FINANCIAL MARKETS LAW COMMITTEE

ISSUES OF LEGAL UNCERTAINTY ARISING IN THE CONTEXT OF VIRTUAL CURRENCIES

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FINANCIAL MARKETS LAW COMMITTEE[1]

This paper has been prepared by the FMLC Secretariat.[2]

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1 The names of FMLC Members are given at the back of this paper. Given the involvement of HM Government and the regulatory authorities in the subject matter, Stephen Parker, Sonya Branch and Sean Martin took no part in the preparation and discussion of this paper.

2 Joanna Perkins (FMLC Chief Executive); Paul Mortby (FMLC Project Assistant) and Ion Soltoian (FMLC Issues Assistant). The FMLC Secretariat is most grateful to Charles Kerrigan (Olswang LLP) and Antony Zacaroli QC (South Square Chambers) for their contributions and to Adam Sanitt (Norton Rose Fulbright LLP) for his comments.

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1. PREFACE

The role of the Financial Markets Law Committee (the "FMLC" or the "Committee") is to identify issues of legal uncertainty or misunderstanding, present and future, in the framework of the wholesale financial markets which might give rise to material risks and to consider how such issues should be addressed.

In 2014, stakeholders approached the FMLC with a recommendation that exploratory work be undertaken by the Committee on the topic of virtual currencies. In response, the FMLC established a "Virtual Currency Scoping Forum" as a space for discussion, with particular reference to the robustness of the existing legal architecture and its ability to accommodate the rapid financial and technological innovation which virtual currencies represent.

This paper analyses the legal aspect of virtual currencies and addresses issues of uncertainty in the context of their development as a medium of exchange. In the course of so doing, some of the advantages and disadvantages described above are examined in greater detail.

The Committee may publish further similar studies in due course.

2. A BRIEF INTRODUCTION TO VIRTUAL CURRENCIES

Virtual currency schemes—also known as digital currency schemes—have proliferated in recent years. As their popularity with consumers and businesses has increased, regulators and markets have been compelled to pay greater attention to them. Proponents argue that they provide the benefits of anonymity, speed and convenience, and remove the need for a payment intermediary. Opponents, on the other hand, claim that anonymity facilitates crime, including money laundering;[3] that virtual currencies depend, almost entirely, on information technology networks which may themselves be subject to systemic risk; that "cryptocurrencies" are volatile; and—despite cryptographers efforts to address many of the risks that can erode financial value—that they are particularly susceptible to loss or theft.

[3] In the U.K., HM Government has resolved to address this issue: HM Treasury, "Digital currency: response to the call for information", March 2015, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/414040/digital_currencies_response_to_call_for_information_final_changes.pdf . See p.19.

The truth is that a wide variety of currencies exist and that, as a group, they share few, if any, common characteristics. Some virtual currencies can be held and used only in the context of a computer game, while others are a straightforward electronic reflection of a "real world currency", like U.S. dollars. The regulatory and legal concerns to which these schemes give rise will bear almost no relation to concerns which regulatory authorities have expressed from time to time about more complex schemes. The paragraphs below provide a brief overview of some of the most well-known virtual currency schemes.

Bitcoins, the best-known and the most prevalent units of virtual currency, are created by a technological process referred to as "mining" which is simulated by an individual's contribution to the computing power of the virtual network serving the scheme. A finite number of Bitcoins can be "mined" by this process, a limitation which is expected ultimately to determine the market value of Bitcoins. The scheme is supported by "distributed ledger technology" (or "DLT") which creates a decentralised transactional system.

Another name for DLT is "blockchain". That is because the technology operates to create a chain of blocks (or files) containing transaction data in which each new block contains a derived form (i.e., a hash) of the previous block. These blocks are stitched together in a chain of increasing length, the authenticity of which is verified by the combined computing power of multiple users on the network. The chain is extended when new transactions are organised into new blocks which are then added to the end of the existing blockchain and resubmitted to the network. Once accepted by the distributed network, a block cannot be changed or removed. A block which is created but rejected by the network becomes orphaned and cannot be reintegrated into the system. This is designed to prevent transactions being duplicated and to eliminate the re-use (or "double spend") of coins or tokens—risks to the robustness of virtual currency schemes which will be discussed more fully below. A full copy of a currency's blockchain would contain every transaction ever executed in the currency.

Bitcoin and other similar "altcoins", such as Litecoin, are properly described as "cryptocurrencies" because they rely on cryptographic techniques to record transactions in the decentralised ledger and to identify the unique character of individual coins. One cryptocurrency platform which has gained a higher profile recently is Ethereum, where transactions are executed in an altcoin called Ether.

Unlike, say, the Bitcoin platform, Ethereum offers programmable, automated transaction functionality (or "smart contracts"). In June 2016, a crowd-funded investment vehicle consisting of a "decentralised autonomous organisation" (or "DAO")—which may be thought of as a collective virtual wallet enhanced by "smart" contracts governing membership, voting and investment management—was attacked and Ether worth some $55 million was withdrawn without investors' permission.

Both Bitcoin and Ether are "mined" using network power. One cryptocurrency which is not mined in this way is Nemcoin, also known as XEM, which is transacted on the NEM platform. Newly "minted" Nemcoins were first distributed evenly to about 3000 stakeholders in the community. Having been distributed, the coins can now be transferred on the NEM platform, which incorporates DLT like other altcoins. New blocks in the blockchain are created by an author who is identified using a consensus technique called "Proof-of-Importance". This mechanism is intended to encourage stakeholders to spend, rather than hoard, the coins.

In contrast to these cryptocurrencies, Ripple—the second largest virtual currency scheme by market capitalisation—is a centralised payment system built around a shared public database.[4] This central ledger can only be amended by a process known as "consensus"—a democratised technological voting mechanism which does not depend on cryptographic techniques to record transactions. Unlike Bitcoin, Ripple allows for the direct exchange of other currencies, including "real world" currencies, through its payment system.

Where a virtual currency has this characteristic of being interchangeable with "real world" currency, it is sometimes said to be "open" rather than "closed". If the currency is freely interchangeable it is said to have "bidirectional flow", if it can be purchased but not sold in other currencies it is said to have "unidirectional flow". An example of the former is Linden Dollars, the currency created for the purposes of the online virtual world known as Second Life. Linden Dollars can be bought for U.S. dollars with a credit card and exchanged for digital goods inside Second Life. Surplus Linden Dollars can then be sold and converted back into U.S. dollars. Examples of the latter are to be found among the schemes created by the purveyors of computer games for use within their games, e.g. "Nintendo Points", which can be

[4] Ripple, available at https://ripple.com/. See also Ripple, "How Ripple Works", available at https://ripple.com/knowledge_center/how-ripple-works/.

purchased online by credit card but which cannot subsequently be converted back into money in the real world. Some virtual currencies are not “open” at all. Among these are “in-game” currencies which cannot be bought or sold outside the game. World of Warcraft Gold is said to be an example.

