5-2019

Property in digital coins

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Abstract

Digital coins have burst into mainstream awareness over the past year, mainly as a result of high-worth 'Initial Coin Offerings' ('ICOs'). The most immediate question in the legal treatment of digital coins is whether they are properly seen as digital 'commodities', and/or as 'securities', and/or as units of 'money'. But the conceptual underpinnings of these categories are not clear, nor is it clear how these categories relate to each other; no legal system currently deals adequately with *incorporeal objects* as objects of property law. This category includes not only digital coins but more conventional money and securities. Establishing a satisfactory account of their treatment in property law is therefore a necessary first step to incorporating digital coins into private law theory. I argue that this task best approached on the basis of a plausible ontology of incorporeal objects, including those embodied in paper (i.e. banknotes and conventional securities) and those that exist natively in 'cyberspace' (i.e. electronic 'book-money', modern securities, and now digital coins). We therefore urgently need to develop a plausible account of a how packets of data can be treated as an object of property rights. Using a comparative analysis of English law and Civilian law (particularly German) concepts of property as an entry point into this complex of problems, I explore the ontology of incorporeal objects and the role of documentation in their creation and maintenance as part of the 'ontic furniture' of our economic world. I explore the conceptual basis of property in digital coins in terms of a new category of property. Such a category is long overdue and will be increasingly important in the future.

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1. Introduction

This article explores the legal nature of the 'coins' issued in 'Initial Coin Offerings' ('ICOs'), with a focus on the question: What do I get, or *in what* do I get a right, when I purchase a 'coin' in an ICO? Although it is reflexive to ask at the outset whether a given class of digital coins are properly seen as 'money', 'securities', 'commodities' and/or some other legal category, my case is that such questions can only be addressed usefully once we have put a fix on how a digital coin is a legally cognizable object in the first place. In particular, it is essential to explain how a digital coin can be the object of property rights, as the law of property plays a foundational role in the broader scheme of private law that governs dealings between agents concerning things of value. As it is *prima facie* obvious by now that a digital coin should be an object of property rights as a matter of economic reality, the important question becomes one of explaining digital coins' legal mode of existence. In other words, before we tackle the question of a digital coin's 'money-ness' (for example) we should describe its 'thing-ness', and this article explores the conceptual framework for doing so.

The structure of this article is as follows. Section 2 frames the issue with a definition of digital coins and a brief overview of the kinds of coins currently circulating. It also surveys the kind of legal problems that might arise in the context of digital coins, and argues that the law's remedial response to all of these problems requires an object of property rights. This section is comparative, contrasting the approach in English law with that of certain Civilian jurisdictions, particularly Germany. Reference is made to the first major corporate insolvency proceedings implicating digital coins, which took place in Japan. This section provides a factual basis for, and justification of, the conceptual account that follows, which I believe should inform the development of new doctrinal categories. The law regulates new forms of social behavior reactively, following social and technological innovations. In times of rapid, fundamental change—as we are witnessing with the application of distributed ledger technology ('DLT') in commerce and finance—it is only by taking a basic point of departure that we can avoid applying over-deterministic legal categories to new technologies.

Section 3 sets out the common law position in relation to incorporeal objects of property rights in more detail. Digital coins would appear, at first blush, to fall within the English law category of choses in action, that is intangible personal property. This section brings into relief the historical and conceptual difficulties with that category, and argues that a more thorough-going reform is necessary. I argue that a more detailed view of the division within the category of choses in action between so-called documentary intangibles and

pure intangibles reveals that the ontology implicit within the conventional categories of the common law cannot accommodate digital coins adequately. While the traditional approach circumvents some difficulties associated with incorporeal objects of property, I argue that it neither does justice to conventional money or securities nor is capable of dealing with digital coins rationally. I therefore support recent calls for reform of English property law, and suggest even more fundamental reform of our catalogue.

Reforming a category of property law requires a basic consideration of the conceptual structure of property law itself. Section 4 marshals the conceptual resources necessary to develop a more ontologically sound concept of property in cyberspace, i.e. the legally relevant objects and events that take place and exist natively in a digital information system. This requires, above all, a more sophisticated understanding of the role of documentation in the construction of legal objects. I argue that we recognize incorporeal objects directly as objects of property rights. In the English idiom, this would probably be achievable by rationalizing personal property with a scheme of 'tangible personalty' and 'intangible personalty'. In the Civilian idiom, which traditionally distinguishes between *res corporales* (i.e. physical things) and *res incorporales* (i.e. reified rights), this would involve the creation of a third category of *res*, namely *res digitales*. On this view, a *res incorporales* might be 'embodied' in either a *res corporales* (paper) or in a *res digitales* (a digital document); developing rules for *res digitales* would then enable us to develop a rational scheme of operations governing how such a thing is created, maintained, and dealt with (e.g. transferred or stolen).

Section 5 concludes with an overview and a sketch of the problems that remain.

2. Framing the Issue

Before considering the legal treatment of digital coins, it is perhaps useful to consider how computer scientists think about digital objects. Satoshi Nakamoto's seminal whitepaper introduced the concept of a peer-to-peer payment using a 'blockchain' ledger kept across a network of computers.[1] The whitepaper uses a coin analogy that posits the registration of a new public key in the ledger as the 'transfer' of an object from one user to another:

> We define an electronic coin as a *chain of digital signatures*. Each owner transfers the coin to the next by digitally signing a hash of the previous transaction and the public key of the next owner and

[1] This structure is by now familiar: A set of data packets are created *ex nihilo*, and transactions are effected by combination of some of these data with a user's 'public key'—an identifier not unlike a user name or email address—to form the next block in a 'chain'. This record of transactions is stored across a network of computers ('nodes') to form a 'distributed ledger' in which each block is verified by nodes as it forms, using a combination of cryptography and game-theory incentives.

> adding these to the end of the coin. A payee can verify the signatures to verify the chain of ownership.[2]

The details vary from blockchain to blockchain, but this potted description is sufficient to frame the problem of conceptualizing a chain of digital signatures as an object of economic value whose manipulation in the information system has legal (or para-legal) consequences, namely a change of ownership.[3]

Computer scientists are used to creating systems of structured symbolic data such that certain packets of data behave, within the rules of the system, as objects.[4] But it is not straightforward what *kind* of objects they are—legally or metaphysically speaking. I will explore this question in further detail below; for now, however, it is sufficient to state the thesis that digital coins (and other apparent 'digital objects') are not 'just data' in the sense of mere information; they are structured in a way that makes them behave like objects, at least within certain data structures such as a game or a blockchain.[5] Further, it is neither necessary nor desirable to leave questions of entitlement to digital coins to the 'code' alone, as some have argued;[6] digital coins are objects of economic value and disputes will arise that must engage national legal norms.[7] It is imperative that national legal systems have an appropriate and well-considered response, and the foundation of that response is the private law of property.[8]

Practical issues with the legal treatment of digital coins

It is necessary to note that different ICOs issue coins of different types, with different economic uses. Although competing frameworks are being developed, we can observe (i) ICOs that intend to launch a private currency, or 'currency tokens'; (ii) ICOs that issue a

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[2] Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' (2009), available at https://bitcoin.org/bitcoin.pdf.

[3] Already a problem appears in this scheme: Actually, nothing *moves* at all, which makes this rather unlike the conventional notion of 'transferring': see David Fox, *Property Rights in Money* (Oxford 2008), para [5.25]. It is not even the case that one packet of data is moved from one storage medium to another; rather, data are changed in an account that is replicated across a number of storage media in different physical locations. I will explore this problem in more detail in a subsequent contribution on the concepts of possession, transfer, and negotiability in digital environments. See A.K.L. Milne, 'Argument by False Analogy: The Mistaken Classification of Bitcoin as Token Money' (November 25, 2018), available at SSRN: https://ssrn.com/abstract=3290325. See also J.S. Rogers, 'The New Old Law of Electronic Money' (2005) 58 *SMU Law Review* 1253 and Eva Micheler, *Property in Securities* (Cambridge 2003), 208 on 'possession' in the context of account-based systems, which may offer more fruitful analogies.

[4] See e.g. https://docs.oracle.com/javase/tutorial/java/concepts/object.html.

[5] Cf K.F.K. Low and E.G.S Teo, 'Bitcoins and Other Cryptocurrencies As Property?' (2017) 9 (2) *Law, Innovation and Technology* 235, 248.

[6] See e.g. Tatiana Cutts and David Goldstone QC, 'Bitcoin Ownership and its Impact on Fungibility' (Coindesk, 14 June 2015) www.coindesk.com/bitcoin-ownership-impact-fungibility/.

[7] See generally J.G. Allen and R.M. Lastra, 'Border Problems II: Mapping the Third Border' (UNSW Law Research Paper No. 18-88, January 1, 2018), available at SSRN: https://ssrn.com/abstract=3296614.

[8] K.F.K. Low and E.G.S Teo, 'Bitcoins and Other Cryptocurrencies As Property?' (2017) 9 (2) *Law, Innovation and Technology* 235, 250.

digital asset class for speculative investment, or 'security tokens'; (iii) ICOs that issue a kind of voucher for the delayed delivery of a good or service, or 'utility tokens'.[9] Further, not all digital coins are issued *via* an ICO process—so-called 'airdrops' and 'forks' are also significant. Consistent with my fundamental focus, I will use *digital coin* as an umbrella term for all types and will not differentiate between digital coins issued in an ICO or otherwise.[10]

As digital coins have gained the interest of a wider base of market participants and have come onto the radar of national regulators, they have been classified as digital commodities, as securities, and as units of money under prevailing laws. United States regulators, in particular, have been proactive about bringing digital coins within existing legal categories (and regulatory frameworks), casting the bulk of ICOs as securities issues and characterizing certain digital coins as digital commodities.[11] Of course, a digital coin's characterization under the prevailing law has important legal and regulatory implications. Besides money laundering, prudential, and capital markets regulation, characterization determines a digital coin's tax status, for example. To date, most attention has focused on questions of regulation rather than the nature of rights one can have in a digital coin.[12] But, while it may be essential to determine whether a digital coin is a commodity and/or a

[9] But see Apolline Blandin, Ann Sofie Cloots, Hatim Hussain, Michel Rauchs, Rasheed Saleuddin, Rasheed Saleuddin, J.G. Allen, Bryan Zhang, and Katherine Cloud, *The Global Cryptoasset Regulatory Landscape Study* (Cambridge Centre for Alternative Finance, forthcoming 2019), Part I on the limitations of this approach.

[10] I used 'digital token' in the first drafts of this paper, but, pending an enquiry into the different senses in which 'token' is used in computer science and in law (particularly payments law), I opted to use 'coin' instead. This emphatically does not endorse the notion that any digital coin has or ought to have 'money' status—on the contrary, as so many digital coins are obviously not money, adopting the parlance of the 'cryptocurrency' movement allows me to avoid conceding the token point just because I wish to avoid calling bitcoins 'coins'. On problems with the token analogy, see A.K.L. Milne, 'Argument by False Analogy: The Mistaken Classification of Bitcoin as Token Money' (November 25, 2018), available at SSRN: https://ssrn.com/abstract=3290325. For an analysis of bitcoins and money (also from a property perspective), see generally K.F.K. Low and E.G.S Teo, 'Bitcoins and Other Cryptocurrencies As Property?' (2017) 9 (2) *Law, Innovation and Technology* 235, 267 who argue that 'property rights over bitcoins may well represent a truly unique and novel form of property altogether, whereby the legal right is inseparable from its registration, here on the blockchain.'

