Cryptocurrencies as Property: Solving the Riddle

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Abstract

In this article, we provide a novel solution to the crypto-property riddle. Most scholars and the highly persuasive Legal Statement handed down by the UK Jurisdiction Taskforce agree that cryptocurrencies defy traditional categories of property. On their account, cryptocurrencies are neither things in possession nor things in action. Disquietingly enough, this may pose a challenge to their categorisation as property: if a strict bipartition of personal property were reaffirmed in the future, and appeal to a third category of 'intangibles' undercut, cryptocurrencies might eventually be denied proprietary status. However, we argue that there is a fundamental mistake in the Legal Statement and any argument running along similar lines. It is false that cryptocurrencies fit no traditional category of property: they can be treated as things in action. Our argument to this effect is structured as follows. Firstly, we show that cryptocurrencies are smart-contractual rights (that is, rights under smart contracts). Secondly, we observe that smart contracts are most likely to be treated like ordinary contracts in English law, and so rights under smart contracts as simple

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contractual rights. It follows that cryptocurrencies are indeed contractual rights and, therefore, things in action amenable to proprietary status.

Keywords: bitcoin, blockchain, cryptocurrency, property, English law

I. Introduction

In January 2018, online financial-news-provider MarketWatch came up with a sharp simile: "cryptocurrencies are a bit like the Kardashians".[1] Just like the headline-hitting, celebrity-packed Californian dynasty, cryptocurrencies have large media exposure whilst remaining fundamentally obscure and shrouded in mystery. Unfortunately, their mystery is not confined to gossip circles. The legal status of cryptocurrencies is unclear and stuck in limbo too. As of November 2020, English law is still undecided as to whether cryptocurrencies are, or should be, property. At some point, it *will* have to decide one way or another. In fact, some may suspect that the issue is irrelevant to begin with as cryptocurrencies have no need for legal recognition: Blockchain-based platforms use peer-to-peer consensus precisely to avoid intermediation, and strong cryptography is meant to make dealings practically irreversible. After all, the 'code is law', or so the puzzled crypto-anarchist may say.[2] However, it would be fallacious to see the law as playing no role in the crypto-world. Although transactions may be cryptographically irreversible, their legal effects can always be reversed or altered. The recovery of fraudulently transferred or 'stolen' coins (or recovery of their value) is still ultimately a matter for judges to decide.[3] Similarly, the possibility of devising crypto-coins or of settling them on trust transcends computer science and the algorithms of cryptography.

    In English law, there is a welcome judicial trend towards treating cryptocurrencies as property.[4] However, two problems stand in the way of a full recognition of their proprietary status. Firstly, cryptocurrencies may be seen as mere information (that is, as just a series of lines of code) and information is, in principle, precluded from constituting property.[5] Secondly, English law traditionally

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[1]   Stacy Rapacon, 'Clueless about Bitcoin? Here's Your Cryptocurrency Crash Course' (*MarketWatch*, 31 January 2018) <https://www.marketwatch.com/story/clueless-about-bitcoin-heres-your-cryptocurrency-crash-course-2018-01-31> accessed 26 November 2020.

[2]   Lawrence Lessig, 'Code Is Law' (*Harvard Magazine*, 1 January 2000) <https://harvardmagazine.com/2000/01/code-is-law-html> accessed 26 November 2020.

[3]   See Section III.B below.

[4]   See Section III below.

[5]   *Your Response v Datateam Business Media* [2014] EWCA Civ 281, [2015] QB 41, [42]; UK Jurisdiction Taskforce, 'Legal Statement on Cryptoassets and Smart Contracts' (LawTech Delivery Panel 2019) paras 59–65.

contemplates two categories of personal property: things in possession and things in action. Oddly enough, cryptocurrencies are said to belong to neither.[6]

In the present article, we address the second challenge. We argue that cryptocurrencies *are* things in action and, therefore, amenable to property status. The argument is structured as follows: In the next section, we provide an overview of cryptocurrencies, charting their rampant rise and cursorily outlining the technology behind them. In the third section, we briefly contextualise the scholarly and judicial debate on the legal characterisation of cryptocurrencies, surveying the case law and the Legal Statement on Cryptoassets and Smart Contracts recently released by the UK Jurisdiction Taskforce. In the fourth section, we provide a technical argument to show that cryptocurrencies can be conceptualised as 'smart-contractual rights'. In the fifth and sixth section, we deduce that by virtue of their smart-contractual nature, cryptocurrencies amount to contractual rights and, therefore, to things in action. As a result, we conclude that they can comfortably be accommodated within the property law doctrine.