Bitcoin is a scheme which is technologically “closed” but is functionally “open”. That is, there is no exchange possible between Bitcoins and real world currencies within the scheme itself—balances cannot be held and transactions cannot be executed or recorded in other currencies. Nonetheless Bitcoins have been designed as a “real world” medium of exchange and the market that has grown up around the scheme allows holders to purchase articles of commerce in the usual way from enterprises that accept Bitcoins as payment. Although new Bitcoins can only be created and introduced into the system by the activity of “mining”, as described above, platforms have been established which allow users to buy and sell Bitcoins for “real world” currency.

Notwithstanding the possibility of currency exchange, Bitcoins are not pegged to any real world currency. The exchange rate is determined by supply and demand. Money supply depends upon limits baked into the scheme as mentioned above and on a projected reduction in Bitcoin production which will occur as the scheme loses velocity. (The algorithms which produce new coins will become more complicated, exhausting the available network computing power, leading to the production of fewer Bitcoins). Some virtual currencies, however, are pegged, to a greater or lesser extent, to real world currencies. The Linden Dollars scheme, for example, is managed by Linden Lab which has made a deliberate decision to maintain a stable exchange rate with the U.S. dollar and achieves this by “printing” Linden Dollars as necessary. Where a virtual currency has perfect “peg” to a real world currency, as online vouchers do, for instance, it will likely be classified as “e-money” for the purposes of legislation (discussed further below) and may be said to have “crossed over” into the real world as an electronic representation, like bank balances, of real money.

It will readily be seen from this cursory scan of the virtual currency environment that a wide range of schemes have been initiated and that many of these have little in common with one another. Various efforts to define the class as a whole have been made by experts, authorities and commentators and some of these are set out (for interest only) in an annex to this paper. The analysis below is primarily intended to address the legal aspect of virtual currencies whose value floats against real world currencies but which remain either technologically or functionally open to real world currencies.

3. PROPERTY OR PERSONAL RIGHT

At the heart of many of the regulatory questions which surround virtual currencies is the question of their legal character. At the heart of that question is another: how to allocate this new and, allegedly, disruptive technology to the traditional categories of property and personal rights developed by the common law.

The characteristics of property are well-established and were summarised in *National Provincial Bank v Ainsworth* [1965] 1 AC 1175 at 1247-8, by Lord Wilberforce:

> before a right or an interest can be admitted into the category of property, or of a right affecting property, it must be definable, identifiable by third parties, capable in its nature of assumption by third parties and have some degree of permanence or stability.

Examples of rights and interests which do not qualify as property within this broad definition include licences, certain quotas, permissions, reversionary interests, a claim for rescission and a right to apply for a discretionary court order. These are rights or interests which confer a benefit, if at all, exclusively on the person of the right-holder and they cannot be transferred.

Recent judicial decisions have tended to support the categorisation of rights as property wherever they have acquired economic value and shown themselves susceptible to transfer and trade, even in cases where the intention of the originator is to implement a purely administrative scheme. For instance, a milk quota and an emissions allowance have both, notwithstanding each is commonly understood as a licence or permission, been held to be property.[5] With this in mind, the likelihood is that those units of virtual currency which have been convincingly shown to have both economic value and transferability among market participants will be categorised as a type of property at common law. Whether a particular virtual

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5 See, for example, *Swift v Dairywise Farms Ltd* [2000] 1 WLR 177 (milk quotas) and *Armstrong DLW GmbH v Winnington Networks Ltd* [2013] Ch 156 (emissions allowances).

currency is sufficiently robust to have economic value and transferability in market terms is a threshold question which is beyond the scope of this paper.

4. IN ACTION OR IN POSSESSION?

Property in English law may be either real or personal property. According to *Halsbury's Laws of England* (4th edn) Vol 35 para 1201, personal property is "[broadly] all forms of property, movable or immovable, corporeal or incorporeal, other than freehold estates and interests in land". It follows that, if units of virtual currency are property, they are personal property.

Personal property is further divided into chattels real—largely leasehold interests, which may be disregarded for the purposes of this paper—and chattels personal, where the latter can be either "in possession" or "in action" at common law, hence: "*choses* in possession" and "*choses* in action". A chose in action is a property right that can only be obtained or enforced through legal action. A chose in possession, in contrast, is a thing of which physical possession can be taken.

In other jurisdictions, as well as in some U.K. statutes,[6] it is more common to divide personal property into tangible and intangible property. Where this distinction is made, it is logical to assume that units of virtual currency—being "virtual"—must be intangible property, if they are property at all. In this, virtual currencies would differ from, say, sovereign currency in the form of coins and notes. (These latter are tangible property and so chattels in possession—although notes may be simultaneously a chose in action, which is a kind of intangible property.[7]) This is the view which has been taken, for example, by the New York Department of Taxation and Finance in saying that, for sales tax purposes, convertible virtual currency is intangible property.[8]

The class of intangible property is normally regarded as essentially the same as the class of choses in action. Nonetheless, virtual currencies may share several of the characteristics of choses in possession, described in *Halsbury's Laws of England* (2013) Vol. 80 para. 806 as:

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6 For example, the Finance Act 2004; the Fraud Act 2006; and the Theft Act 1968.

7 Proctor, *Mann on the Legal Aspect of Money*, 7th Edn. (Oxford, 2012), see paragraph 1.46.

8 Technical Memorandum TSB-M-14(5)C, (7)I, (17)S of December 5, 2014.

> things which are at once tangible, movable and visible, and of which possession can be taken, for example animals, household articles, money… and everything else that can properly be put in motion and transferred from place to place.

Taking Bitcoins as an example, it is noteworthy that they are transferred and stored in such a way that they may be lost, which the common law recognises as a characteristic of choses in possession but not of choses in action.[9] A related point is that a transfer of possession can be effected by placing Bitcoins in a digital wallet on the user's computer, which will connote a transfer of ownership. Here, the Bitcoin is not merely representative of property rights (as most retail storage or delivery receipts would be, for example) but appears to be—at least, within the logic of the virtual system—a right in possession.

A great many consequential legal issues and questions would naturally flow from the legal classification of virtual currencies as either choses in action or choses in possession. On the one hand, were a virtual currency to be classed as a form of chose in action, then the question automatically arises against whom the action to enforce the rights of owner lies. This is likely to be critical for a trustee in bankruptcy or a liquidator appointed in the event of the insolvency of the holder of virtual currency. The office-holder would need to know against whom action could be taken to realise the value in the virtual currency. It is similarly important for anyone considering taking security over virtual currency.

It is impossible to do more in this paper than highlight this as an area of legal uncertainty since identifying the person or persons who have control of the virtual coins or tokens and against whom it is therefore appropriate to act to enforce the holder's rights is likely to vary depending on the type or nature of the virtual currency. The answer is likely to be different as between, on the one hand, a virtual currency such as Bitcoin, with a distributed ledger (where it is difficult to identify any person against whom action could be taken to vindicate rights constituted by the virtual currency) and, on the other hand, those available within the confines of a computer game (where there may, for example, be a contractual right against the creator of the game).