[11] See Securities and Exchange Commission, Release No. 81207: Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934—The DAO' (25 July 2017), https://www.sec.gov/litigation/investreport/34-81207.pdf; US Commodities Futures Trading Commision, Release Number 7231-15 (17 September 2017), https://www.cftc.gov/PressRoom/PressReleases/pr7231-15; US Department of the Treasury FinCEN, FIN-2013-G001 (8 March 2013), https://www.fincen.gov/sites/default/files/shared/FIN-2013-G001.pdf; in *SEC v Trendon T. Shavers & Bitcoin Savings and Trust*, Case No. 4:13-CV-416 (US District Court, Eastern District of Texas, 18 September 2014), in which Mazzant J held that an investment of bitcoins was an investment of 'money' for the purposes of the test in *SEC v W. J. Howey Co*., 328 U.S. 293 (1946). By way of comparison see e.g. ASIC, 'INFO 225: Initial Coin Offerings' (4 October 2017), http://asic.gov.au/regulatory-resources/digital-transformation/initial-coin-offerings/. See also Reuben Grinberg, 'Bitcoin: An Innovative Alternative Digital Currency' (2012) 4(1) *Hastings Science & Technology Journal* 159, 161.

[12] See K.F.K. Low and E.G.S. Teo, 'Bitcoins and other cryptocurrencies as property?' (2017) 9(2) *Law, Innovation and Technology* 235, 236.

security and/or a unit of currency, the first stage of analysis is to clarify how a legal system takes cognizance of an objects that lives in 'cyberspace' at all.[13]

The basic assumption of this investigation is that a digital coin's characterization must proceed on the basis of a case-by-case investigation, and that prior to this investigation it is necessary to explore digital coins as objects of property rights more generally. To enquire into a digital coin's economic function we must first describe the *object* that has this or that economic function.[14] At base, this raises a question of property law: How should a digital coin be object of legal operations? Can it be 'possessed', 'owned', 'transferred', 'sold', 'gifted', 'abandoned', 'stolen', 'bailed', 'securitized', 'entrusted', or 'detained'? If so, how?[15]

Technologically-mediated social practices are complex activities that comprise social (including legal) and technological layers. A unit of money, for example, is a technological artefact (whether using metallurgy or digital computing) that accrues value when it is positioned within a community as an object of economic value.[16] Whether we are concerned with a virtual sword, 'real estate' bought and sold in a game-world, a quantity of frequent flyer miles, or a chain of digital signatures, technologically-mediated activities are part of the economy that legal systems are called upon to regulate. Legal problems arise when the rules of a technological system allow behavior that diverges from the real-world expectations of the (ultimately) human users of that system, whose interests the law serves (ultimately) to protect.[17]

What happens when the private keys kept by a 'crypto-currency' exchange on behalf of users are compromised, and transactions are approved using the blockchains consensus protocol that assign the 'chain of digital signatures' with the hacker's public key instead of mine? Can I seek a legal remedy such as conversion or detinue when another user 'takes'

[13] See e.g. D.R. Post, 'Law and Borders: The Rise of Law in Cyberspace' (1996) 48 *Stanford Law Review* 1367; David Koepsell, *The Ontology of Cyberspace* (Open Court 2000).
[14] Karl Olivecrona, *The Problem of the Monetary Unit* (Macmillan 1957), 10-11.
[15] See Sjef van Erp, 'Ownership of Digital Assets?' (2016) 5(2) *European Property Law Journal* 73, and Sjef van Erp, 'Ownership of Digital Assets and the Numerus Clausus of Legal Objects' (Maastricht European Private Law Institute Working Paper No. 2017/6, October 1, 2017), available at SSRN: https://ssrn.com/abstract=3046402 for an extended discussion, especially at 10 discussing *Your Response Ltd. v. Datateam Business Media Ltd.* [2014] EWCA Civ 281 and other cases involving the 'theft' of 'pure information'.
[16] See Tony Lawson, 'Comparing Conceptions of Social Ontology: Emergent Social Entities and/or Institutional Facts?' (2016) 46(4) *Journal for the Theory of Social Behaviour* 359 on the concept of 'positioning'; see in particular Tony Lawson, 'Social Positioning and the Nature of Money' (2016) 40(4) *Cambridge Journal of Economics* 961. Despite my broad preference for a Searleian approach to social ontology, and without prejudice to the details of that debate which bear on the issues set out here, Lawson's concept of 'positioning' well describes the psychological disposition involved in the creation of things like money and digital coins. See also Geoffrey Ingham, 'A critique of Lawson's 'Social Positioning and the Nature of Money' (2018) 42(3) *Cambridge Journal of Economics* 837 and Tony Lawson, 'The Constitution and Nature of Money' (2018) 42(3) *Cambridge Journal of Economics* 851.
[17] I say 'ultimately' because many of the subjects of law are not, in fact, human—consider only the role of corporations as rights-and-duties-bearing units and as the *loci* of legally cognisable interests.

my bitcoins by misusing my private key? What happens to my bitcoins when a 'crypto-currency' exchange files for insolvency? Both pragmatically and analytically, the *sine qua non* to determine the law's treatment of a digital coin is some kind of legally cognizable object—regardless of whether that object is ultimately characterized as a commodity and/or security and/or unit of currency: As Sjef van Erp argues, structured information can be acted upon in this way '[only] if it is qualified as a separate object as to which subjects can have legal relationships.'[18] This requires an explanation of the ontology of digital objects, which, if successful, should apply to a range of different types including digital coins. In my view, it is desirable to tackle the ontology of virtual objects as objects of private law head-on.

As digital coins present both novel problems and new variations on familiar themes, they provide a challenging and topical context for such an enquiry. An important parallel literature examines money and securities.[19] A significant literature also exists on virtual objects in computer games.[20] All of these literatures wrestle with the basic question whether we are really dealing with property at all. For example, there is a discussion afoot regarding the ownership of consumer data *qua* commodity; while the 'owners' of data are not without any rights, their legal position will be determined by contract, criminal, competition, intellectual property, tort, and privacy law, for example—'in currently applicable law there are no rules on a specific "property right" regarding data.'[21] End user license agreements ('EULAs') in online games, for example, stipulate that the game operator has exclusive control and ownership of the game, and that virtual items in-game have no legal significance or status.[22] On this approach, the nature of a virtual house should not even arise because the legally relevant problem is one of contract, not property law. This approach, however, rather circumvents than answers questions about the ontology of virtual objects. Whether or not they can be avoided in the context of games, they certainly

[18] Sjef van Erp, 'Ownership of Digital Assets?' (2016) 5(2) *European Property Law Journal* 73, 74.
[19] See in particular David Fox, *Property Rights in Money* (Oxford 2009); Eva Micheler, *Property in Securities* (Cambridge 2003); Simon Gleeson, *The Legal Concept of Money* (Oxford 2018).
[20] See e.g. J.A.T. Fairfield, 'Virtual Property' (2009) 85 *Boston University Law Review* 1017.
[21] Daniel Zimmer, 'Property Rights Regarding Data' in Sebastian Lohsse, Reiner Schulze, Dirk Staudenmayer, *Trading Data in the Digital Economy: Legal Concepts and Tools* (Nomos 2017), 103. See also P.B. Hugentholty, 'Data Property in the System of Intellectual Property Law: Welcome Guest or Misfit?' in the same volume at 75; Josef Drexl, Reto M. Hilty, Luc Desaunettes, Franziska Greiner, Daria Kim, Heiko Richter, Gintarė Surblytė and Klaus Wiedemann, 'Data Ownership and Access to Data: Position Statement of the Max Planck Institute for Innovation and Competition of 16 August 2016 on the Current European Debate' (Max Planck Institute for Innovation & Competition Research Paper No. 16-10, August 16, 2016), available at SSRN: https://ssrn.com/abstract=2833165.
[22] See e.g. Ronan Kennedy, 'Virtual rights? Property in online game objects and characters' (2008) 17(2*) Information & Communications Technology Law* 95.

have to be answered if we wish to understand legal relations concerning things like book-money, electronic securities, consumer data *qua* commodity—and now digital coins.[23]

The Mt. Gox insolvency

In a comparative perspective, Common Lawyers seem fairly well-placed to approach digital coins, as the common law is used to recognizing intangible things as objects of property rights. While Continental lawyers have generally proceeded from strict *a priori* definitions of the objects in which property rights (especially the right of ownership) can be had, common lawyers have eschewed any kind of rigid (or consistent) taxonomy in favour of a historical and contextual approach.[24] To the common law mind, a digital coin looks a lot like a chose in action, not least because most digital coins function as the economic analogue of securities such as company shares (which are traditionally considered choses in action by English law).[25] A chose in action is a reified right, i.e. a legal right (the 'action') that is treated by the law *as if* it were a thing. As I elaborate in Section 4, this impulse pushes us in the right direction—but not far enough. There are historical and conceptual problems with the category that call for a rationalization of the common law catalogue of property, and for direct conceptual engagement with the nature of incorporeal objects of property in the common law.[26] More importantly, it is plausible that some digital coins may not constitute rights, and so could not fit into the pattern of reified rights at all.[27]

[23] I use money as an example for discussion throughout this article, both because digital coins have been argued to be a new form of money, and because money provides a useful point of triangulation. I also draw parallels with conventional securities. I do not make any definitive claims about any digital coin's money or security status in any jurisdiction.

[24] See Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 197, 213.

[25] This is the position taken in the US, in particular. The Securities Exchange Commission has held that certain digital coins constitute securities under the US definition of the term: see e.g. SEC Release No. 81207, 'Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO' (25 July 2017), https://www.sec.gov/litigation/investreport/34-81207.pdf; see also the public statement of Chairman Jay Clayton, https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11.

[26] Michael Bridge, for example, suggests abandoning the dichotomy between choses in action and choses in possession and instead distinguishing between tangible and intangible personal property: see Michael Bridge, *Personal Property Law* (Fourth Edition, Oxford University Press 2015), 16.

[27] Bitcoins, for example, are not straightforwardly rights, because there is no obvious obligor on the Bitcoin blockchain. Bitcoins would appear to be either digital objects in their own right, or nothing at all. The Commodities and Futures Trading Commission has consistently taken the position that bitcoin and certain other digital coins are a commodity covered by the Commodity Exchange Act: see *In re Coinflip, Inc.*, CFTC No. 15-29, 2015 WL 5535736 (17 September 2015), https://www.cftc.gov/sites/default/files/idc/groups/public/@lrenforcementactions/documents/legalpleading/enfcoinfliprorder09172015.pdf; see also *CFTC v. McDonnell*, No. 18-CV-361, 2018 WL 1175156, (E.D.N.Y. 6 March 2018) in which Weinstein J held at 1 that 'A "commodity" encompasses virtual currency both in economic function and in the language of the statute.' For federal taxation purposes, the IRS has notified that digital coins will be treated as property: IRS Notice 2014-21, https://www.irs.gov/pub/irs-drop/n-14-21.pdf. More recently, Chairman Jay Clayton has publicly opined that some digital coins (bitcoins in particular) are rather commodities than securities: see https://www.cnbc.com/video/2018/06/06/sec-chairman-cryptocurrencies-like-bitcoin--not-securities.html.

The problems with the English position will take some time to unpack, but the situation is also problematic in other jurisdictions. This is illustrated by the notorious Mt. Gox insolvency proceedings in Japan.[28] For a time, Mt. Gox was the largest exchange for bitcoins and other digital coins, by some estimates accounting for almost 80% of global transactions.[29] Following an alleged hacking event, in which 850,000 bitcoins were 'lost' or 'stolen', Mt. Gox filed for insolvency in the Japanese courts. About 200,000 bitcoins were subsequently 'found' in the company's computer system.[30] Subsequently, one bitcoin 'owner' filed a claim against the trustee in bankruptcy for repayment of his bitcoins. The court dismissed the claim, however, on the basis that bitcoins were not things capable of ownership: Article 85 of the Japanese Civil Code defines 'things' capable of ownership as *tangible* things.[31] Judge Masumi Kurachi held that the Japanese law only allows for ownership of tangible entities that occupy space and which allow for exclusive control.[32] In consequence, none of these creditors could get a proprietary remedy—they had to take part in the insolvency proceedings as unsecured creditors with a money claim assessed at the date of insolvency. At the then valuation of US $550 per bitcoin, these contested bitcoins represented about US $110 million in value; at the peak value of almost US $20,000 per bitcoin in late 2017, they were nominally worth about US $4 billion. At the time of writing, bitcoins were trading at about US $6,300,[33] which would still leave the company's shareholder with a huge windfall.