II. Setting the Stage: A Peek at the Crypto-Universe

Introduced by Satoshi Nakamoto in 2008, Bitcoin is an electronic payment system that operates without requiring participants or peers, to trust centralised financial institutions to secure transactions.[7] While there had been previous attempts at building peer-to-peer payment networks where transactions are validated cryptographically, Bitcoin provided the first trustless solution to the so-called "double-spending problem".[8] The key to this achievement is twofold: it consists of (a) a data structure, i.e., the blockchain, and (b) a procedure to modify it, i.e., the Proof-of-Work or PoW.[9] As the name itself suggests, the blockchain is made up of a sequence of groups of transactions (so-called 'blocks'): these are linked together through cryptographic proofs, which ensure that the history of transactions cannot

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[6]   UK Jurisdiction Taskforce (n 5) paras 66–84.

[7]   Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' (2008) 1 <https://bitcoin. org/bitcoin.pdf> accessed 4 November 2020.

[8]   The double-spending problem arises when participants attempt to spend the same coins multiple times, either maliciously or erroneously. See Wei Dai, 'B-Money' <http://www.weidai.com/ bmoney.txt> accessed 4 November 2020; Nick Szabo, 'Bit Gold' (*Satoshi Nakamoto Institute*, 29 December 2005) <https://nakamotoinstitute.org/bit-gold/> accessed 4 November 2020; Adam Back, 'Hashcash - A Denial of Service Counter-Measure' (2002) 10 <http://www.hashcash.org/ papers/hashcash.pdf> accessed 4 November 2020.

[9]   Markus Jakobsson and Ari Juels, 'Proofs of Work and Bread Pudding Protocols' in Bart Preneel (ed.), *Secure Information Networks: Communications and Multimedia Security IFIP TC6/TC11 Joint Working Conference on Communications and Multimedia Security (CMS'99) September 20–21, 1999, Leuven, Belgium* (Springer US 1999) <https://doi.org/10.1007/978-0-387-35568-9_18> accessed 4 November 2020.

be altered. Any participant in the network may publish a proposal for the next block, so long as they supply a valid PoW for that block through a process referred to as 'mining'. PoW is a cryptographic puzzle that is slow and computationally (thus, economically) expensive to solve, but incredibly fast to verify. Since computational resources cannot be faked, by selecting the blockchain that was hardest to the mine (that is, the longest chain), network participants can form a consensus on the true history of transactions.[10] The resulting framework allows peers to independently verify any cryptographic claim of ownership of Bitcoin tokens by third parties.[11]

Since then, the paradigm has spread to other applications, with blockchain being used for alternative cryptocurrencies,[12] or to describe digitised (or *tokenized)* physical assets,[13] like gold,[14] real-estate properties, and art.[15] Therefore, the technology soon expanded from *cryptocurrencies*, implementing blockchain to create money-like tokens, to *cryptoassets* modelling generic transferable digital assets.

The need to address the adoption problems caused by the high volatility of traditional cryptocurrencies led to the birth of *stable-coins*, i.e., cryptocurrencies backed by fiat currency, gold, or other cryptocurrencies.[16] These currencies allowed the decentralised finance (De-Fi) ecosystem to boom, with applications

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[10] This is because PoW mathematically proves that the majority of resources have been committed to backing this version among alternative transactional histories.

[11] Clearly, 'claim of ownership' is here meant in the strictly cryptographic sense, as something determinable by computers alone.

[12] Brad Chase and Ethan MacBrough, 'Analysis of the XRP Ledger Consensus Protocol' (2018) Ripple Research arXiv:1802.07242 [cs] <http://arxiv.org/abs/1802.07242> accessed 4 November 2020; Shen Noether and Sarang Noether, 'Monero Is Not That Mysterious' (2014) Monero Research Lab, 10 <https://coinpaprika.com/storage/cdn/whitepapers/39.pdf> accessed 4 November 2020.