9 A chose in action cannot be the subject of an action in conversion: *OBG Limited and others (Appellants) v. Allan and others* [2007] UKHL 21 where an action for conversion is historically rooted in a fictitious allegation that the claimant has lost the chattel and that the defendant has found it; OBG at [95]. (A chose in action can, however, be the subject of a theft.)

If, in contrast, virtual coins or tokens are choses in possession, and their value is realisable solely by virtue of their being exchanged for something else, then it is vital for a trustee in bankruptcy, liquidator or secured creditor to know by what means, if any, s/he is able to obtain possession of the coins or tokens. In particular, an insolvency practitioner will wish to understand how to transfer coins or tokens to a third party so as to exchange them, directly or indirectly, for "real world" currency that can be made available for distribution to creditors.

On balance and considering the issues sketched very briefly above, it would seem that the legal uncertainty arising if virtual currencies are classified as choses in action is likely to be greater than if they are acknowledged to share the essential characteristics of choses in possession. Given that some virtual coins and tokens, at least, share certain characteristics of both intangible property and choses in possession, however, it may be convenient to understand them—where the currency is economically robust enough to be classed as "property"—as a kind of hybrid: "virtual choses in possession". That is, intangible property with the essential characteristics of choses in possession.

One question which might arise for re-evaluation in light of this suggestion is the question whether virtual currencies constitute "goods" for the purposes of sale of goods legislation. In England, a sale of, say, Bitcoins could not qualify as a sale of goods, even if they were a personal chattel, if they were classified either as a chose in action or as money. In Scotland, the same sale would not qualify if Bitcoins were classified as "incorporeal property". There is a risk, however, that anything deemed to be a "virtual chose in possession"—intangible/incorporeal and yet somehow capable of being held "in possession", without (at least, in the case of virtual currencies) qualifying as money—would naturally fall to be classified as "goods" in England but not in Scotland. This would be an odd outcome.[10] The FMLC notes that this question is primarily one of consumer policy, rather than legal classification, and may be dealt with accordingly by statutory amendment. The question whether virtual currencies may be classified as "money" (which would avoid any divergence between the scope of application of the statute in England and its application in Scotland) is discussed below.

[10] Interestingly, in other common law jurisdictions, choses in action and forms of intangible property can sometimes qualify as goods for the purposes of sale of goods legislation. See, for example, in New Zealand, the Fair Trading Act 1986, section 2 where "goods" means "personal property of every kind (whether tangible or intangible)".

5. DOCUMENTARY INTANGIBLES

One traditional category of property which shares some of the characteristics of both choses in possession and choses in action is constituted by what are sometimes described as "documentary intangibles".[11] An example of this kind of hybrid property is a promissory note. Here, the debt itself is a chose in action, but the document which represents it is a chose in possession. The two cannot be separated and when the document is transferred so, too, is the debt, as a general rule. Professor Bridge describes a right in this category as one ‘‘so firmly ‘locked up’ in the document embodying it that it can be dealt with at common law only through the medium of that document" and he goes on to give bills of lading and bills of exchange as good examples.[12]

Property of this kind includes negotiable instruments (bills of exchange, promissory notes and cheques); negotiable securities (for example, bearer bonds and notes) and certain other mercantile documents relating to the storage, transport and delivery of goods (for example, bills of lading). When such instruments are transferred, the purchaser who takes them in good faith, for value and without notice of the defect in title, acquires a good title even though the seller may have had a bad or defective title or, indeed, no title at all.

Documentary intangibles which can deliver ownership with the transfer, or transfer and endorsement, of the document in this way are said to have the character of being "negotiable" and this will be discussed further below. Documentary intangibles represent a debt which can be sued upon like a chose in action but the document can also be the subject of an action in conversion—to recover their face value—like a chose in possession. The character of negotiability privileges documentary intangibles over and above ordinary choses in possession in that it permits the holder for the time being to transfer a better title to the property than he himself has.

Documentary intangibles are not the only kind of things which amount to more than a merely personal right but which sit uneasily between the traditional categories of chose in action and chose in possession. Goodwill, for example, is both intangible and recognised as a species of property but it is intransmissible other than as part of a

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[11] See McKendrick (ed.), *Goode on Commercial Law*, 4th Edn (London, 2010), p.32; and Bridge, *Personal Property Law*, 3rd Edn (Oxford, 2002), p.6.

[12] *Ibid*, Bridge, p.230.

business and it may, in certain circumstances, be "locked in" to particular business premises like a corporeal chattel.[13] Electricity is similarly resistant to easy definition. A person cannot steal electricity at common law, which suggests it is neither a chose in possession nor a chose in action, but the Theft Act recognises that it is nonetheless a thing of substance which is capable of "abstraction".[14] At the 2006 XVIIth International Congress of Comparative Law, hosted by the Netherlands Comparative Law Association, participants were invited to submit national responses to a questionnaire on areas where the status of legal rights or interests as incorporeal property might be in doubt and/or subject to national differences in approach, including: privacy rights (i.e. to one's own image or personal data); intellectual property and credit. In her response, Dr Jane Ball observed, *inter alia*, that the extension of English property law rights to cover computer software had been limited.[15] The particular case of computer software is discussed in the second annex below.

Returning to the subject of this paper, if there is general property in virtual currencies, the question remains whether they constitute choses in possession, choses in action, hybrid property which is negotiable and thus privileged in terms of possession, hybrid property which is non-negotiable, or something else entirely. The question of negotiability is discussed in the section below.

6. POSSESSION, DELIVERY AND OWNERSHIP

A basic principle of common law is the rule *nemo dat quod non habet*—that no one can give a better title than they themselves have and, conversely, a purchaser cannot receive better title to property than the seller. The principle is, however, subject to a number of significant exceptions, the commonest of which is probably money itself. Sovereign currency in the form of notes and coins in general circulation generally cannot be recovered from a person who has obtained possession of them in good faith—ownership of such notes and coins passes on delivery. In this respect, coins

13 See *Halsbury's Laws of England* (2016), Vol. 77, para. 172.

14 *Law v Blease* [1975] Crim LR 513 established that a person using the electricity necessary for a telephone call was not guilty of theft; *cf* section 13, Theft Act 1968.

15 Ball, "The Boundaries of Property Rights in English Law", *EJCL* available at: http://www.ejcl.org/103/art103-1.pdf, see para. 3.3.

and notes are sometimes said to be "negotiable chattels", on account of the fact that title passes "in currency", where negotiability refers to the idea that property or ownership can follow possession, if possession is taken in good faith for value. (Historic or commemorative coins which are not legal tender are not normally money but ordinary chattels and do not benefit from this exception.)[16]

Banknotes are a two-fold exception to the *nemo dat* principle because they also qualify as promissory notes ("*I promise to pay the bearer*…") for the purposes of the Bills of Exchange Act 1882 and, thus, as negotiable instruments.