The Mt. Gox example shows two things. First, it shows that the technical details of how things like bitcoins are 'stored', 'lost', 'found', and 'stolen' require careful consideration. These legal operators are part of a legal logic that evolved to regulate *human* agents' use of *physical* assets. We can apply them by analogy to 'data driven agents' and incorporeal

[28] See e.g. Justin Sabin and Bruce Suzuki, 'The Magic of Mt. Gox: How Bitcoin Is Confounding Insolvency Law', http://bankruptcycave.com/the-magic-of-mt-gox-how-bitcoin-is-confounding-insolvency-law/.

[29] See Takashi Mochizuki and Eleanor Warnock, 'Mt. Gox Shows Bitcoin's Growing Pains' (Wall Street Journal, 17 February 2014), https://www.wsj.com/articles/bitcoin-platform-mt-gox-apologizes-for-delayed-response-1392636011.
Travails Illustrate Market's Convulsions as First Generation of Companies Trading the Virtual Currency Face Challenges' (WSJ 17 February 2014), https://www.wsj.com/articles/bitcoin-platform-mt-gox-apologizes-for-delayed-response-1392636011. Mt Gox is a neologism formed from the name of the game 'Magic: The Gathering' and 'exchange', underscoring the connection between game-world virtual objects and virtual objects that are ascribed 'real world' economic value.

[30] This begs the question of how bitcoins are lost or stolen—'possession' of a bitcoin means having control of the private key that allows a computer node to project a change to the blockchain that will be verified by other nodes following the proper mathematical protocol of the governing software. So the loss or theft of a bitcoin means the loss or theft of a password, in effect, and the rediscovery of a bitcoin finding the private key associated with the relevant chain of digital signatures.

[31] See http://www.japaneselawtranslation.go.jp/law/detail/?id=2057&vm=04&re=02.

[32] An English paraphrase translation of Judge Kurachi's decision, edited by Megumi Hara, Charles Mooney, and Louise Gullifer, is now available here: https://www.law.ox.ac.uk/research-and-subject-groups/digital-assets.

[33] https://www.coindesk.com/price/, accessed 14 June 2018. Since writing and publication the value of bitcoins has fallen further.

objects like digital coins, but we should do so not as an alternative to understanding the 'space' they inhabit. Rather, these analogies must proceed on the basis of a concept of cyberspace as a *situs* of legally relevant objects, events, and actions.[34]

Secondly, a number of European jurisdictions have the same dogmatic concept of property ('*Sachbegriff*') on which the Japanese law was modelled.[35] The German Civil Code §90, for example, defines 'things' [*Sachen*] according to the Pandectist interpretation of Gaius' *Institutes*, i.e. as corporeal objects [*körperliche Gegenstände*] only. However, other provisions of German property law have as their object not *Sachen* but 'objects' [*Gegenstände*] generally. The term *Gegenstand* has been interpreted to include incorporeal objects such as security rights which are, thereby, effectively treated as objects of property law.[36] While this does not exactly do violence to the language—words mean, after all, whatever we agree they do—it is not intuitive why we should think of a security interest as a *Gegenstand* but not a *Sache*.[37] While this has the practical effect of making rights objects of *Sachenrecht* (although they are no *Sachen*), it comes at the cost of systemic coherence.[38] The Mt. Gox example therefore shows that important European jurisdictions have property law regimes that have a fundamental, indeed axiomatic, hurdle to recognising objects that exist only in cyberspace as objects of property law, and will produce outcomes that are at odds with the reasonable expectations of market participants

[34] See Philip Brey, 'The Social Ontology of Virtual Environments' (2003) 62(1) *American Journal of Economics and Sociology* 269.

[35] Germany, Greece, Portugal, the Netherlands, Hungary, and Poland, for example, all adopt a definition of 'thing' and 'ownership' whereby only physical objects can be 'owned': see Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 321. Non-physical objects can be the subject of other property rights, but not the right of ownership (as understood in the Civilian legal systems).

[36] See §1273 German Civil Code. Further, as Eva Micheler has pointed out, a sub-regime exists in German law under the *Depotgesetz* which effectively deals with many of the practical issues of securities holding: See generally Eva Micheler, *Property in Securities* (Cambridge University Press 2003). However, I find it undesirable to deal with securities on the basis of a special regime that is at odds with the fundamental principles of a jurisdiction's property law; further, I find it less attractive to deal with different incorporeal objects such as securities, money, and digital coins in separate property regimes than to develop a coherent over-arching framework.

[37] The term *Gegenstand* means literally 'object' and refers to anything that 'stands opposite' the observing subject. It can, therefore, effect a bit of nominalist alchemy to the extent that anything I perceive is *ipso facto* a *Gegenstand*, and this makes the term conceptually broad enough to cover invisible, intangible creatures of a legal order such as security interests. The term *Sache* appears to derive from the Old High German root for a legal conflict or contest, and to have been used first in Middle High German for 'thing' (see Gerhard Köbler, *Etymologisches Rechtswörterbuch* (Mohr 1995), 348). The Prussian Civil Code (1794) §1 defined *Sache* nominalistically as 'everything, which can be the object [*Gegenstand*] of a right or obligation', and §2 expressly included 'the dealings of persons and their rights, insofar as they constitute objects of another right'. See G.L. Gretton, Ownership and its Objects' (2007) 71 *Rabels Zeitung* 802, 808. The dogmatic definition of *Sachen* as physical objects is, according to Gretton, a 19th century innovation of the German Pandectists.

[38] In more than a century since the passage of the Code, the German literature seems not to have produced a satisfactory answer so much as gotten bored with the question: G.L. Gretton, 'Ownership and its Objects' (2007) 71 *Rabels Zeitung* 802, 821.

and encourage jurisdictional arbitrage. Within the context of the European insolvency regime, for example, such divergences are undesirable from a legal policy point of view.

As Eva Micheler explains, the situation was not always thus in German law, and there are historical antecedents that offer resources for the future development of these Civilian codes.[39] Devices such as legislative stipulations that so-called 'register goods' are 'goods' might also offer an approach to dealing with incorporeal objects of property rights.[40] But, while less acute in the non-Pandectist Civilian jurisdictions, difficulties appear everywhere.[41] French law, for example, makes obligations and actions such as company shares 'moveable property' by legislative fiat.[42] Generally, while these legal systems manage to accommodate incorporeal objects, jurists have not explained those accommodations very well in theoretical terms; they have, instead, created *ad hoc* compromises between systemic coherence and economic pragmatism. It is unclear why a right should be 'moveable', for example—a right is non-spatial. Christian von Bar explains:

> To state that purely normative objects are protected by property rights all across the European Union is one thing; to gather and categorise them is another… In many jurisdictions there is not even a linguistic framework for describing and categorizing 'immaterial' objects, even for internal purposes. That is not just the case [in jurisdictions] where the conceptual definition of a 'thing' is limited to corporeal objects, which invites one to throw everything else in a separate residual category… It is also the case in jurisdictions where… jurists are obliged [by the relevant codification] to allocate purely normative objects to the binary categories of moveable and immovable property. At least linguistically it is impossible to 'move' claims and other rights or to keep them still.[43]

Against this background, it is no surprise that one recent French commentator labelled bitcoins *objets juridique non identifié*.[44] This could encourage jurisdictional arbitrage and undermine efforts towards legal harmonization. It is an unhappy state of affairs because digital incorporeal objects now account for the lion's share of the global financial economy. The opportunity to think carefully about the nature of incorporeal objects, their relation to corporeal objects, and their relation to the documents that record their existence, should thus be welcomed.

A new category of property?

[39] See Eva Micheler, *Property in Securities* (Cambridge 2000), Ch 9 for a historical overview of the development of German and Austrian law from the 18th century.
[40] But see Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 174, 200.
[41] See e.g. Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 130-132 on the Italian and Spanish law of *cose* and *beni* and *cosas* and *bienes* respectively.
[42] '*Par la détermination de la loi*': see Article 529 *Code Civil*.
[43] See Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 311, 314-315.
[44] See Myriam Roussille, 'Le Bitcoin: Objet Juridique Non Identifié' (2015) 159 *Banque & Droit* 27; Iris Barsan, 'Legal Challenges of Initial Coin Offerings (ICO)' (2017) 3 *Revue Trimestrielle de Droit Financier* 54.

When confronted with an entity that defies straightforward placement in our catalogue of all that exists and is the case, we have three options: (i) we can deny the intuitive fact that it exists (i.e. that it is a legally cognizable entity) at all; (ii) we can shoehorn it into an existing category; or (iii) we can reform our catalogue. As a general principle, it is undesirable for the law to diverge too far from the expectations of the community that uses it,[45] so I reject (i) as a viable approach. While 'bodging' what we've got is a serviceable approach in many cases, there is no guarantee that our existing categories (whether the chose in action for English law, or the *Gegenstand* for German law, or the notion of register goods) will provide a rational framework for digital coins, and we may be trapped in the path-dependencies of our legal system's inherited categories before an optimally rational solution is achieved.[46] This cautions against (ii). I would therefore advocate for option (iii). In my view, adjusting private law specifically to make space specifically for incorporeal objects[47] would not only help us to describe the legal nature of digital coins, it would also make our law of property in general more future-ready.

Any new juridical category must rest on a solid conceptual foundation. The effort to conceptualize digital coins should therefore be part of a collaborative one involving philosophers, historians, economists, and lawyers from different jurisdictions. The danger for lawyers is that, if we analyze digital coins only under our own national law currently in force, we will encourage jurisdictional arbitrage and forum shopping by market participants. This is unavoidable, but it should be mitigated. Likewise, legal academics working only on questions of national law will produce a literature that speaks at cross purposes and/or analyses an empty matrix.[48] That is the contribution that legal theory has to make to assist both practicing lawyers and economists in their respective tasks. Thus, while I focus on English property law in the balance of this paper, much of my analysis applies *mutatis mutandis* to other European legal systems.

[45] See Shawn Bayern, 'Dynamic Common Law and Technological Change: The Classification of Bitcoin' (2014) 71 *Washington & Lee Law Review Online* 22, 34.

[46] The path taken by a legal system is heavily informed by its historical categories and institutions. English law's catalogue of property, for example, is an old one whose basic structure grew organically in the feudal period; its major refinements happened in the 18th and 19th centuries in the era of paper documents, and its approach to the dematerialization of financial instruments is informed by that background. See Eva Micheler, 'English and German Securities Law: A Thesis in Doctrinal Path Dependence' [2007] *Law Quarterly Review* 251.

[47] In the initial drafts of this paper I used the term *immaterial objects*. However, the concept of 'materiality' is difficult; there are some senses in which non-physical objects are 'material', and there are also some senses in which physical objects (which reduce ultimately to particles and forces described by the physical sciences) are not 'material' and therefore nothing is. I thank Tony Lawson for discussions on im/materiality as part of the Cambridge Social Ontology Group.

[48] See Ed Howden, 'The Crypto-Currency Conundrum: Regulating and Uncertain Future' (2015) 29 *Emory International Law Review* 741, 761.