[13] Darryn Pollock, 'How Tokenization Opens A New World Of Asset Management And Investment' (*Forbes*, 15 April 2019) <https://www.forbes.com/sites/darrynpollock/2019/04/15/can-tokenisation-open-a-new-world-of-asset-management-and-investment/> accessed 4 November 2020.

[14] Charles Cascarilla, 'Pax Gold Whitepaper' (2019) Pax Gold 14 <https://www.paxos.com/wp-content/uploads/2019/09/PAX-Gold-Whitepaper.pdf> accessed 4 November 2020.

[15] Michael Stephen Haley, '"Digital Art" Framed And Collected On Blockchain' (*Forbes*, 30 January 2020) <https://www.forbes.com/sites/michaelhaley/2020/01/30/digital-art-framed-and-collected-on-blockchain/> accessed 4 November 2020.

[16] 'The Maker Protocol: MakerDAO's Multi-Collateral Dai (MCD) System' <https://makerdao.com/whitepaper/White%20Paper%20-The%20Maker%20Protocol_%20MakerDAO%E2%80%99s%20Multi-Collateral%20Dai%20(MCD)%20System-FINAL-%20021720.pdf> accessed 4 November 2020.

including decentralised exchanges,[17] peer-to-peer lending,[18] and insurance.[19] The assets currently locked in De-Fi, account for $12 billion out of the $400 billion total market capitalisation of cryptocurrencies,[20] a staggering figure that shows how the interest in cryptocurrencies is no longer limited to freaks and enthusiasts. This is further borne out by data from the leading exchange platform, Coinbase, which reports holding $7 billion worth of cryptocurrencies in their institutional custody platform.[21]

A remarkable application of blockchain has been using it as a consensus layer to agree on outcomes of smart-contract execution. It is worth noting that smart contracts do not necessarily have to use blockchain: their invention precedes Bitcoin by two decades, originally referring to systems (like vending machines) that use software and hardware to provide self-enforceability of contracts.[22] However, blockchain-based smart contracts have found widespread adoption: by leveraging the trustless properties of the blockchain consensus model, they remove the need to trust any particular execution environment of the smart contract. We will refer exclusively to this class of smart contracts throughout the article. This paradigm has been mainly popularised by Ethereum,[23] currently the second-biggest cryptocurrency by capitalisation,[24] which provided a blockchain to host programmable smart contracts. A common use case has been to implement new cryptocurrencies by describing the transactional logic in a smart contract on top of an existing blockchain, without the need to build a new decentralised network.

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[17] Michael Oved and Don Mosites, 'Swap: A Peer-to-Peer Protocol for Trading Ethereum Tokens' (2017) 13 <https://www.airswap.io/pdfs/SwapWhitepaper.pdf> accessed 4 November 2020.

[18] Robert Leshner and Geoffrey Hayes, 'Compound: The Money Market Protocol' (2019) 3-4 <https://compound.finance/documents/Compound.Whitepaper.pdf> accessed 4 November 2020.

[19] Hugh Karp and Renis Melbardis, 'A Peer-to-Peer Discretionary Mutual on the Ethereum Block-chain'<https://nexusmutual.io/assets/docs/nmx_white_paperv2_3.pdf> accessed 4 November 2020.

[20] 'Cryptocurrency Prices, Charts And Market Capitalizations' (*CoinMarketCap*) <https://coinmarketcap.com/> accessed 4 November 2020.

[21] 'Coinbase Custody Acquires Xapo's Institutional Business, Becoming the World's Largest Crypto…' (*Medium*, 19 August 2019) <https://blog.coinbase.com/coinbase-custody-acquires-xapos-institutional-business-becoming-the-world-s-largest-crypto-2c1b46fc94c4> accessed 4 November 2020.

[22] Nick Szabo, 'The Idea of Smart Contracts' (1997) <https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/idea.html> accessed 22 October 2020.

[23] Vitalik Buterin, 'A next Generation Smart Contract & Decentralized Application Platform' (2014) 36 <https://cryptorating.eu/whitepapers/Ethereum/Ethereum_white_paper.pdf> accessed 22 October 2020.

[24] 'Cryptocurrency Prices, Charts And Market Capitalizations' (*CoinMarketCap*) <https://coinmarketcap.com/> accessed 4 November 2020.