While the category of negotiable instruments may not be closed,[17] this analogy would seem to be of limited assistance in an attempt to understand the legal nature of virtual currencies. First, there is the obvious objection that shoe-horning a modern payment technology like virtual currencies into concepts defined by Victorian legislation (i.e. the Bills of Exchange Act 1882) would seem to be retrogressive and, without amendment, precluded by the legislation itself. Second, there are a number of defining features shared by all negotiable instruments which are not, or not necessarily, replicated in virtual currencies. For example, negotiable instruments enjoy a hybrid character which in part reflects their nature as debts payable in a real-world currency. Units of virtual currency do not have this character and may not be pegged to any real world currency. Further, negotiable instruments are, by virtue of section 83 of the 1882 Act, to be executed in writing and signed by the obligor. Not only are the concepts of writing and signature not applicable to virtual currencies but units may be wholly anonymised. For these reasons, virtual currencies should not be understood as negotiable instruments, even by distant analogy with other financial innovations, such as vouchers and in-game "bank notes", which more closely resemble documentary intangibles.

The category of negotiable things also includes negotiable or bearer securities.[18] Here, however, it seems there is, if anything, less opportunity to push back the

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16 For a detailed discussion see Proctor, *supra* n.6, at paragraph 1.73.

17 In the tax case of *Argos Distributors Ltd v Customs and Excise Commissioners* (Case C-288/94), the Advocate-General observed that a face value sales voucher "behaves as if it were a negotiable instrument".

18 Bearer securities may transfer title with possession, although registered securities do not. Very few investors, however, hold negotiable securities such as bearer bonds, notes, warrants or shares today. It is much more common for an issuer to deposit a single Global Bearer Bond or Note at a central securities depository (or "CSD") which will then record the interests of investors as book entries in an electronic system. By this process, investors acquire a dematerialised, intermediated interest in the bearer security. This "book entry" confers not a legal interest but an equitable one.

boundaries of the definition. The FMLC has, in the past, written extensively on the effects of dematerialisation and intermediation in securities systems, noting that these developments have left most end-investors with a merely equitable interest in securities, and has observed that:

> it is highly unlikely that [mercantile] rules [which protect the good faith purchaser of negotiable securities] extend to electronic assets such as contemporary intermediated securities. As a result, a purchaser of the interest in, say, bonds (unlike a purchaser of a physical bond) is not protected by the rule that a holder in due course of a negotiable instrument takes free of any prior claims and is unaffected by any flaw in the title (for example, where the bond was stolen) of the transferor. Equity protects a person who in good faith acquires legal title without notice of any adverse claims, but this protection cannot apply if the purchaser only acquires an equitable interest in the securities.[19]

It would appear, therefore, that the categories of negotiable instrument and negotiable security are—to all broad intents and purposes—closed as far as technical innovation is concerned and unlikely to be extended, even incrementally, to new assets. If this is indeed correct, it means that the *nemo dat* rule will apply to virtual currencies—if they are chattels at all—unless they are negotiable chattels like money. This possibility is discussed in the following paragraphs.

7. MONEY, MONEY, MONEY

There is no single wholly satisfactory theory of what money is, particularly as to its legal aspect. Certain theories of money emphasise its function as sovereign currency and legal tender while others emphasise its societal role as a means of payment and yet others point to its economic aspect and its sensitivity to monetary policy.

While it is unlikely that any one of these theories can satisfactorily account for all the attributes of money, it is clear that one or other may be more or less useful for certain purposes. The "State" theory of money as sovereign currency has been important,

[19] See: Financial Markets Law Committee, "Analysis of the need for and nature of legislation relating to property interests in indirectly held investments securities, with a statement of principles for an investment securities statute", July 2004, pg 13, available at http://www.fmlc.org/uploads/2/6/5/8/26584807/3b.pdf.

for example, in helping us to answer both simple questions about counterfeiting and difficult questions about monetary union and economies in transition. But a theory of this kind will not easily account for the way in which U.S. dollars are more widely accepted in many economies—and, therefore, offer a better discharge of commercial obligations—than the local sovereign currency. Nor does it satisfactorily explain how consumers have come to regard a dematerialised chose in action, like a bank account balance, as "money in the bank".

For questions like these, we need instead to have regard to money's function as the currency of commerce. Charles Proctor, in *Mann on the Legal Aspect of Money*, refers to a theory of money which focuses on this function as "the Societary theory of money".[20] According to this theory, the negotiability of coins and notes stems from their ability to "pass in currency",[21] i.e. commonly and continuously to be accepted as payment in exchange for articles of commerce. As explained by Best J in *Wookey v Pole* 4 B & Ald 1, the rule that "where the owner of money had lost the possession of it, he had lost the property in it" is justified because:

> by the use of money the interchange of all other property is most readily accomplished. To fit it for its purpose the stamp denotes its value, and possession alone must decide to whom it belongs.

It seems reasonable to infer from this that if a chattel, having a face value or other ascertainable value, is widely accepted in "interchange" for all other kinds of property then the law will regard it as a negotiable chattel, whether or not it is also a unit of the sovereign currency. That is, a chattel which qualifies as money under the Societary definition should be negotiable whether or not it also qualifies under the State definition.

Whether units of a virtual currency have achieved the status of being "passed in currency" is a mixed question of fact and law. It is beyond the scope of this paper to analyse, or speculate on, whether individual virtual currencies might qualify or not. The FMLC notes, however, that the European Court of Justice—in a case which

20 S*upra* n.6, see paragraph 1.29.

21 A phrase adopted by Lord Mansfield in *Miller v Race* (1758) 1 Burr 452, at 457.

called for an analysis, for tax purposes, of the nature of exchange transactions involving Bitcoins—stated that Bitcoins constitute a contractual means of payment.[22]

8. E-MONEY: IT'S MONEY, JIM, BUT NOT AS WE KNOW IT…

In *Mann on the Legal Aspect of Money*, Charles Proctor considers the extent to which comparisons may be made between payments in physical cash and payments by bank account transfer.[23] He observes that a funds transfer has many of the hallmarks of a payment in cash: it will generally be irrevocable and will confer both "possession" of the funds and good title on the recipient, who need not—if he is himself in good faith—be concerned with the provenance of the funds (other, perhaps, than as a matter of financial regulation). Moreover, both the transferor and transferee will think of themselves as having dealt in "cash" or "money"—rather than in claims on the bank account provider(s)—and will also strongly think of themselves as *possessing* and *owning* that money when funds are credited, even though there may be, on a strictly traditional legal analysis, no choses in possession or negotiable chattels changing hands.

Proctor concludes that his analysis:

> would appear to justify the earlier conclusion that funds standing to the credit of a bank account should be regarded as "money" for legal purposes.[24]

In a later section of his book, Proctor extends the analysis to "e-money."[25] E-money includes pre-paid cards (like oyster cards), pre-paid accounts online (as Paypal can be) and on electronic devices (such as mobile telephones). It is defined in European legislation as:

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22 See case C-264/14, *Skatteverket. v. David Hedqvist*, available at http://curia.europa.eu/juris/document/document.jsf?docid=170305&doclang=EN.