3. English Law's Conventional Ontology of the Invisible

Digital coins cannot be seen or handled. In one sense, a digital coin on a distributed ledger exists everywhere and nowhere: everywhere because it is stored on all the nodes of the relevant network, and nowhere because no one node is (alone) authoritative or dispositive of its existence. (One node could be destroyed, for example, without loss of the coin.) On the other hand, digital coins can be dealt with, manipulated, and 'moved' in cyberspace, i.e. between different users' accounts.[49] This raises problems if we wish to take an ontological realist stance towards them. Intuitively we want to say that these things are 'real', that they truly exist, but it is difficult to explain how and why that is the case. Non-spatio-temporal objects that consist of structured symbolic data only exist to the extent that we perceive them to exist. But to say that something exists we tend to insist that it must be independent of human perception and intention—perceptions and intentions are part of ourselves, not part of reality.

Rather than from our existing legal categories, therefore, I think it is worthwhile to start out enquiry from the intuitive fact that objects exist and assume a social—including economic and legal—reality when a community of people treat them as real. As Adolf Reinach observed in his examination of the *a priori* foundations of civil law, we create incorporeal objects all the time through our intentional conduct in the world:

> The concept of a thing [*Sache*] in no way coincides with that of a bodily object, even if positive enactments [such as the German Civil Code] would restrict it to this. Everything which one can 'deal' with, everything 'usable' in the broadest sense of the word, is a thing: apples, houses, oxygen, but also a unit of electricity or warmth, but never ideas, feelings, or other experiences, number, concepts, etc.[50]

This is obviously a much broader *Sachbegriff* than that taken by the German Civil Code, and it is arguable over-broad.[51] Digital coins, again, present an instance of a longstanding problem, for many of the familiar features of economic and legal reality are just as invisible

[49] They can also be moved around in physical space, i.e. through movement of the hard disk or other 'cold storage' device on which the private keys are kept, but this kind of movement is generally less important to their conceptual analysis. In this context, digital coins again raise old questions in a new technological context: see P.J. Rogers, 'The Situs of Debts in the Conflict of Laws—Illogical, Unnecessary and Misleading' (1990) 49(3) *Cambridge Law Journal* 441, arguing that a debt does not need a physical location for the purpose of conflicts rules and should not be given one.

[50] Adolf Reineich, 'The *A Priori* Foundations of Civil Law' (1983) 3 *Aletheia* 1, 53; see also Barry Smith and Leo Zaibert, 'Real Estate: The Foundations of the Ontology of Property' in Heiner Stuckenschmidt, Erik Stubkjaer, and Christoph Schlieder (eds.), *The Ontology and Modelling of Real Estate Transactions* (Ashgate 2003), 52.

[51] On whether energies, for example, are properly seen as 'things'. Christian von Bar argues against recognising electricity and heat as objects of property rights: see Christian von Bar, *Gemeineuropäisches Sachenrecht* (C.H. Beck 2015), 166. However, as I explain below, this does not preclude the '*Sachqualität*' of other intangible objects. In other respects, Reinach's and von Bar's approach overlap in their essentially phenomenological approach; when an object is *treated* as a legal 'thing', it becomes one.

and intangible as digital coins. Barry Smith uses the example of collateralised debt obligations ('CDOs') to illustrate the point. CDOs are not straightforward physical, spatial entities; they cannot stand in ordinary relations of cause and effect; they cannot be picked up or put down. Yet they are not purely conceptual or abstract entities, either—a CDO exists, and its existence is part of history, tied to time and change. A CDO is ontologically queer: it appears, on the one hand, as an abstract mathematical object like a number that can be sliced, diced, and moved around frictionlessly; on the other hand, it behaves much like a tangible thing as an object of legal relations.[52] Similar observations could be made of other securities,[53] or of the apparent 'money' in my bank account (or my bank's 'money' with the central bank). Digital coins simply bring these problems to a head in a new technological and economic context.[54]

It is important to remember that the law is instrumental in creating many of these objects. Indeed, the law's incorporeal specimens are central to the existence of an advanced economy. As Uskali Mäki observes, the 'ontic furniture' of the economic world consists, in large part, of legally constituted thing like markets, money, prices, households, firms, banks, governments, property rights, commodities, wages, taxes, debts, and interest.[55] Thus, legal theory in fact has a foundational role to play in constituting, and explaining the constitution of, economics' subject matter. *Prima facie*, all objects in the economy from parcels of land to derivatives should fit within an ontology of things capable of constituting 'property'—or, in the Civilian idiom, meeting the conceptual definition of a 'thing' capable of being the object of property rights. But, as von Bar's observation above makes clear, private law theory has not yet explained how the law creates property out of thin air, simply by declaring that it something exists and is 'property'.[56]

The English lawyer's Wunderkammer[57]

[52] See Barry Smith, 'How to Do Things with Documents' (2012) 50 *Revisti di estetica* 179, 179.
[53] 'Securities represent a category of intangible concepts and abstract notions. The word is not linked per se to the image of a tangible object or to a specific physical manifestation of reality—which is precisely why such legal systems employ quite complex mechanisms to define and identify the characteristics of securities.' Giuliano Castellano, 'Towards a General Framework for a Common Definition of "Securities": Financial Markets Regulation in Multilingual Contexts" (2012) Uniform Law Review 449, 461.
[54] See Barry Smith, 'Aristotle, Menger, Mises: an essay in the metaphysics of economics' in Bruce Caldwell, *Carl Menger and his Economic Legacy* (Duke University Press 1990), 263.
[55] Uskali Mäki, 'Scientific realism as a challenge to economics (and vice versa)' (2011) 18(1) *Journal of Economic Methodology* 1, 8; see also Uskali Mäki, 'Scientific Realism and some Peculiarities of Economics' in R.S. Cohen, Risto Hilpinen, and Qui Renzong (eds), *Realism and Anti-Realism in the Philosophy of Science* (Kluwer 1996).
[56] This is the case, for example, in strata title systems, which define a set of geographical coordinates above the surface of the earth and treat that parcel as a piece of real estate: See Kevin Gray, 'Property in Thin Air' (1991) 50(2) *Cambridge Law Journal* 252. It is equally, if less obviously, the case with every other kind of property in my view.
[57] For a marvellous description of the Renaissance *Wunderkammer*, see the introduction to Jessie Hohman and Daniel Joyce (eds.), *International Laws Objects* (Oxford 2019).

Every legal system contains an implicit ontology of what exists, in the sense of both positing what exists and the relation between different things that exist. Legal systems—even common law legal systems, albeit to a lesser extent—distinguish systematically between 'persons' (actors, agents, subjects of the law), 'things' (objects of the law which are acted upon), and 'rights' (legal positions between persons *vis-à-vis* each other and things).[58] Although not entirely without difficulty,[59] these axiomatic categories must structure whatever conceptual scheme we develop for digital coins, at least at the heuristic level.

The ontology of the common law posits a fundamental distinction within objects between things 'real' and things 'personal'. Things real paradigmatically relate to land. However, they also include 'incorporeal hereditaments', a raft of intangible objects of significance in the feudal system that were treated *like* land for purposes of the law of succession. Many incorporeal hereditaments are defunct, e.g. 'advowsons' and 'corodies', but there are also some modern-sounding things such as franchises, offices, and rights of way—though their social, economic, and political role has changed. William Blackstone described incorporeal hereditaments as things that are 'not the object of sensation, and can be neither seen nor handled', as 'creatures of the mind, [which] only exist in contemplation'; an incorporeal hereditament, he said, was 'a right issuing out of a thing corporate', whether real or personal (or moveable or immoveable); not the same as the thing but 'collateral thereto'.[60]

> In short, as the logicians speak, corporeal hereditaments are the substance, which may always be seen, always handled: incorporeal hereditaments are but a sort of accidents, which inhere in and are supported by that substance; and may belong, or not belong to it, without any visible alteration therein.[61]

As Przemyslaw Palka notes, the English taxonomy of property law uses a 'positive-negative dualist' logic, i.e. positing things real as a primary category and lumping everything else into a residual category—personal property.[62] Personal property is, in turn, classified according to a dichotomy: every 'thing personal' is either a 'chose in possession' or a 'chose in action'; the classical view is that '[t]he law knows no *tertium quid* between the two.'[63]

Digital coins as choses in action?

[58] See Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 128.
[59] I have in mind particularly the bleeding between the categories of rights and things, which choses in action and *res incorporales* (in the Gaian sense, though not the Pandectist sense) demonstrate. Quasi-agentive algorithms in the future will problematize the distinction between persons and things.
[60] William Blackstone, *Commentaries on the Laws of England Volume 2* (Clarendon Press 1766), 17, 20.
[61] William Blackstone, *Commentaries on the Laws of England Volume 2* (Clarendon Press 1766), 17, 20.
[62] Przemyslaw Palka, 'Virtual property: towards a general theory' (PhD Thesis, EUI Florence 2017), 150, cadmus.eui.eu/handle/1814/49664. See also
[63] *Colonial Bank v Whinney* (1885) 30 Ch. D. 261 (Fry L.J.), affirmed in *Colonial Bank v Whinney* (1886) 11 A.C. 426.

From a modern viewpoint, the sub-category of choses in action appears as the most obvious place to park digital coins in English law, not least because it already contains many conventional securities and, technically, banknotes and book-money.[64] Four anomalies, however, caution against doing so unreflectingly. First, choses in action were traditionally non-assignable, whereas digital coins (and many other digital incorporeal objects) are meant to be hyper-negotiable. It is necessary to consider the historical foundations of our legal categories to ensure that path-dependencies exist do not impair the law's future operation. Secondly, both choses in action and incorporeal hereditaments are incorporeal, but they straddle English property law's basic dichotomy of real and personal property. This is not necessarily problematic, but it is odd that a classification of things by type should treat some incorporeal objects as tantamount to land and others as tantamount to chattels, and perhaps points to the general serviceability of the system. Thirdly, choses in action look a lot like *rights* being treated *as if* they were *things*. This requires some explanation and is problematic from certain dogmatic perspectives, especially in certain Civilian legal systems. Finally (and conversely) some digital incorporeal objects are *not* rights being treated as objects—a bitcoin, for example, does not represent the obligation of any person, and thus cannot be straightforwardly considered a chose in action.[65] Other digital coins, so-called security tokens, do embody a right, and do fit the chose in action mold; we should, however, not ignore the common properties that bitcoins and those other digital coins share, at least at this fundamental level of analysis.

Choses in action may not be a very comfortable one to park digital coins, in any case. The category was originally a very restrictive one: a chose in action was originally a thing that could not be 'possessed' (i.e. held and moved or placed physically), but could only be 'had' in the course of legal action, such as the right to sue on a debt, e.g. in tort. Importantly, the existence of a chose in action was conceptually rooted in the law of bi-lateral obligations, not the *erga omnes* rights of property law. *Pace* Blackstone:

> [W]hile the thing, or its equivalent, remains in suspense, and the injured party has only the right and not the occupation, it is called a *chose* in action; being a thing rather *in potentia* than *in esse:* though the owner may have as absolute a property in, and be as well entitled to, such things in action, as to things in possession.[66]

For this reason, choses in action remained categorically non-transferable until well into the 19th century. Over the centuries, the category expanded to include rights arising from contract, debt, and property as well as tort. It is now extremely wide, but this is due to its

[64] See H.W. Elphinstone, 'What is a Chose in Action?' (1893) 9 *Law Quarterly Review* 311.
[65] See E.F.K. Low and E.G.S. Teo, ‚Bitcoins and Other Cryptocurrencies As Property?' (2017) 9 (2) *Law, Innovation and Technology* 235, 247.
[66] William Blackstone, *Commentaries on the Laws of England Volume 2* (Clarendon Press 1776), 398

use as a catch-all rather than principled development. Indeed, its development to a species of property was convoluted, bound up with the procedural law, the offences of maintenance and champerty, and the interplay between contract, land law, and tort in both law and equity.[67] Further, despite a constant instinct to reconcile the two categories of incorporeal objects, incorporeal hereditaments and choses in action remain distinct in the modern law.