For Ethereum, a huge milestone was standardising these types of contracts through common interfaces. The first of these was ERC20,[25] which has been used to create more than three hundred thousand distinct coins.[26]

III. Cryptocurrencies: A Legal Riddle

Despite their relevance in our society, the status of cryptocurrencies in English private law is still unsettled and largely disputed.[27] The critical juncture in the scholarly debate is whether bitcoins and all other cryptocurrencies could (and should) count as property.[28] Far from being merely academic lucubration or a verbal dispute, this so-called 'property question' has far-reaching implications in at least two practical respects.[29] Firstly, determining that something ('*x*') is property has a facilitative effect: we expand the range of ways that an owner ('A') can deal with *x* (for example, enabling A to maximise *x*'s value or alienate it if she so wishes). As noted by Tatiana Cutts, recognition of *x*'s proprietary status often practically translates, among other things, into A's ability to (a) devise *x*; (b) settle *x* on trust; (c) secure rights on *x*; or (d) include *x* in a company's estate for the purposes of insolvency proceedings.[30]

Secondly, finding that *x* counts as property has a protective effect: we can legally safeguard A's connection to *x* by imposing so-called 'exclusionary duties' on others (e.g., tortious liability in conversion or interference with goods).[31] Furthermore, many statutes make express reference to 'property' so that both their effect and application are largely dependent on proprietary status.[32] Seeing how consequential the proprietary label can be, it is then critical to clarify when it can

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[25] Artur Gontijo and Sam Richards, 'ERC-20 Token Standard' (7 December 2020) <https://ethere-um.org/en/developers/docs/standards/tokens/erc-20/> accessed 4 November 2020.

[26] 'Token Tracker | Etherscan' (*Ethereum (ETH) Blockchain Explorer*) <http://etherscan.io/tokens> accessed 17 February 2021.

[27] Kelvin FK Low and Ernie GS Teo, 'Bitcoins and Other Cryptocurrencies as Property?' (2017) 9 Law, Innovation and Technology 235, 235-236; see also UK Jurisdiction Taskforce (n 5) 9.

[28] Low and Teo (n 27) 235.

[29] Paul T Babie and others, 'Cryptocurrencies as Property: Ruscoe and Moore v Cryptopia Limited (In Liquidation) [2020] NZHC 728' (2020) University of Adelaide Law Research Paper No. 2020-33, 1 <https://papers.ssrn.com/abstract=3578264> accessed 25 October 2020.

[30] Tatiana Cutts, 'Crypto-Property: Response to Public Consultation by the UK Jurisdiction Taskforce of the LawTech Delivery Panel' (2019) LSE Law Policy Briefing Papers 36/2019, 3 <https://papers.ssrn.com/abstract=3406736> accessed 8 November 2020.

[31] ibid 3.

[32] By way of example, see the Theft Act 1968, s 4(1).

rightly be used. For this purpose, we now turn to unpack the very concept of 'property'.

A. Property: a primer

Firstly, it is inaccurate to speak of 'property' in terms of objects (e.g., 'the car is my property').[33] It is widely agreed that 'property' refers to a type of rights we have *in* objects.[34] Specifically, property rights bind an indeterminate class of people with respect to a thing (a so-called 'res'). We could refer to them as 'rights in something' or 'rights *in rem*' if we are to use a vexed terminology dating back to Roman jurisprudence.[35] If property rights usually affect the world at large, *personal* rights have a more limited effect instead and are only binding on one or a few parties. We could classify the latter as 'rights *vis-à-vis* someone' or 'rights *in personam*'.[36]

Sure enough, the third-party effect cannot account for what makes a right proprietary in the first place. It is just a *consequence* of the property status, not its conceptually-defining feature. In fact, we might face a charge of circularity if we were to define property in terms of its third-party effect: ultimately, we would be saying that (i) a right is proprietary if it affects third parties and that (ii) a right affects third parties *because* it is proprietary.[37] As a result, some have found that property should be better characterised as 'a bundle of rights' (which may consist, among other things, of the right to alienate, devise or secure rights on *x*).[38] Others have taken a narrower view and conceptualised property as simply 'a right to exclude'.[39] On this view, we have property in *x* when the law acknowledges that others owe us a duty not to interfere with *x*: their duty of non-interference correlates with our *right* to exclude them from *x*.[40]

Importantly for the purposes of our argument, English law traditionally divides property into two categories: land ('real' property) and chattels ('personal'

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[33] UK Jurisdiction Taskforce (n 5) para 35.