23 Proctor, *supra* n.6, at paragraph 1.75.

24 Ibid.

25 Ibid, paragraphs 1.80 to 1.81. He observes that the recipient of an e-money payment need not have reference either to the identity or the creditworthiness of the payor and, like a bank transfer, the funds constitute money both owned and possessed by the recipient of the payment for all practical purposes.

> monetary value represented by a claim on the issuer which is stored in an electronic device and accepted as a means of payment by undertakings other than the issuer.[26]

Virtual currencies pegged to "real world" currencies may also be classified as e-money.

What is interesting about these passages is the implicit view that a functional definition of money is appropriate. The traditional categories of chattel distinguish, as discussed above, between tangible and intangible property, between choses in action and choses in possession. Money has traditionally been both tangible and "in possession"—the fact that negotiable instruments simultaneously represent a chose in action does nothing to change that—and a strictly traditional approach might suggest that it cannot exist outside those categories. Proctor, however, rejects this approach, in favour of a flexible, modern definition which better accords with the common understanding of money.

This account of money has implications for virtual currencies whether or not they are pegged to "real world" currencies and, therefore, like e-money, represent money's worth. Once it is accepted that electronic money—i.e. money which is not constituted by tangible property and therefore cannot be the subject of physical control—can be possessed and that ownership can pass with possession, key objections that might otherwise exist to accepting virtual currencies, in their legal aspect, as "money" fall away. Another objection—that virtual currencies are not legal tender and not issued by the State—also falls away, since bank deposits and e-money are obligations issued by private organisations.

The cases of bank deposits and e-money, then, lend strong support to the view that virtual currencies which have become a medium of exchange and which are capable of "passing in currency" should, in their legal aspect, be viewed as money.

[26] Directive 2009/110/EC of the European Parliament and Council on the taking up, pursuit and prudential supervision of the business of electronic money institutions (the "Electronic Money Directive"), see Article 2(2).

9. FOREIGN EXCHANGE?

What then of virtual currencies which cannot (yet) be said to "pass in currency" within the jurisdiction? These may be of two kinds: (1) virtual currencies designed for a limited transactional purpose—for example, "in game" currencies which can only purchase virtual goods;[27] and (2) virtual currencies designed to serve as a medium of exchange in the "real world" and accepted by a limited set of market participants but which have, to date, not gained widespread acceptance.

The role of the latter may perhaps be said to be somewhat analogous to the role of foreign money in a jurisdiction where it is not legal tender. Foreign money is issued for the purpose of acting as a medium of exchange and, in at least one location, it is accepted and traded as payment, just as functionally "open" virtual currencies are accepted for payment in the real world within the user community. In the U.K., however, foreign money cannot purchase articles of commerce or satisfy a debt unless expressly stipulated for by the creditor. It cannot do so for an odd mix of reasons, both legal and socio-practical: foreign money is not sovereign currency or legal tender, there is no general social practice of accepting foreign money as payment and ordinary commercial debts within the jurisdiction are, by law, denominated in pounds sterling unless another currency is stipulated for.

Yet, under English law, foreign money is still regarded, in its legal aspect, as "money". Any argument to the contrary was laid to rest by the Court of Appeal in *Camdex International Ltd v Bank of Zambia* [1997] CLC 714, where Phillips LJ noted that, in the event foreign currency is specified in a contract as the means of payment it retains its character as a medium of exchange. He went on to say:

> this reflects the fact that there exist different media of exchange, that their relative values fluctuate over time and that for this reason parties to a transaction may be concerned to stipulate for a particular currency. The fact that the identity of the currency may be a material feature of

27 "In game" currencies fall outside the remit of the FMLC, which is to consider legal developments in the framework of the wholesale financial markets. It has been suggested to the Committee, however, that "virtual transactions"—exchanging purpose-built virtual currencies for virtual securities—may, in future, be a useful innovation in financial markets infrastructure. It is said that innovations of this kind could offer intra-day settlement by means of proxy virtual transactions, which are then "converted" or "materialised" into net "real world" transactions at the end of the day. If these or similar developments occur, the FMLC may wish to consider the status and nature of purpose-built currencies with a limited sphere of transactional operation. Meanwhile, it should be noted that such currencies may, if pegged to "real world" currencies, constitute e-money within the definition above.

> the transaction does not translate the currency into a commodity, whatever the nature of the transaction.

It is clear that foreign money also constitutes money for a host of purposes reflected in legislation—for example, the policy objectives of the Forgery and Counterfeiting Act 1981—including for the purposes of the Financial Collateral Arrangements (No 2) Regulations 2003, SI 3226/2003, where "cash" is:

> money *in any currency* credited to an account, or a similar claim for repayment of money and includes money market deposits (emphasis added).

Crucially, there is no reason to believe that foreign money is not negotiable under English law, just like pounds sterling. Banknotes and coins will still, it is to be strongly inferred, count as negotiable chattels such that they can be transferred by mere delivery.[28] If so, it follows from what is said above about electronic money that a transfer of funds electronically will also deliver both possession and good title at common law to a recipient.

10. A CONSTANT MEASURE OF VALUE

This may be a good point at which to compare economic approaches to theorising virtual currencies and efforts to identify the legal aspect thereof. In its 2014 Q3 Quarterly Bulletin,[29] the Bank of England, in the course of considering innovative payment systems, observed that:

> something may be considered money from the perspective of economic theory to the extent that it serves as a medium of exchange with which to make payment; a store of value with which to transfer 'purchasing power' (the ability to buy goods and services from today to some future

[28] Inferred, that is, from the prevailing practice and also from the approach taken by the Court of Appeal in *Camdex International Ltd v Bank of Zambia*. This result is the subject of authority under New York Law: *Brown v Pereira* (1918) 182 App Div 992; 176 NY Supp 215 (Supreme Court of New York).

[29] Available at: http://www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2013/a13.aspx.

date); and a 'unit of account with which to measure the value of any particular item for sale'.[30]

A similar account was given by the European Central Bank in a paper on *Virtual Currency Schemes* published in October 2012.[31] The paper concluded that virtual currencies do indeed act as a medium of exchange and as a unit of account within a particular virtual community—and qualify as "money" to that extent—but it questioned whether they were sufficiently reliable and safe to act as a "store of value".[32] In 2014, however, in the Q3 Quarterly Bulletin mentioned above, the Bank of England noted that DLT is adept at resolving the "double-spend problem", reduces the credit, liquidity and operational risks that can beset more conventional payment systems and eliminates the fraud risk associated with identity theft or card theft.[33] It went on to observe that the "risk of direct loss of digital currencies is higher than that for deposits" but the loss of a virtual wallet remains "analogous to" the risk of loss of a physical wallet along with its contents in the form of coins and notes.[34] If this is correct, well-engineered virtual currencies are, in general, no less effective as a "store of value" than "real world" currencies. The one exception, noted the Bank of England, is the risk of system-wide fraud on cryptocurrencies like Bitcoin reflected in what is commonly called "the pool of miners scenario". If would-be attackers were able to obtain sustained control of a majority of the total computing power across the

[30] *Ibid*, at p. 264.