The role of documentation

In the 16th century, the 'chose' in the chose in action transmuted from the *right* to bring an action to the *document* that evidenced that right. Perhaps it is more accurate to say that the two were conflated. William Holdsworth explained in the early 20th century that, once this device was used, '[it] became inevitable that the many new documents which the growth of the commercial jurisdiction of the common-law courts was bringing to the notice of the common lawyers should be classified in this category.'[68] Thus, during the 17th, 18th, and 19th centuries, financial documents such as negotiable instruments, stock, shares, policies of insurance, and bills of lading were declared by the courts to be choses in action. All of these new choses in action were fundamentally obligational in nature, and their reification was instrumental in creating a capital market in which they could be transferred as objects of commerce. The novation of obligations is more complicated than the transfer of property, so the reification of an obligation and its enclosure in a written document eased the movement of capital in secondary markets.[69]

Although they rightly brought attention to the role of documentation in the constitution of legal objects such as shares, these developments did not assist the rationalization of the law. English law now distinguishes within choses in action between *documentary*

[67] W.S. Holdsworth, 'The History of the Treatment of "Choses" in Action by the Common Law' (1920) 33(8) *Harvard Law Review* 997, 1000, 1012, 1029.
[68] W.S. Holdsworth, 'The History of the Treatment of "Choses" in Action by the Common Law' (1920) 33(8) *Harvard Law Review* 997, 1011.
[69] One of the biggest difficulties in the evolution of highly liquid financial instruments of the kind we know today is the general principle that *nemo dat quod non habet*, i.e. no-one can give what he does not have. The modern position is that property in negotiable instruments passes with possession: 'A bill of exchange is like currency. It should be above suspicion.' *Arab Bank v Ross* [1952] 2 QB 216, 227 (CA) (Denning LJ). Negotiability, however, was a long time coming and its role is generally not well understood. Modern lawyers generally take the need for negotiable paper instruments too much for granted; many early systems in fact used book-entry to record ownership of equity or debt securities, and many early note systems were not negotiable in the modern sense: See J.S. Rogers, 'Negotiability, Propety, and Identity' (1990) 12 *Cardozo Law Review* 471; see also J.S. Rogers, 'The Myth of Negotiability' (1990) 31 *Boston College Law Review* 265, 275-277: 'In late nineteenth and early twentieth century works, negotiable instruments are distinguished from other forms of contract by distinguishing *negotiability* from mere assignability or transferability. In the eighteenth and early nineteenth century works, negotiable instruments are distinguished from other forms of contracts by distinguishing their *assignability* from the general common law rule proscribing the assignment of a chose in action and by distinguishing the characteristic presumption of consideration, which negotiable instruments share with deeds and other specialties, from the requirement for proof of consideration for other simple contracts.'

intangibles and *pure intangibles.* Documentary intangibles are 'mere rights' 'enclosed in and represented by a paper'—but in virtue of this enclosure, they are essentially treated like tangible chattels. Arianna Pretto-Sakmann explains:

> The right is patently intangible, the paper tangible. The phrase 'documentary intangibles' classifies such rights as tangible, on the strength of the tangible document, in contrast to 'pure intangibles'. Strictly speaking, an intangible is something which is not cognisable with the sense of touch. Logically, there cannot be different degrees of intangibility. However, graduations may be acceptable on the empirical level. A true documentary intangible is one in which the paper is seen as having the value of the right in which it is embodied, while a documented intangible is a right merely evidenced in a paper. We can say that documentary intangibles are corporeals in a diluted or extended sense. A synonym of 'documentary intangible' is 'document of title'. […] When the document is equated with and embodies the right to the goods it behaves like a chattel. Delivery, with any necessary endorsement, will transfer to the deliveree legal title to the embodied right. Misappropriation of the document falls within the tort of conversion, just in the same way as misappropriation of a bicycle.[70]

To work by analogy with the law of money, the orthodox position is that 'money' is coins and banknotes and that these are, for legal intents and purposes, to be treated as physical chattels. In this way, the difficulties of applying the elements of the tort of conversion (for example) to a non-spatio-temporal object (i.e. a dollar) are avoided—the tort, adapted to tangible personal property, bites on the banknote.

In light of with my observations in Section 2, however, this renders the current law even less capable of accommodating digital coins. There are at least three problems, which money again brings into relief. First, modern ('fiat') coins and banknotes are in fact promissory notes,[71] and the bulk of the modern money supply consists of demand deposits recorded on commercial banks' electronic ledgers.[72] Treating money as chattels effectively ignores this fact, and simply fails to say very much about the most important features of modern money. Central bank reserves held by commercial banks present similar issues.

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[70] Arianna Pretto-Sakmann, *Boundaries of Personal Property: Shares and Sub-Shares* (Bloomsbury 2005), 73-74. In connection with money, the elided passage reads: 'English law has long engaged in this extension. As early as the Middle Ages the first intangibles to be made tangible were *créances* (debts) represented by wooden tallies. A tally was a 'wooden' intangible and as such a 'documentary' intangible *ante litteram*.'

[71] Georg Simmel rightly noted: '[M]etallic money is also a promise to pay and… it differs from the cheque only with respect to the size of the group which vouches for its being accepted.' Georg Simmel (Tom Bottomore and David Frisby trans.), *The Philosophy of Money* (Routledge 1978 [1907]), 174-179. In a similar vein, J.M. Keynes observed that the Indian Rupee 'being a token coin, [was] virtually a note printed on silver.' J.M. Keynes (Elizabeth Johnson and Donald Moggridge eds.), *The Collected Writings of John Maynard Keynes, Volume 1:Indian Currency and Finance* (Cambridge University Press 1978), 26.

[72] See e.g. Hyman Minsky, *Stabilising an Unstable Economy* (Yale University Press 1986), 230, 249. The differing legal and economic definitions of money present a closely related, but distinct, topic for investigation. Compare, however, F.A. Mann, *The Legal Aspect of Money* (5th Edition, Oxford University Press 1992), 6 with Charles Proctor, *Mann on the Legal Aspect of Money* (6th Edition, Oxford University Press 2005), 9. See also Michael Bridge, *Personal Property Law* (4th Edition, Oxford University Press 2015), 22. Simon Gleeson, *The Legal Concept of Money* (Oxford 2018) came to press to late to incorporate substantively into this investigation.

Secondly, the thing in which banknotes evidence title is logically incapable of realization, except in the sense of exchange for other promissory notes of the same value. As Karl Olivecrona notes, there is nothing behind a banknote today *but another banknote*; 'paradoxically, the claims on the central bank are always good because they can never be honoured'.[73] The value in a documentary intangible is in the writing, not the paper. Thirdly, and most importantly, documentary intangibles are dematerializing before our eyes. Treating documentary intangibles as if they were bicycles does not place the law well to regulate the financial economy of the next century, which will be based on software processes, not on paper instruments.[74]

These three problems are exacerbated in the case of digital coins, for which there is never any paper. They require us to explain the legal thing-ness of an entity that is (i) evidenced only in digital data and (ii) may or may not be, or be grounded in, a right.

The need for reform

We have, then, a complex and highly path-dependent body of rules governing the incorporeal objects that form the bulk of our financial capitalist economy.[75] The legal learning on these objects skirts the edges of metaphysics, and occasionally dabbles, but generally operates within a loose commonsense ontology framed by historical categories. We all know that things like money and bonds do, actually, exist in some relevant sense, as they are the objects of extensive dealings; although documentary intangibles dwell in 'empires of paper', they are different to monopoly money or joss money—they are somehow 'real' whereas these others are 'mere' fictions.[76] And we know that the law is crucial to their constitution as social objects. But we have not theorized their existence (or the law's role in their creation) very well.[77] In fact, we mostly lack an adequate linguistic and conceptual apparatus to speak of them precisely, and our inherited categories get us bogged down in the minutiae when we should be thinking in broad strokes.

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[73] Karl Olivecrona, *The Problem of the Monetary Unit* (Macmillan 1957), 62.
[74] See D.W. Arner, J.N. Barberis, and R.P. Buckley, 'The Evolution of Fintech: A New Post-Crisis Paradigm?' (UNSW Law Research Paper No. 2016-62), available at SSRN: https://ssrn.com/abstract=2676553.
[75] '[T]he development of the law and practice of negotiable paper and "created" deposits afford the best indication we have of dating the rise of capitalism.' Joseph Schumpeter (Elizabeth Boody Schumpeter ed.), *A History of Economic Analysis* (Routledge 1984), 78; see also Geoffrey Ingham, *The Nature of Money* (Polity 2004), 72.
[76] See C.F. Blake, *Burning Money: The Material Spirit of the Chinese Lifeworld* (University of Honolulu Press 2011), 2; see See Ingvar Johansson, 'Money and Fictions' in Felix Larsson (ed.), *Kapten Nemos Kolumbarium* (Göteborg University 2005), 74.
[77] The common law systems have traditionally focussed on the *content* of property rights, rather than on the nature of the *objects* of property rights: see Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 213. The lack of a dogmatic *Sachbegriff* is a mixed blessing; it has avoided the dogmatic problems faced by German and Japenase law (for example), on the one hand, but it has dulled our sensibilities to the importance of describing legal thing-ness, on the other.

In the early 19th century, Jeremy Bentham criticized Blackstone for excluding four important categories from his treatment of things. They should, by now, be predictable: (i) sums of money; (ii) shares in a joint stock company; (iii) government annuities; and (iv) miscellaneous 'services'.[78] Blackstone was not alone in neglecting these important objects. Company shares were generally excluded from catalogues of real property (i.e. they were rightly not considered to be incorporeal hereditaments) and were also generally excluded from treatises on personal property.[79] That is, despite their importance as an asset class, shares were neither fish nor fowl during a very important period of legal and economic history.[80] Bentham presented to the 1828 Real Property Commission a novel scheme of property law, more conducive to the logical categorization of 'incorporeal subject matters of property', based on his ideas about general jurisprudence and deontic logic. It was more or less ignored.[81]

Broad strokes are more necessary now than ever, for digital computer systems have become the site of many economic objects and events. Where a 'bond' used to be a paper instrument, it now exists as the sum of states of millions of transistors that record the relevant information (in this case about an obligational relationship); instead of moving from hand to hand, digital financial instruments are kept in complex, intermediated arrangements which themselves challenge the law's traditional approaches.[82] Cloud storage and now the advent of data structures stored across decentralized global networks present economic objects and events that are hard to fit within existing categories up to and including territorial jurisdictions. Looking forward, the effect of digitalization will be compounded by the fact that documents are changing from static entities to dynamic, quasi-agentive ones.[83] It is time for the law to govern cyberspace self-consciously and rationally.

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[78] In Bentham's theory of law, a 'service' was an obligation owed by one party to another—he was therefore treating certain bundles of personal rights as a form of incorporeal property.
[79] See Mary Sokol, 'Bentham and Blackstone on Incorporeal Hereditaments' (1994) 15(3) *Legal History* 287, 287.
[80] In *Nightingale v Devisme* (1770) 98 ER 361, Lord Mansfied had to decide whether East India Company stock was 'money'. He prefaced his decision (that it was not) with the comment: 'This is a *new species* of property, arisen within the compass of a few years.' Rogers points out that trade in stocks had been common in London for 75 years already, and that a man of Lord Mansfield's sophistication must have been more familiar with them than this *dictum* suggests. It was not until the late nineteenth century that treatises on investment securities and stock exchange transactions appeared. J.S. Rogers, 'Negotiability, Property, and Identity' (1990) 12 *Cardozo Law Review* 471, 476.
[81] Mary Sokol, 'Bentham and Blackstone on Incorporeal Hereditaments' (1994) 15(3) *Legal History* 287, 292
[82] See e.g. Eva Micheler, 'Intermediated Securities and Legal Certainty' (LSE Legal Studies Working Paper No. 3/2014), available at SSRN: https://ssrn.com/abstract=2336889.
[83] Consider 'smart contracts' which incorporate executable code and perform contractual obligations as well as documenting them: see e.g. J.G. Allen, 'Wrapped and Stacked: "Smart Contracts" and the Interaction of Formal and Natural Languages' (2018) 14(4) *European Review of Contract Law* 307; J.M. Lipshaw, 'The Persistence of "Dumb" Contracts' (2019) 2(1) *Stanford Journal of Blockchain Law and Policy* (forthcoming).

