<sup>171</sup> See <https://tether.to/>.

conventional financial instruments and vice versa. This question has important implications for the VC's risk of spreading contagion.

### **How do users hold and trade the VC?**

This question, closely related to the last, has to do with the 'wallet' in which users store their private keys and the 'exchange' on which they buy and sell VC tokens. In particular, it is important to determine whether users hold their VC tokens directly, in the sense that the user's VC tokens are associated with private keys known to the user, or indirectly, in the sense that the user's VC tokens are associated with private keys known to an intermediary. This has important implications for the legal position of the VC holder and the kind of institutional ecosystem to which the VC gives rise. In the latter case, the intermediary's terms and conditions (and national law) will determine the user's legal relationship to 'their' tokens, often in some fiduciary or nominee constellation. Another closely related aspect is whether VC tokens are traded 'on-chain' or 'off-chain'. In the former case, each trade is effected by a modification to the VC's blockchain ledger. In the latter case, trades are recorded on the internal ledger of some intermediary who controls the private keys associated with the VC tokens being traded.<sup>172</sup>

### **How is the volume of the VC supply determined?**

VC schemes might fix a rate and final quantum of token creation, tie the number of tokens to another asset (such as gold or USD), or leave the matter to the discretion of some kind of governance body within the VC scheme. This informs the suitability of the VC for its intended functions and the kind of issues it might raise now or in the future for monetary policy and financial supervision. For example, the total supply of bitcoins is capped by the software at 21 million, and new bitcoins are created through the 'mining' process (i.e. given as an incentive to miners) at a fixed and decreasing rate, which could cause issues if Bitcoin were ever used as a currency. Investor protection issues may also arise from abusive issuing practices.

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<sup>172</sup> See R.J. Straus and M.J. Cleary, 'United States' in Stuart Hoegner (ed.), *The Law of Bitcoin* (iUniverse 2015), 178.



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Speculation on Bitcoin, the evolution of money in the digital age, and the underlying blockchain technology are attracting growing interest. In the context of the Eurosystem, this briefing paper analyses the legal nature of privately issued virtual currencies (VCs), the implications of VCs for central bank's monetary policy and monopoly of note issue, and the risks for the financial system at large. The paper also considers some of the proposals concerning central bank issued virtual currencies.

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