[31] Available at https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf.

[32] *Ibid*, at p. 11. Virtual currencies are typically stored in e-wallets. Some of these are unencrypted, making them targets for experienced hackers. As regularly noted in the press, there are currently thought to be hundreds of hackers targeting virtual currency holders, stealing e-wallets and related identification information. For example, the ransomware virus Cryptolocker was successful in spreading through email attachments, encrypting hardware and infecting computers (https://en.wikipedia.org/wiki/CryptoLocker).

[33] Bank of England, *Quarterly Bulletin* (2014 Q3) *supra*, at p. 267-271. Virtual currencies are generally considered to benefit from the anonymity of the network because there is no identity verification and therefore no risk of identity theft. The FMLC notes, however, that the blockchain ledger is public, and that research has suggested that with the right knowledge pseudonyms (hashes of public keys) can be linked to the IP addresses where a transaction is generated.

[34] *Ibid*, at p.271. Safeguards, to ensure the veracity of transactions in virtual currencies have been adopted by all viable schemes and so the risks of counterfeiting have been largely eliminated. The risks associated with theft and loss, however, have proved much more persistent. Virtual currency transactions, owing to their technological nature, are irreversible and offer no legal protections for consumers against human error. Unlike credit cards, which offer chargeback protection, once units of virtual currency are transferred the transaction is irrevocable. Consumers do not have the benefit of the most common forms of redress in cases of financial loss, mistake or fraud because e-wallet providers, exchanges and trade platforms are not regulated and do not have a physical presence. This is largely a regulatory question rather than a legal-definitional one.

entire network of miners they could influence the speed, security and cost of the production and functioning of the cryptocurrency in question. As well as these technological risks there is a small practical risk that they could collude to disrupt or change the entire scheme.

Less robust cryptocurrency systems may contain features that can be exploited for the purposes of theft or fraud. In June 2016, a vehicle on the Ethereum platform was subject to such an attack, as mentioned above. The largest DAO on the platform was exploited by a user who successfully managed to drain over a third of DAO tokens into a "child DAO" using a recursive "splitDAO" function to withdraw his/her funds from the parent DAO multiple times.[35] While this attack exploited a weakness in the DAO, rather than in the Ethereum code itself, it is arguably the platform's smart contract functionality which indirectly gave rise to the fraud risk. Moreover, efforts by users to recover the stolen Ether may have systemic consequences for the platform. One of the remedies suggested by some users has been to introduce a so-called "hard fork" in the blockchain which would orphan the funds in the child DAO and replicate them in the parent DAO. The stakeholder community has debated keenly whether this would potentially give rise to double spending thereby undermining both Ether's fungibility and its capacity to act as a store of value.

Whether a particular virtual currency is sufficiently well-designed to eliminate double spending of units and minimise other risks to the framework so as to act as a "store of value" in this most basic sense is a threshold question which is beyond the scope of this paper. The FMLC notes that it may well be a question which is co-extensive with the threshold test identified at the outset of this paper, namely: whether a virtual currency scheme is sufficiently economically robust that the coins and tokens are capable of being classified as "property", in the legal sense.

What is clear, however, is that the failure of a currency to act as a "constant measure of value"—a higher standard which would appear to combine the "store of value" aspect and the "unit of account" aspects—in no way prevents that currency from

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[35] For more information on this topic, see http://www.coindesk.com/understanding-dao-hack-journalists/ or http://www.coindesk.com/the-dao-is-closing-down/.

being money.[36] The better view is that a currency which cannot act as a robust store of economic value can nonetheless still qualify as "money" and can still be of negotiable character. This is clear from the analogy with foreign currency, which may rapidly devalue or appreciate in value against sterling but which will, following *Camdex International Ltd v Bank of Zambia*, still qualify as money for the purposes of English law.

11. REGULATORY ASPECTS

The fact that virtual currencies may, as to their legal aspect, have a strong claim to negotiability as "money", does not necessarily entail that they should be treated as "money" in all contexts. Money is defined for a broad array of legal, economic and financial purposes and the analysis of virtual currencies in their relation to those definitions should not be rigidly pre-determined across all categories. Virtual currencies have similarities with money, commodities, securities and instruments of payment and it may be appropriate to regulate schemes by analogy with commodities or securities accordingly. In 2014, the Bank of England apparently agreed:

> digital currencies are not at present widely used as a medium of exchange. Instead, their popularity largely derives from their ability to serve as an asset class. As such they may have more conceptual similarities to commodities, such as gold, than money.[37]

In a similar vein, is the conclusion drawn last year by the U.S. Commodity Futures Trading Commission ("CFTC") that Bitcoin is a commodity within the meaning of

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[36] In *Treseder-Griffin v Co-operative Society* [1956] 2 QB 127 (CA) Lord Justice Denning (as he then was) said "sterling is the constant unit of value by which in the eye of the law everything else is measured". He speculated that it might be contrary to public policy for a creditor to use a gold clause to index-link contractual payment obligations. In *Multiservice Bookbinding Ltd v Marden* [1979] Ch 84, Mr Justice Browne-Wilkinson (as he then was) rejected the public policy argument and noted that the English courts could award damages in other currencies (following *Miliangos v George Frank (Textiles) Ltd* [1976] AC 443). In each case, the failure of certain currencies to act as an adequate store of value was observed: in *Treseder-Griffin*, the court was prepared to characterise sterling as a constant measure of value but emphasised the correlative volatility of foreign currencies; and in *Multiservice Bookbinding* Browne-Wilkinson J was determined to recognise the realities of inflation by alluding to sterling as a currency "whose value is being eroded".

[37] McLeay, Radia and Thomas, "Money in the modern economy: an introduction", Bank of England Quarterly Bulletin 2014 Q1, p.6, available at: http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q1.pdf.

section 1a(9) of the Commodity Exchange Act, where "commodity" is defined to include, among other things, "all services, rights, and interests in which contracts for future delivery are presently or in the future dealt in".[38] The relevant CFTC Order admits that this is a particularly broad definition.[39] The Commission would probably add, if asked, that the width of the definition is justified by the regulatory intent of the legislation.