[34] ibid paras 35–36.

[35] For an analysis and critique of this terminology, see Pavlos Eleftheriadis, 'The Analysis of Property Rights' [1996] 16(1) Oxford Journal of Legal Studies 31.

[36] It is worth noting that most commentators find that all rights are ultimately rights against a person (rights in personam); see Wesley Newcomb Hohfeld, *Fundamental Legal Conceptions As Applied in Judicial Reasoning* (Walter Wheeler Cook ed, Yale University Press 1919).

[37] See Kevin Gray, 'Property in Thin Air' (1991) 50(2) The Cambridge Law Journal 252, 293.

[38] Eric R Claeys, 'Property 101: Is Property a Thing or a Bundle?' (2009) 32(3) Seattle University Law Review 637.

[39] James E Penner, 'The Bundle of Rights Picture of Property' (1995) 43(3) UCLA Law Review 711; Thomas W Merrill, 'Property and the Right to Exclude' (1998) 77(4) Nebraska Law Review 730.

[40] Penner (n 39); James E Penner, *The Idea of Property in Law* (Oxford University Press 2000).

property).[41] The category of chattels (specifically, that of 'chattels personal') is further divided into two subject-matters: things in possession and things in action. In the sections below, we will see how this distinction relevantly plays out in the context of cryptocurrencies and their legal categorisation.[42]

B. Cryptocurrencies in english private law

The question over the legal status of cryptocurrencies (for the sake of brevity, we will refer to this as the 'crypto-property question') was addressed for the first time in the Common Law world in *B2C2 v Quoine*, a judgement delivered by the Singapore International Commercial Court in March 2019.[43] The facts were as follows. The defendant Quoine operated a crypto-currency-exchange platform. Following a technical glitch in its trading algorithm, Quoine inadvertently carried out some trades at two hundred and fifty times the market rate. Holding cryptocurrencies on Quoine's platform, B2C2 profited largely from the error in their system. Unsurprisingly, Quoine quickly moved to reverse the trades after detecting the glitch. B2C2 alleged that Quoine held the traded cryptocurrencies on trust for them and that reversing the trades amounted to a breach of trust. Since an asset can only be held on trust if it is capable of amounting to property in the first place, the crypto-property question loomed large in *Quoine*.[44] Even so, the issue was given short shrift in the judgement. Seeing as the defendant Quoine accepted that cryptocurrencies could be *treated as* property, Thorley IJ felt no need to dwell on the issue any further. Still, he swiftly acknowledged that this was the correct legal position, noting that cryptocurrencies have 'the fundamental characteristic of intangible property as being an identifiable thing of value'.[45]

On the other hand, the first known case to confront the crypto-property question in the UK was *Robertson v Persons Unknown*.[46] In that case, Mr Robertson had been involved in a spear-phishing attack and was tricked into transferring £1m worth of Bitcoins into a swindler's account. Mr Robertson sought an interlocutory

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[41] Technically, chattels are first divided in 'chattels real' (i.e., leasehold interests) and 'chattels personal'. It is the category of chattels personal to be then further divided into things in action and things in possession: see MG Bridge, *Personal Property Law* (4th edition, Oxford University Press 2015) 12-13.

[42] See Sections IV, V, and VI below.

[43] *B2C2 Ltd v Quoine Pte Ltd* [2019] SGHC(I).

[44] Sarah Green, 'Cryptocurrencies in the Common Law of Property' in David Fox and Sarah Green (eds.), *Cryptocurrencies in Public and Private Law* (OUP 2019) 141 ('A crypto-coin can never become the subject matter of a trust or a proprietary right of security, nor will it be an asset in a deceased person's estate, unless it is first recognised as an object of property'); UK Jurisdiction Taskforce (n 5) paras 35-37; *Ruscoe and Moore* [2020] NZHC 728, [63] (Gendall J)(New Zealand).

[45] *Quoine* (n 43) [142] (Thorley IJ).