In response to these developments, the Financial Markets Law Committee recently suggested that we create a new hybrid category of personal property to accommodate digital coins:

> Given that some virtual coins and tokens, at least, share certain characteristics of both intangible property and choses in possession… it may be convenient to understand them—where the currency is economically robust enough to be classes as 'property'—as a kind of hybrid: 'virtual choses in possession'. That is, intangible property with the essential characteristics of choses in possession.[84]

We are familiar with money occupying a kind of hybrid space between things in action and things in possession.[85] But, while it is a fascinating question how incorporeal objects *are* possessed, moved, etc., they are clearly *not* capable of possession or movement in the conventional sense, because they are not conventional spatio-temporal objects. One 'possesses' a digital coin, for example, not by holding it physically but by having one's public key incorporated in the last valid block of a chain of digital signatures.[86] Such a proposal would seem, however, to imply not only the creation of a new category of property, but also a new concept of *possession*. Otherwise the proposal would be for an unstable category (i.e. an intangible object capable of physical possession). In order to make sense of a financial technology that is likely to be adopted widely in the future, it is surely time to stop and look at the bigger picture.

4. Towards a New Taxonomy of Property

The notion that a right can be 'enclosed in a paper' contains an ounce of metaphysical domain confusion.[87] There is a metaphor at work here—by enclosing in paper, we mean that a right is somehow *created and/or maintained in existence by an act of writing* (and the persistence of the document over time). As our technological practices change, we need to get a fix on what we are actually doing in order to figure out whether changing the tools also changes the nature of our output. To state our problem precisely, we need to consider the ontological basis on which the law of property accommodates the legal artefacts created with the aid of modern information technology. These include electronic book-money,

[84] Financial Markets Law Committee, 'Issues of Legal Uncertainty Arising in the Context of Virtual Currencies' (July 2016), 8, file:///Z:/virtual_currencies.pdf.
[85] See e.g. Przemyslaw Palka, 'Virtual property : towards a general theory' (PhD Thesis, EUI Florence 2017), 151, www.cadmus.eui.eu/handle/1814/49664.
[86] On the development of the German law concept of possession [*Besitz*] in the context of immobilised global securities certificates, see Eva Micheler, *Property in Securities* (Cambridge 2003), 208.
[87] 'No human being can physically destroy a claim or paint it blue': Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 123. One might also ask whether one can wrap a Thursday in paper. These scholiastic questions are examples of what Bertrand Russell called *meaningless expressions*, rather than simply false ones: see K.R. Popper, 'The Nature of Philosophical Problems and their Roots in Science' (1952) 3(10) *The British Journal for the Philosophy of Science* 124, 128.

securities, and now digital coins. Some of these objects are certainly reified rights, others are not. All are 'housed' in a digital information system.

As David Koepsell puts it, the modern law needs an *ontology of cyberspace*.[88] Ontological investigations can quickly turn into a thicket, and Koepsell suggests a few points of orientation. First, we should distinguish between metaphysics as the study of being *qua* being and ontology as the study of being in the sense of the categorization of what can be observed to exist and the explication of its mode of existence. As lawyers approaching a practical problem, we are more interested in ontology than metaphysics; our immediate goal is to offer a plausible explanation of what the law currently recognizes to exist, rather than to answer purely metaphysical questions about the nature of rights (for example).[89] Secondly, however, our ontology should square with some broadly defensible metaphysics. In my view, we live in a physical universe, i.e. one composed of matter and forces like gravity. Apparently incorporeal objects like rights, corporations, bonds, centimeters, and dollars exist—our legal system would be inconceivable without them—and we must reconcile their existence with what we know about the physical universe. These invisible objects are not, in my view, Platonic ideals that exist 'out there' independently of human intentionality; this demands a theoretical role for human intentionality in their creation. Thirdly, history is important, and there is much to learn from the conventional, pre-reflective ontology of the law, even if it needs refinement. We can proceed by choosing a legal subject and unravel its existing ontology, then see how this squares with principles of formal ontology and logic, and then work out how the law could be changed to reflect a correct ontology.[90] This is largely the approach I have taken thus far. Finally, based on our practical experience of the world of law, our ontology should be particularly concerned with explaining the role that documentation plays in the creation and maintenance of incorporeal objects.

Legal phenomenology

[88] David Koepsell, *The Ontology of Cyberspace* (Open Court 2000). H.S. Ellis, in his survey of early 20th century German monetary theory, makes an observation of money that applies well here: 'Every science must define its terms. Nevertheless, it is contended that … enquiry into basic [monetary] concepts is "patently fruitless" and that the subject may be dismissed with the epithet of "metaphysics". […] No doubt metaphysical enquiries threaten to run off into controversy and scholasticism, […] but the economist can ill afford being disdainful of any honest effort to clarify the concepts with which he operates. The writer on money and banking inevitably gives his theory a certain flavour by his assumptions as to the nature and origin of money and its value, and he would do well to recognize the issues involved in these postulates.' H.S. Ellis, *German Monetary Theory 1905—1933* (Harvard University Press 1937), 1.

[89] David Koepsell, *The Ontology of Cyberspace* (Open Court 2000), 33. See also Barry Smith, 'Beyond Concepts: Ontology as Reality Representation' in Achille Varzi and Laure Vieu (eds.), *Proceedings of the International Conference on Formal Ontology and Information Systems* (Turin, 4-6 November 2004) on the difference between an ontology of concepts and an ontology of objects; my aim in this paper is to make a contribution to the ontology of legal objects, not legal concepts.

[90] David Koepsell, *The Ontology of Cyberspace* (Open Court 2000), 41.

The difficulty is that the ontological commitments a materialist should *not* have are clearer than the commitments she *should* have: Materialists should not believe in 'entelechies, Cartesian souls, or irreducible phenomenal properties', but it is uncertain how they should go about populating their ontology of the world.[91] In my view, the most viable way to explain the creation of legal phenomena is provided by the branch of analytic philosophy called social ontology. The speech act theory of J.L. Austin provides a starting point, which is common to certain schools of social ontology and certain schools of legal theory.[92] Austin observed that we utter some words to *say* things (i.e. 'I am married'). These utterances are studied in terms of their truth and falsity. But we also utter words to *do* things (i.e. 'I hereby pronounce you married'). These utterances have no 'truth value'; to utter them is to perform an action in itself, a *performative utterance*. In the act of saying we change the world—sometimes by creating new objects like marriages, corporations, and dollars.[93]

John Searle's social ontology, for example, explains the construction of social reality with a focus on the role of declarations. Searle's 1995 book presents the basic formula: An *institutional fact* (such as a marriage, a president, or a dollar) is created when a community takes a *brute fact* (i.e. act, object, or event) to 'count as' an institutional fact in a certain context.[94] An institutional fact is essentially a bundle of what Searle calls deontic powers (i.e. rights, duties, prohibitions, etc.) that give agents desire-independent reasons for action.[95] For example, when a wall becomes a 'boundary', it stops just presenting a physical barrier to entry and starts giving subjects normative (typically legal) reasons not to cross the line it demarcates. Searle describes the logico-linguistic operation involved in transforming a wall into a boundary as 'X counts as Y in C' where X is the brute object (wall), Y is the institutional object composed of deontic powers (the boundary, with the implied prohibition of acess) and C is the context (a national legal system or system, a traditional land tenure system, or a local custom, for example).

Doing things with documents

I will return to Searle's formula, but first it is necessary to make some observations on the role of writing, which is under-developed in Searle's account. We have seen that documents are historically central to the English law's treatment of choses in action, and

[91] Alyssa Ney, 'Neo-Positivist Metaphysics' (2012) 160(1) *Philosophical Studies* 53, 54-55.
[92] See Paul Amselek, 'Philosophy of Law and the Theory of Speech Acts' (1988) 1(3) *Ratio Juris* 187.
[93] See Barry Smith, 'How to Do Things with Documents' (2012) 50 *Revisti di Estetica* 179; see also Adolf Reinach (J.F. Crosby trans.), 'The A Priori Foundations of the Civil Law' (1983) 3 *Aletheia* 1 (originally published in German in 1914).
[94] E.g. that I am married, that we have a contract, that tomorrow is Thursday, that the Soviet Union no longer exists. The basic distinction between institutional facts and brute facts is explained in G.E.M. Anscome, 'On Brute Facts' (1958) 18(3) *Analysis* 69. See generally John Searle, *The Construction of Social Reality* (Free Press 1995).
[95] See John Searle, *Making the Social World* (Oxford University Press 2010), Chapter 5 for an overview of the basic concepts of Searleian social ontology.

that many of the entities which structure our legal and economic reality today exist in virtue of the fact that there are documents which record the declarations that created them (e.g. marriage certificates and certificates of incorporation). Recent developments, including DLT, increasingly demand an explanation of the shift from *physical* documentation on paper to *digital* documentation in a computer system. This is, however, rendered difficult by the fact that we have not adequately studied the role of (ordinary) documentation in the constitution of social reality generally.[96]

Barry Smith explains that the records and abstractions that constitute the property system bring new systems of entities into existence in the legal universe. These entities, not the assets they represent,[97] are the subject matter of an extensive economy—people buy and sell them, use them to gather information, to create incentives, and to structure a division of labour between people with different skills and functions. Many of the commodities in a financial capitalist economy, as we have seen, do not directly represent any physical asset at all; they are composed of information and are essentially recorded bundles of legal relations. The highly structured CDOs that precipitated the last global financial crisis again serve as an example, as they were composed of many aggregated credit relations backed with many aggregated assets as collateral. A modern ('fiat') dollar represents no physical asset whatever, merely a complex structure of legal relationships.

Unlike verbal utterances, documents are self-contained, complete, and they can endure self-identically over a period of time in isolation from the individuals who participated in their creation. Importantly, documents allow the institutions they create and maintain to be bought and sold with more liquidity and impersonality than rights and obligations evidenced only in memory, and they can be combined into more stable and more sophisticated structures—what Smith calls *document-complexes*.[98] Sophisticated forms of social organisation are possible in societies without formal documents, but the level of complexity is necessarily throttled. By augmenting memory, documents make possible new kinds of enduring social relations and social entities, which together open up new dimensions of socio-economic reality. Without document-complexes, entities like modern

[96] See Maurizio Ferraris and Giuliano Torrengo, 'Documentality: A Theory of Social Reality' (2014) 57(3) *Rivista di estetica* 11; Ferraris is probably the leading theorist of documentation in social ontology.
[97] Hernando de Soto's theory of capital is instructive here. 'Capital' should be seen as discrete from assets; capital is something abstract, created by documents that refer to an asset's most economically and legally significant qualities. I may live in a house, for example, held under a traditional or informal legal system, but I do not have *capital* unless and until I have something like a document of title that operates independently within a financial economy as an object in its own right. Capital is created in documents such as titles, pledges, securities, contracts, and so forth. The moment you focus your attention on the quality of the owner's *rights* in a house instead of the quality of the house itself, he says, you have 'stepped from the material world… into the universe where capital lives': Hernando de Soto, *The Mystery of Capital* (Random House 2010), 48.
[98] Barry Smith, 'How to Do Things with Documents' (2012) 50 *Revisti di Estetica* 179, 183.

business firms, insurance companies, and banks would be inconceivable.[99] Smith therefore introduces the concept of a *documentary act* as an extension of the speech act. By filling forms, registering, conveying, validating, attaching, etc., we create new entities within various domains of social reality including legal institutional reality.[100] Often, document-based commercial practices precede legal recognition of the new class of entity, as the example of company shares illustrates.[101]

Electronic documentation

How, then, does changing the nature of a document change the nature of the object it creates and whose existence it sustains? Two matters need to be taken into account to answer this question. The first is the degree of what Koepsell and Smith call *ontological dependency* on documentation.[102] While the issuance of a marriage certificate might be the operative fact that constitutes the marriage as an institutional fact, for example, the destruction of the certificate does not destroy the marriage. By way of contrast, the creation *and* continued existence of a bearer bond depends on the existence of the document—if it is burned, the bond vanishes into thin air.