The analogy with securities has also found favour with regulators. A year before the CFTC Order referred to above, the U.S. Securities and Exchange Commission ("SEC") obtained a final judgement from a U.S. district court against a Texan company—Bitcoin Savings and Trust —pursuant to federal security legislation that prohibits fraudulent offers and sales of "securities".[40] The court judgement ruled that Bitcoin-denominated units or shares in a Bitcoin-denominated Ponzi scheme run by founder, Trendon T. Shavers, met the definition of investment contracts and, as such, were securities.[41]

In the European context, regulatory questions of this kind cannot be postponed indefinitely (or, indeed, for very long at all). As virtual currencies play an increasingly significant role in the financial markets, the question of how the regulatory *acquis* should apply to them will become a pressing one. To take one example, virtual currencies may be used as collateral in financial transactions. If virtual coins and tokens are to benefit from key protections in the event of the insolvency of the collateral giver, the collateral taker or a relevant intermediary, certain chapters of the E.U. financial regulatory rulebook must apply. One instance of these protections is the guarantee of collateral enforceability afforded to collateral-takers by Article 4 of Directive 2002/47/EC on financial collateral arrangements (the "FCAD").[42] The FCAD, which covers financial collateral consisting of cash,

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38 United States Commodity Futures Trading Commission, Order of the CFTC (Docket No. 15-29) in the Matter of Coinflip, Inc., d/b/a Derivabit, and Francisco Riordan, available at http://www.cftc.gov/idc/groups/public/@lrenforcementactions/documents/legalpleading/enfcoinfliprorder09172015.pdf.

39 *Ibid*, p. 3.

40 Available at https://www.sec.gov/litigation/litreleases/2014/lr23090.htm.

41 See the court decision at: http://www.law.du.edu/documents/corporate-governance/securities-matters/shavers/SEC-v-Shavers-No-4-13-CV-416-E-D-Tex-Sept-18-2014.pdf.

42 This directive was implemented in the U.K. by means of the Financial Collateral Arrangements (No 2) Regulations 2003, referred to above.

financial instruments or credit claims,[43] defines "financial instruments" as shares in companies and:

> other securities equivalent to shares in companies and bonds and other forms of debt instruments if these are negotiable on the capital market, and any other securities which are normally dealt in and which give the right to acquire any such shares, bonds or other securities by subscription, purchase or exchange or which give rise to a cash settlement (excluding instruments of payment), including units in collective investment undertakings, money market instruments and claims relating to or rights in or in respect of any of the foregoing.[44]

It also defines cash as "money credited to an account in any currency".[45] On the basis of the legal analysis above, it might be said that there is a good arguable case for classifying virtual coins and tokens—where certain threshold questions as to economic robustness etc. are satisfied— as "cash" within the meaning of the terms as they are used in the Directive and a much less cogent case for identifying some currencies as "securities", but the question is best addressed as one of regulatory policy rather than legal categorisation.

The FMLC observes that, while a clear definition of the legal aspect of virtual currencies is not in any way conclusive as to their regulatory treatment, it may assist regulators in predicting the outcomes of proposed regulatory approaches. For instance, the legal risks to a payment settlement system which accepts payment in virtual currencies will differ depending on whether or not a good faith recipient receives good title based solely on delivery. If units of virtual currency are negotiable, as the analysis above suggests, title passes with delivery minimising the risk that the settlement system can be disrupted by "*nemo dat*" property claims brought by an antecedent owner.

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[43] See Article 1(4)(a).

[44] Article 2(1)(e).

[45] Article 2(1)(d).

12. CONCLUSION

The objective of this paper has been to analyse the legal aspect of virtual currencies. The Committee has expressed the view that virtual currencies which have achieved status as a medium of exchange within a significant user community have a good claim to be regarded as money. If so, it follows that they will be negotiable. Since this does not sit easily with the traditional distinctions between choses in possession and choses in action there may be an argument for recognising the new reality of the digital world and extending the traditional legal categories so as to recognise virtual choses in possession as a new form of property.

This paper has not identified all issues of legal uncertainty arising in the context of virtual currencies but has, instead, identified various areas where more information is needed or a common approach is desirable. It is the Committee's hope that this paper will serve to raise awareness of the issues and as a springboard for further analysis and discussion.

ANNEX I - DEFINITIONS

The table below sets out definitions of virtual currency attributable to various commentators and authorities for a range purposes. The list is included for readers' interest.

Source	Definition
Japanese Payment Services Law, as amended (in translation)	"Data of value which are transferrable by electronic data processing systems among miscellaneous parties, which can be used as payment in exchange for other goods or services, which are not denominated or redeemable in domestic or foreign monetary unit of account, and which can itself be purchased and sold. Data of value which are transferrable by electronic data processing system among miscellaneous parties and which can be exchanged with such virtual currency are also regarded as virtual currency."
European Central Bank, "Virtual Currency Schemes", October 2012, p.5	"A type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community."
European Central Bank, "Virtual Currency Schemes – a further analysis", February 2015, p.25	"Virtual currency can… be defined as a digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money."
European Banking Authority, "EBA Opinion on 'virtual currencies'", 4 July 2014, p.10	"The usage of the term 'currency' is misleading… VCs are defined as a digital representation of value that is neither issued by a central bank or public authority nor necessarily attached to a FC [Fiat Currency], but is used by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically."
Financial Action Task Force Report *Virtual Currencies: Key Definitions and*	"Virtual currency is a digital representation of value that can be digitally traded and functions as (1) a medium of

Potential AML/CFT Risks (June 2014), p.4	exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status (i.e., when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction. It is neither issued nor guaranteed by any jurisdiction, and fulfils… functions only by agreement within the community of users of the virtual currency."
Ali & Barrdear (Bank of England) "Innovations in payment technologies and the emergence of digital currencies", p.5	"Bitcoin…is a privately developed, internet-based currency and payment system that requires no intermediaries (like banks) for the processing of payments. Furthermore, the supply of bitcoins is not controlled by central banks. It is commonly referred to as a 'cryptocurrency' as it relies on techniques from the field of cryptography to ensure the secure validation of transactions."
Brito, Shadab, Castillo, "Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling" [2014] Colum. Sci. & Tech. L. Rev 144, p.147.	"Bitcoin is frequently described as "digital currency." While that description is accurate, it can be misleading as it is both too broad and too narrow. It is too broad because Bitcoin is a very particular kind of digital currency called a cryptocurrency… On the other hand it is too narrow because although currency is one aspect of the Bitcoin system, Bitcoin is more broadly an Internet protocol with many applications beyond payments or money transfer, such as recording property titles and authenticating documents."
United States District Court, *Securities and Exchange Commission v Trendon T. Shavers and Bitcoin Savings and Trust*	"It is clear that Bitcoin can be used as money. It can be used to purchase goods or services… The only limitation of Bitcoin is that it is limited to those places that accept it as currency." "It can also be exchanged for conventional currencies, such as the U.S. dollar, Euro, Yen, and Yuan. Therefore, Bitcoin is a currency or form of money, and investors wishing to invest in BTCST provided an investment of money."