[46] *Liam David Robertson v Persons Unknown* (CL-2019-000444, 15 July 2019)(QB).

Asset Preservation Order (APO) over one hundred stolen Bitcoins, eighty of which were intercepted at Coinbase in the UK.

In the High Court, Mrs Justice Moulder found that the question of whether Mr Robertson had property in the cryptocurrencies, was a seriously triable issue. As a result, she granted both an Asset Preservation Order (APO), prohibiting any dealing with the intercepted Bitcoins, and a *Bankers Trust* order enjoining Coinbase to disclose any information it had on the fraudster.[47] Even if it was but an interim decision, *Robertson* was a first step in evidencing English courts' readiness to tackle the crypto-property question head-on and in particular, to treat cryptocurrency as property, if and when necessary.

Similarly, in *Vorotyntseva v Money-4 Ltd* the High Court granted the claimant a worldwide freezing order against cryptocurrency platform Money-4 (trading as Nebeus).[48] Mrs Vorotyntseva had transferred £1.5m worth of Bitcoins and Ethereum to Nebeus, to hold it on its platform. When Mrs Vorotynteseva began to suspect that her funds could be dissipated (and given that no evidence to the contrary effect was forthcoming), she applied for a worldwide freezing order against Money-4. At the interlocutory hearing, Birss J was satisfied that there was an actual risk of dissipation and moved to grant a freezing order prohibiting any future disposal of the relevant cryptocurrencies.[49] Importantly, Mr Justice Birss found it unproblematic that the court could grant a *proprietary* injunction on the facts of the case. He noted that no one had ventilated any possibility that Mrs Vorotyntseva was not entitled to the cryptocurrencies nor "any suggestion that cryptocurrency cannot be a form of property".[50]

Despite signalling English judges' welcome pragmatism and their preparedness to treat cryptocurrencies as property, both the interlocutory decision in *Vorotyntseva* and the one in *Robertson*, failed to shed light on the legal basis of the would-be proprietary status of cryptocurrencies. Eventually, a more coherent and reasoned analysis of the issue was articulated in a legal statement released by the UK Jurisdictional Taskforce (UKJT) of the LawTech Delivery Panel ('the

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[47]   ibid (Moulder J).
[48]   *Vorotyntseva v Money-4 Ltd, t/a Nebeus.com* [2018] EWHC 2598 (Ch).
[49]   ibid [10] (Birss J).
[50]   ibid [13] (Birss J).

Statement'). Albeit not technically binding, the Statement is still a highly persuasive authority and has already been relied upon in a few recent judgements.[51]

C. The legal statement

In the main, the Statement finds that cryptocurrencies can in principle be treated as property.[52] In its discussion of property, the Statement appeals to the 'necessary characteristics' of property as identified by the House of Lords in *Ainsworth*: (i) definability; (ii) identifiability by third parties; (iii) power to affect (and be assumed by) third parties and; (iv) permanence or stability.[53] The Statement further adds (i) certainty; (ii) exclusivity; (iii) control and; (iv) assignability as other indicia, recognised in the case law to be critical to the proprietary status.[54] After recapping these alleged pre-requisites of property at common law, the Statement concludes that there is nothing automatically disqualifying cryptocurrencies from meeting all such conditions, in line with the High Court's approach in *Robertson* and *Vorotyntseva*.[55]

Still, the Statement acknowledges that there are some doctrinal complications in conceptualising cryptocurrencies as property. Above all else, there is the elephant in the room of the English case of *Colonial Bank v Whinney*.[56] In *Whinney*, Fry LJ held that "all personal things are either in possession or in action. The law knows no *tertium quid* [third thing] between the two".[57] That case has long been taken to state a fundamental proposition of law: only things that can be physically possessed and rights that can be claimed or enforced through legal action can be personal property – nothing else can.[58] Disquietingly enough, the Statement finds that cryptocurrencies can neither be physically possessed (they are by their very nature, intangible) nor embody any right capable of being enforced

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[51] *AA v Persons Unknown Who Demanded Bitcoin on 10th and 11th October 2019, Persons Unknown Who Own/Control Specified Bitcoin, iFINEX trading as Bitfinex, BFXWW Inc trading as Bitfinex* [2019] EWHC 3556 (Comm); *Ruscoe v Cryptopia Ltd (in Liquidation)* [2020] NZHC 728 (New Zealand).