The second, closely related matter is the nature of the institutional fact itself. In Searle's classical 'X counts as Y in C' formula, X is a brute fact and Y is an institutional fact; by ascribing deontic properties to a brute fact (properties which are not, by definition, inherent in the brute fact),[103] communities create institutional facts. However, this aspect of Searle's ontology has been the subject of contention. Smith responded to Searle's 1995 presentation of the formula with the objection that some institutional facts, such as

[99] This probably explains the use of physical money tokens in so many societies before the advent of paper and double-entry book-keeping. See also A.W. Crosby, *The Measure of Reality: Quantification and Western Society 1250-1600* (Cambridge 1997), 204-205.

[100] Barry Smith, 'How to Do Things with Documents' (2012) 50 *Revisti di Estetica* 179, 186; Barry Smith, 'Searle and de Soto: The New Ontology of the Social World' in Barry Smith, D.M. Mark, and Isaac Ehrlich (eds), *The Mystery of Capital and the Construction of Social Reality* (Open Court 2008), 47.

[101] This was certainly the case with company shares. Company shares are called *equity* because they were recognised by Chancery before the common law. See e.g. Paddy Ireland, 'Capitalism without the capitalist: The joint stock company share and the emergence of the modern doctrine of separate corporate personality' (1996) 17(1) *The Journal of Legal History* 41-73.

[102] These are *independence*, *specific dependence*, and *prototypical dependence*. Specific dependence, they say, may be 'strong' or 'weak' depending on whether the document can be replaced by a copy. See David Koepsell and Barry Smith, 'Beyond Paper' (2014) 97(2) *The Monist* 222, 224. See also J.G. Allen, 'Wrapped and Stacked: "Smart Contracts" and the Interaction of Natural and Formal Language' (2018) 14(4) *European Review of Contract Law* 397.

[103] This is also one of the main points of difference between the Berkeley and Cambridge Schools of social ontology. Tony Lawson, for example, is adamant that in order to count as an institutional fact (be *positioned* in his terminology), the thing must have inherent capacities to serve the function it is positioned to serve. For two instructive exchanges, see Tony Lawson, 'Some Critical Issues in Social Ontology: Reply to John Searle' (2016) 46(4) *Journal for the Theory of Social Behaviour* 426; John Searle, 'The Limits of Emergence: Reply to Tony Lawson' (2016) 46(6) *Journal for the Theory of Social Behaviour* 400; Tony Lawson, 'Social Positioning and the Nature of Money' (2016) 40 *Cambridge Journal of Economics* 961; John Searle, 'Money: Ontology and Deception' (2017) 41(5) *Cambridge Journal of Economics* 1453.

electronic money, do not have an X term; in place of metal and paper, electronic book-money (for example) rests on digital information structures that are poorly captured by the XYC formula. Smith asserted that these were *free-standing Y terms*, i.e. institutional facts (bundles of deontic powers) not resting on a brute fact. Searle conceded by introducing a variation to his theory; he accepted the existence of Y terms for which there is no X term, and said that the logico-linguistic operation involved is simply a declaration that 'Y exists in C'.[104] While space precludes me from entering into the details of the free-standing Y term debate here, it is at least heuristically helpful to recognize that law is a nominalistic realm in which we can effectively declare objects into existence which then structure our social life. Ingvar Johansson has rightly observed that no one has yet fully teased out the differences between the basic case of institutional facts anchored in a physical object and free-standing institutional facts.[105]

The virtual furniture of financial capitalism

The 'ontic furniture' of the economic world, I have said, is virtualizing before our eyes. Johansson explores this terrain by expanding a now-classical analogy between money and chess, which offers some final key insights into the nature of digital coins as well. A basic game of chess is played on a board with physical pieces. The transformation from a wooden figurine to a 'rook' is explained by the basic formula: 'X (a wooden figure) counts as Y (a rook) in the context C (the game of chess)'. This formula expresses the imposition of a function on a brute object: when we accept that a figurine counts as a rook, it starts doing things (in the context of a game of chess) that a wooden figurine could not. The status moves the natural object into a new domain of social reality, i.e. the domain of a game. Johansson calls this basic case *real chess*. Chess players often record their games, however, and for this purpose translate the chess pieces and board into an algebraic system of notation. Our rook is no longer a figurine but the letter 'R'; the play-space is no longer a board but a column of notations on a set of Cartesian coordinates (e.g. R moves a1 to d1). In other words, the objects and events that constitute a game of chess are *represented in documentary form*. We can thus review particular games of chess as discrete, documented historical facts. Searle's basic formula no longer works in this context, however, as there is no X term. Johannson suggests that we instead use the formula 'Z (our notation for rook) counts in C (a game of chess) as a representation of the basic formula (X (wooden figurine) counts as Y (a rook))'. In this case we have an algebraic representation of a real game of

[104] See Barry Smith and John Searle, 'The Construction of Social Reality: An Exchange' in David Koepsell and Laurence Moss (eds.), *John Searle's Ideas About Social Reality: Extensions, Criticisms, and Reconstructions* (Blackwell 2003), 285.
[105] Ingvar Johannson, 'Money and Fictions' in Felix Larsson (ed.), *Kapten Nemos Kolumbarium* (Göteborg University 2005).

chess.

But the act of recording real chess using such notation opens up a further possibility, too. Imagine that we live in different cities, and can never play chess on a board. Instead, we send each other messages such as 'R moves a1 to d1'. We have now started playing a new form of chess, which Johansson calls *account chess*. The interesting thing is that the objects and events that make up a game of account chess are particulars, rather than universals, but are neither straightforward spatio-temporal objects nor Platonic objects. Account chess is, according to Johansson, a *fictional object*. Intuitively, whatever else is said about the true ontological status of fictional objects, 'we often speak and act as if there were such enduring, identifiable, and re-identifiable fictional particulars.'[106] But even social ontologists have failed to present a persuasive framework for describing fictional social objects. To fill the gap, Johansson presents a scheme of *fictional institutional facts*, *representational institutional facts*, and *primitive institutional facts*.[107]

Johannson applies his scheme to the evolution of money. A traditional bank book that records movements of coins and banknotes is, like an algebraic documentation of a game of real chess, a representation of something else. But, like the algebraic chess notation, it bears the possibility of a new kind of money that exists only in information:

> Instead of material money transactions (compare: material chess moves) we now often have transactions by means of mere accounts of money (compare: moves in account chess). The latter kind of transaction is made in terms of a very special kind of fictional object, *account money*. What since long is called 'deposit money' and 'checking account money' can be regarded as a species of account money. Such money can exist by means of both book-entries and computer databases.[108]

This provides an avenue of enquiry for conceptualizing digital coins, as well, whether they are used for payment, investment, or any other kind of record-keeping. Where a conventional unit of money or a conventional security has traditionally been embodied in a physical object (a piece of paper), it has now moved to an *account-based* domain of legal institutional reality. The existence of a bitcoin, as a unit of fiat book-money, is evidenced and maintained only by an electronic ledger—the former centralized, the latter decentralized, the former representative of a legal obligation incumbent on the commercial

[106] Ingvar Johannson, 'Money and Fictions' in Felix Larsson (ed.), *Kapten Nemos Kolumbarium* (Göteborg University 2005), 78-79.
[107] In a similar vein, Thomas Hobbes distinguished between *natural persons*, who are authors of their own acts; *artificial persons*, who act as agents of another; and *fictional persons*, who are, in a civil state, granted personality in virtue of being represented by another although they are, by nature, not something that is capable of acting at all: 'Inanimate things, as a church, a hospital, a bridge, may be personated by a rector, master, or overseer.' Thomas Hobbes (Richard Tuck ed.), *Leviathan* (Cambridge 1996), 111.
[108] Ingvar Johannson, 'Money and Fictions' in Felix Larsson (ed.), *Kapten Nemos Kolumbarium* (Göteborg University 2005), 86, 95.

bank who keeps the ledger, the latter representative of no legal obligation of any legal entity but nonetheless a unit of economic value in a market.

In terms of ontological dependence, a fiat dollar relies on documents even more fundamentally than a unit of currency in a commodity-based monetary system; if the electronic documentation vanishes, the dollars vanish into thin air, too. A bitcoin's existence is even more connected to the electronic records that create it—the bitcoin itself is, after all, nothing but a 'chain of digital signatures'. Further, unlike the fiat dollar, there is not even necessarily a set of defined legal relations that constitute the bitcoin—it would thus seem to have a higher degree of ontological dependency on the digital data structure that creates it.

We now have a better concept of the ontology of technologically-mediated, document-dependent legal artefacts to support the intuition that digital coins should be recognized as objects of property rights in virtue of their economic importance.

Property in digital coins

It is now time to set out my proposal for a category of incorporeal object that would explain how one can have property in a digital coin. I have not entered into the debate about the desirability or logical possibility of reifying rights and treating them as things.[109] From the

[109] The starting point in the characterisation of 'things' is generally Gaius' *Institutes*: 'Corporeal things are those which, by their nature, can be touched, such as land, a slave, a garment. (…) Incorporeal things, on the other hand, are such as cannot be touched but exist in law, for instance, an inheritance, usufruct, or obligations.' (George Mousourakis, *Roman Law and the Origins of the Civil Law* (Springer 2015), 114, citing the *Institutes* 2.2.1-2.) With national idiosyncrasies, most European legal systems are influenced by his basic categorisation between *res corporales*, which included all physical things such as land, human beings, metals, etc, and *res incorporales*, which included rights such as *haereditas, usufructus, usus,* and *obligationes* (but not *dominium*). According to some views, problems arose from the 19th century German Pandectists' interpretation of Gaius to define things generally as tangible, physical objects only, as discussed in Section 2: See G.L. Gretton, 'Ownership and its Objects' (2007) 71 *Rabels Zeitung* 802, 808, 821; see also Peter Birks, 'The Roman Law Concept of Dominium and the Idea of Absolute Ownership' [1985] *Acta Juridica* 1. The logical problem with rights in rights is one of an infinite regress, or as Francesco Giglio puts it, 'looping'; if I can own (i.e. have a right of ownership) in the right of ownership, for example, then I must have a right of ownership in a right of ownership in a right of ownership, and so on: see Francesco Giglio, 'Pandectism and the Classification of Things' (2012) 62 *University of Toronto Law Journal* 1, 22. Likewise, if rights (including ownership) are 'things', then to 'own' a right is to have a thing in a thing. The debate within, between, and across national property laws has developed from a common basis to such levels of nuance that the intellectual effort required to argue one's way out of it is almost overwhelming. This kind of logical conundrum is, I think, evidence of a problem somewhere in the logical scheme. There are at least two obvious solutions to the problem. The first is to deny that ownership is a right: this radical step is taken, for example, in the context of French law by the heretical Samuel Ginossar, *Droit réel, propriété et créance* (Librarie Générale de Droit et de Jurisprudence 1960). The second is to accept that, upon the first iteration (i.e. a right of ownership in a right of usufruct) the owned right is reified, i.e. ceases to be a 'right' and becomes a 'thing'. For various doctrinal reasons this is thought to be difficult, impossible, unattractive, or heretical—although, as we have seen, we all make practical concessions for important obligations-bundled-as-things like company shares. For all the learning on the question, we are basically in the dark while commercial practice races ahead into a brave new world of increasingly incorporeal spaces and things. The matter has become, already at the national level, a labyrinth that has kept generations of lawyers trapped within a debate on terms that appear to

perspective of English law, it is likely that many digital coins will fit this mold. However, some 'virtual objects' are not reified rights, so I will proceed on the basis that we are not just concerned with digitally recorded rights but also apparent digital commodities.