Derek A. Dion, "I'll Gladly Trade you Two Bits on Tuesday for a Byte Today: Bitcoin, Regulating Fraud in the Economy of Hacker-Cash" *Illinois Journal of Law, Technology & Policy* (2013, Vol 1) 165	"Bitcoin is an electronic form of currency unbacked by any real asset and without specie, such as coin or precious metal." "It is not regulated by a central bank or any other form of governmental authority; instead, the supply of Bitcoins is based on an algorithm which structures a decentralized peer-to transactions system."
United States Internal Revenue Service, Notice 2014-21	"Virtual currency is a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value. In some environments, it operates like "real" currency – i.e., the coin and paper money of the United States… and is customarily used and accepted as a medium of exchange… but it does not have legal tender status in any jurisdiction."
United States Department of the Treasury, Financial Crimes Enforcement Network Guidance FIN-2013-G001[46]	"In contrast to real currency, "virtual" currency is a medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency. In particular, virtual currency does not have legal tender status in any jurisdiction. …"convertible" virtual currency…either has an equivalent value in real currency, or acts as a substitute for real currency."
Swiss Confederation "Federal Council report on virtual currencies in response to the Schwaab (13.3687) and Weibel (13.4070) postulates" of June 25, 2014, p.7	"The Internet has provided interested parties with the opportunity to create virtual communities on the net, and some of these communities have also created their own electronic means of payment, thereby creating a new form of money. A virtual currency is a digital representation of value which can be traded on the Internet and although it takes on the role of money – it can be used as a means of payment for real goods and services – it is not accepted as legal tender anywhere. These currencies have their own denominations. They differ from e-money in that they are not based on a

[46] Available at http://fincen.gov/statutes_regs/guidance/html/FIN-2013-G001.html.

	currency with legal tender status. Virtual currencies exist only as a digital code and therefore do not have a physical counterpart for example in the form of coins or notes. Given their tradability, virtual currencies should be classified as an asset."

ANNEX II – COMPUTER SOFTWARE: GOODS OR SERVICES?

Computer programs themselves, while self-evidently "things" in the lay sense, would appear to be neither choses in possession nor choses in action. A person's copyright in, or patent over, a program is—where available—a chose in action but this is distinct from a person's having general property in the software itself. English law does not appear to recognise a "computer program" as a "thing" at all and the expression is not defined.[47]

This lack of "thing-ness" is reflected in the judgment, 20 years ago, of Sir Iain Glidewell in the Court of Appeal in *St Albans City and District Council v International Computers Ltd* [1996] 4 All ER 481. In rejecting the idea that a computer program could be "goods" within the meaning of the Sale of Goods Act 1979 and/or the Supply of Goods and Services Act 1982, where "goods" are "all personal chattels other than things in action and money",[48] Sir Iain said (at p. 493), somewhat elliptically: "Clearly a disk is within this definition. Equally clearly, a program, of itself, is not." Here, he appears to have reached his conclusion not on the grounds that a program is an incorporeal "thing in action" (and so expressly excluded from the statutory definition of "goods") but rather on the grounds that a program is not a thing at all. He was persuaded, he said, by the view that software is merely "a set of instructions" for a computer, analogous to an "instruction manual on the maintenance and repair of a particular make of car", or an "algorithm" which, when encoded, enhances physical goods in the form of a computer disk.

Given that neither of the analogies favoured by Sir Iain seems to have kept pace with developments in computer software, it is pertinent to ask whether they remain apposite for the contemporary world. Today, millions of retail users can download programs or "apps" from the internet directly to mobile devices and anything which Sir Iain would have recognised as a disk is pretty much wholly obsolete. Moreover, the activity of providing or using just one software program can constitute the entire commercial strategy of a business. And, of course, there are virtual currencies, computer code written—or "mined"—purely for the sake of its intrinsic value to the user and not for its ability to regulate any hardware function or activity. These are radical changes which even the technology companies of the 1990s failed to predict.

47 See *Halsbury's Laws of England* (2013), Vol. 23, para. 617.

48 That is, under English Law. Section 18 provides "as regards Scotland" that "goods" also comprises "all corporeal moveables".

In 1999, for example, Microsoft wrote that the electronic delivery of progams would "never" entirely replace traditional delivery by disk.[49] They make Sir Iain Glidewell's characterisation of software programs as a mere "instruction manual" for hardware look a little out-dated.

It is, perhaps, also pertinent to ask whether a legal framework for the technology markets which does not recognise general property in a computer program may inadvertently be impeding the development of those markets—just as a failure to recognise property in credit might have impeded the development of the financial markets. Such enquiries are, however, beyond the remit of the FMLC and the scope of this paper.

The rejection of the idea that a computer program can constitute "goods" unless it is "locked in" to a disk or other medium has led some to take the view that the purchase of a computer program may be, in fact, a contract for the supply of services, at least for the purpose of applying tariffs to cross-border trade. In 1990s, CD-ROMs delivering computer software were classified as "goods" subject to the General Agreement on Tariffs and Trade ("GATT"). By 1999, however, it was clear that computer software would increasingly be transmitted by electronic means and a debate emerged about whether these transmissions should be regarded as services, subject to the General Agreement on Tariffs and Services ("GATS"), or as a new category of "virtual goods" subject to GATT, as intellectual property subject to the TRIPs Agreement on Trade-Related Intellectual Property, or as something else.[50]

Unsurprisingly, perhaps, Microsoft argued, in its 1999 white paper to the World Trade Organisation ("WTO"), that digitally delivered software should be classified exclusively as intellectual property, thus occupying a tariff-free zone.[51] This appears, broadly, to be the approach that prevailed at the WTO: encoded disks continue to qualify as "goods", along with certain other categories of software embedded in items of computer hardware; bespoke developer services qualify as "consultancy" and thus services and other kinds of digitally-delivered programs fall outside the tariff regimes except in so far as they constitute intellectual property.

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49 See Microsoft, "WTO and Electronic Commerce: Issues for World Trade" (September 8, 1999), at section I(E) (*Classification of Software*). The paper is available at: https://www.microsoft.com/issues/essays/1999/11-15wto-b.mspx.

50 Microsoft, *ibid*.

51 *Ibid*.

While Microsoft's preferred approach may be logical and even satisfactory from a fiscal perspective, it may need closer examination from the market perspective. A lack of general property in computer software prevents the transfer for value of any special property (other than intellectual property) in software. It prevents, for example, a business which has acquired from a developer a very expensive copy of a computer program assigning a security interest in that program to raise funds (unless it has also acquired the copyright). As technologies like blockchain and DLT improve developers' ability to privilege a single piece of code in the system in a way such that all other system participants can be required automatically to acknowledge individual "ownership" of that code, the notion that there is no general property in a digitally-delivered computer program starts to look less and less like a serviceable hypothesis on which to build a legal framework for the technology markets of the future.

Given this, the FMLC considers there to be a good arguable case for the legal recognition of general property in, at least, some computer programs or computer code. Further, in light of what is said above about transferability and value, the FMLC considers that, were there to be a re-consideration of computer code for the purposes of legal classification, virtual currencies would be a useful heuristic for that re-framing exercise.

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