In the idiom of English property law, digital coins would most naturally form a new type of personal property (rather than realty).[110] Michael Bridge has suggested that we abandon the traditional categories of personal property and 'fold traditional things in action into the broader category of intangible personalty' such that we have a neat taxonomy of intangible and tangible personalty; the 'terminology of things in action and things in possession would be allowed gradually to subside'.[111] I think that this proposal is a good one. Within the category of intangible personalty, we should devise appropriate distinctions between incorporeal objects that are reified rights and incorporeal objects that are not reified rights. A close relationship of dependency will always exist between an incorporeal object and its documentary substrate, of course, which I will return to immediately below.

In the idiom of Civilian property law, Christian von Bar argues that it is necessary to rationalize the conceptual landscape both within and between Continental codifications. The notion that only corporeal objects can be 'things' capable of ownership, for example, should be rejected. In its place, von Bar draws a basic distinction between 'objects', 'objects of legal transaction' (e.g. goods) and 'things':

> One proceeds, in this scheme, from the general to the specific. Anything of which a rule-set is willing and able to take notice of for private law purposes is an 'object'. Anything that can be sold or gifted is an 'object of legal transaction' and therefore a 'good'. A good is an object of some utility to human beings, and whatever is of utility to human beings can generally be incorporated in legal transactions. Finally, 'things' are, in our account, such objects of legal transaction (such as goods) in which *erga omnes* rights can be created, namely property rights.[112]

The scheme is cumulative, in the sense that all things are (i) objects and (ii) of legal transaction, but not *vice versa*. However, because not *all* things can be the object of *all* property rights in every legal system, he suggests a further division within the category of things into 'real things', 'land units, and 'incorporeal normative things':

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preclude an answer. I therefore am content to assert that English law treats rights as things, and to leave the conceptual problems this might or might not raise for an independent and in-depth analysis. I am grateful for Lionel Smith for pointing out the need for me to state a position in this debate and to clarify my views on the conceptual definitions of 'things' and 'rights'. For a practical treatment of this problem, which generally follows the second method set out above, see Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 223.

[110] However, I say this without prejudice to debating the utility of the realty/personalty dichotomy, at least as the primary dichotomy in our taxonomy of property. Although it is beyond the scope of this paper, my intuition is that reconciling the nature of incorporeal hereditaments, real property in the sense of land units, and incorporeal objects (including choses in action and digital commodities) would contribute to our understanding of property law considerably.

[111] Michael Bridge, *Personal Property Law* (4th Edition, Oxford 2015), 16.

[112] Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 129.

> The word 'thing' certainly denotes moveable corporeal things ('wares'). They form one group of 'real' things. Land units share with them the property of corporeality, but, because they comprise a portion of the earth which is inseparable from the rest of the earth, they are only 'objects', 'objects of legal transaction' and 'things' in virtue of a normative framework. The earth is, after all, not even an 'object' of private law. Land parcels are, accordingly, normative things. Land parcels share with moveable corporeal things, however, the ability to be the object of a greater spectrum of property rights. This distinguishes them from mere rights and other incorporeal objects. The latter, the other (or purely normative) things, are generally only suited to being the object of special property rights. Normative things are placed on an equal footing with real things for specific purposes within a legal system; they therefore slip into the role of a thing, without really being one.[113]

This preserves a part of the traditional approach (i.e. placing importance on the corporeality of conventional things), but also recognises the importance and thing-ness [*Sachqualität*] of incorporeal entities in private law. Real things are physical objects that can be possessed and controlled in the ordinary sense; normative things are creatures of law, which he would call 'fictive' but for the latter term's negative connotation.[114]

Such an approach also contrasts subtly with that of Micheler, for example, who has argued that securities are 'neither property nor obligations', but an intermediate category of asset.[115] Following von Bar's approach, if something is treated as an object of *erga omnes* property rights, then it is 'reified' and becomes a thing (whether 'normative' or 'real'). This does not require the creation of a third category (i.e. between things and rights) but entails a reform of the category of things to include *certain* rights, i.e. those that are treated as things. This, in my view, preserves the logical distinction between things and rights in the abstract, by assigning hybrids (such as reified rights) to the category of things in virtue of their reification by dint of law. Micheler correctly stresses path-dependency and incremental development of the law.[116] The inherent path-dependency of legal evolution, however, should not preclude the intentional, forward-looking revision of received categories in light of social, economic, and technological change. In my view, it would seem preferable to reform the categories of 'property' and 'obligations' than to invent a *tertium quid* that contradicts the (relevant) legal system's general approach to property law and its permissible objects.

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[113] Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 129-130.
[114] Christian von Bar, *Gemeineuropäisches Sachenrecht* (Beck 2015), 171. It also shows how even things like land, which seem realer than real, are in fact normatively constituted. It then becomes easier to see land (as set of geographical coordinates in physical space) and virtual real estate, for example (a set of geographical coordinates in cyberspace) as different forms of property—but both forms of property.
[115] Eva Micheler, 'The Legal Nature of Securities: Inspirations from Comparative Law' in Louise Gullifer and Jennifer Payne (eds*.), Intermediated Securities: Legal Problems and Practical Issues* (Hart 2009), 131.
[116] '[W]hen lawyers absorb change they dig deeper into existing soil, rather than branching out into new fields.' Eva Micheler, *Property in Securities* (Cambridge 2003), 229.

Civilian property law provides a useful counterpoint to English law for understanding the continued relevance of the distinction between 'documentary' and 'pure' intangibles alluded to above. Instead of the traditional dichotomy between *res corporales* and *res incorporales*, Przemyslaw Palka suggests a tri-partite scheme comprising *res corporales*, *res incorporales*, and *res digitales*.[117] Palka takes *res incorporales* to be reified rights in the traditional Gaian sense, which I have called incorporeal objects and which are 'normative things' according to von Bar's proposed scheme. One of Palka's key observations is that *res incorporales* might be embodied in either *res corporales* or *res digitales*—in other words, in either paper or digital documentation. The choice will have consequences for how the thing is treated as an object of property. As we have seen, being 'enclosed in a paper' makes a right capable of being treated like an ordinary chattel in the case of documentary intangibles; being 'enclosed' in a digital writing will have consequences for how that right can behave as an object of the law, too. Part of the task before us is to work out what the affordance of the newest technology are, and to impose legal qualifications on them.[118]

5. Conclusion

In this article, I have explored the nature of digital coins as objects of property rights. The law seeks to regulate forms of social, including economic, interaction which it also helps to constitute; however, it only partially constitutes these interactions and often does so reactively, for example as new technologies enable new forms of action. In consequence, I have argued that a basic conceptual enquiry into the legal nature of digital coins logically precedes the kind of functional analysis that would allow us, ultimately, to define the overlapping borders between the categories of commodities, money, securities, and digital coins. Given that categorization generates legal consequences, premature dogmatic categorization could even discourage a rational functional analysis.

This, I argued, justified looking at basic questions of property law in the first instance. I observed that digital coins present problems that are not entirely new, and that incorporeal objects of property generally were not optimally dealt with in any legal system. English law, for example, recognizes incorporeal hereditaments and choses in action. These are, however, poorly constructed categories that straddle the divide between realty and personalty for reasons that have to do with feudal connections between social obligations and land (in the case of incorporeal hereditaments) and early modern rules of procedure

[117] Przemyslaw Palka, 'Virtual property: towards a general theory' (PhD Thesis, EUI Florence 2017), 154, www.cadmus.eui.eu/handle/1814/49664.
[118] See Mareille Hildebrandt, 'Law *as* Information in the Era of Data-Driven Agency' (2016) 79(1) *Modern Law Review* 1.

(in the case of choses in action). I observed that a number of Civilian legal systems limited 'thing-ness' expressly to physical objects—subject to carve-outs—and that others squeezed intangibles into categories such as 'moveables' by adopting a binary *summa divisio*. In all cases, expediency (economic and procedural) has driven the *ad hoc* enlargement of categories at the expense of systematic coherence. While this may be generally serviceable, especially to the practically-minded lawyer, it is sometimes necessary to do some housekeeping; as we stand before what appears to be a period of rapid and fundamental change, now is such a time.

I have proposed the more direct recognition of incorporeal objects as objects of property law. The manner of achieving this will differ from legal system to legal system. In the English idiom, it could be achieved by a conscientious reshaping of personal property around a dichotomy between tangible personalty and intangible personalty. While it is not necessarily desirable to erase the distinction between 'documentary' and 'pure' intangible personalty completely, the distinctions drawn within intangible personality would also have to be rationalized. In this, the insight drawn from a tri-partite reformulation of the Civilian scheme into *res corporales*, *res incorporales*, and *res digitales* makes clear that objects such as shares, bonds, or land titles can be created and maintained *either* in a physical written document *or* in a digital document. The latter must finally be accommodated into our scheme of property law—digital documents do not behave like chattels, but they can do lots of other things, and in the near future they will be capable of doing much more.

This suggests an important branch of research, namely, the ontology and legal status of 'accounting objects'. This notion is familiar to anyone who has done their books—the assets and liabilities that are shifted about in the columns of a double entry book-keeping system are in the nature of what I would call 'quasi-mathematical particulars'. These objects are quasi-abstract, by nature—they can disappear by 'cancelling each other out'. Yet they are particular rather than universal by exactly the same token—a universal cannot be destroyed in the way an accounting entry can. Importantly, these objects are legally as well as technologically constituted, in the sense that the law has an important role to play in explaining their existence and nature.

In any case, recognizing incorporeal objects would bring the positive law into line with the reality that incorporeal objects are the largest class of objects in financial capitalist economies. Their recognition would enable, and indeed require, the development of *sui generis* rules of property law governing their possession, transfer, abandonment, finding, bailment, conversion, detention, and securitization, etc. These rules would be analogous to the (existing) rules of property law that evolved to govern physical objects. Exciting

resources already exist for exploring the more rational treatment of such objects—for example, the German law governing transfers of securities evidenced in an immobilized 'global' certificate, or the English law governing the transfer of registered securities might provide fertile analogies to the transfer of incorporeal objects in DLT-based information systems. But rules would have to be developed from first principles in light of the nature and affordances of the information and communications technology the relevant objects rest upon.

A number of fundamental questions in the law of incorporeal property remain. These include whether we should maintain the distinction between incorporeal hereditaments and choses in action as two forms of incorporeal property in English law; whether the rights *versus* things dichotomy is important or sustainable; how this debate bears on aspects of intellectual property law; and how we ought to conceptualize money (especially book-money, central bank 'reserves', and, potentially, central-bank issued digital coins) in the future. While more programmatic than complete, this article has provided a sketch of the future directions private law could take in the coming decades in response to the virtualization of its subject-matter. It has not aimed to state the final word on incorporeal objects in general, or on the question of property rights in digital coins in particular. The conclusions it has advanced are presented as theses for discussion; it is hoped that further discussion might ensue along the lines I have sketched here. In particular, it is hoped that my comparative analysis will encourage a European dialogue on the notion of property in digital coins that will be of more general importance.