[52] UK Jurisdictional Taskforce (n 5); specifically, the Statement refers to 'cryptoassets' and not 'cryptocurrencies'. But, as the sections below will show, what is said of cryptoassets applies to cryptocurrencies as well (in a technical sense, cryptocurrencies are just a subset of cryptoassets).

[53] *National Provincial Bank v Ainsworth* [1965] 1 AC 1175, 1247-48 (Lord Wilberforce). This test has been subjected to heavy criticism for its apparent circularity: see Martin Dixon, *Modern Land Law* (Routledge 2018) 6 ('the definition is clearly circular, for only if a right is already proprietary is it capable of assumption by third parties (that is, of affecting people who did not create it). After all, the search for an answer to the question – does it bind third parties? – is often the very reason why we need to establish the proprietary or personal nature of the right in the first place.'); Gray (n 37); *Yanner v Eaton* (1999) 201 CLR 351 (HCA), 366.

[54] UK Jurisdictional Taskforce (n 5) para 39; *Fairstar Heavy Transport NV v Adkins* [2013] EWCA Civ 886.

[55] UK Jurisdictional Taskforce (n 5) para 85.

[56] *Colonial Bank v Whinney* (1885) 30 Ch D 261 (CA).

[57] ibid 285 (Fry LJ). The House of Lords endorsed Fry LJ's dictum: (1886) 11 App Cas 426 (HL).

[58] UK Jurisdictional Taskforce (n 5) paras 66–84.

through legal action.[59] On this view, they are neither things in possession nor things in action.

Nevertheless, the Statement resists the conclusion that cryptocurrencies are not property. Instead of throwing in the towel and taking *Whinney* at face value, it notes that property has sometimes been recognised in things that were presumably neither things in possession nor things in action.[60] Take the milk quotas in *Dairywise Farms*, the waste management licences in *Re Celtic* and the carbon emission allowances in *Armstrong* – these were all held to constitute property, albeit failing to fit any doctrinal partition.[61] For the Statement, the case law is reason for hope: English law seems willing to stretch the doctrinal boundaries of property and dispense with watertight compartments if society and modern commercial needs so require. Pragmatically, the doctrine could be stretched in two ways: either by diluting the notion of 'things in action' and taking it as a catch-all phrase for all items of property that are not in possession, or by the admission of a third box of personal property (that of often-called 'intangibles').

In line with the Statement, many from the academic ranks have similarly expressed the view that cryptocurrencies are neither things in possession nor in action, whilst still trusting that a toolbox of 'intangibles' could be used to rescue them from legal limbo.[62] All things considered, the legal debate exudes optimism: despite the House of Lords' judgement in *Whinney*, cryptocurrencies will somehow elbow their way into property law. However, there are reasons to be more cautious and to endorse a "pessimism of the intellect, optimism of the will"[63] in Antonio Gramsci's words. As a matter of fact, *Whinney* has never been overruled. Sitting on the Court of Appeal in *Your Response* in 2014, Moore-Bick LJ found that *Whinney* made it "very difficult to accept that the common law recognises the existence of intangible property other than [things] in action (apart from patents, which are subject to statutory classification)".[64] Interestingly, many statutes expressly stretch the notion of property to include things in action and "other intangible property".[65] The fact that 'other intangible property' is invoked *separately* from (and in addition to) 'things in action' may precisely suggest that the latter category is no catch-all receptacle. Were this the case, we would be left with one option to squeeze cryptocurrencies into property law – namely, that of hoping they could fit the space of 'intangibles', despite it being a judicially-undefined category and one whose very

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[59] ibid.

[60] ibid paras 82–84.

[61] *Dairy Swift v Dairywise Farms Ltd* [2000] 1 WLR 1177 (Ch); *Re Celtic Extraction Ltd* [1999] EWCA Civ 1835, [2001] Ch 475; *Armstrong v Winnington* [2012] EWHC 10, [2013] Ch 156.

[62] By way of example, see David Fox, 'Cyber-currencies in private law' [2016] OtaLawFS 13.

[63] Francesca Antonini, 'Pessimism of the Intellect, Optimism of the Will: Gramsci's Political Thought in the Last Miscellaneous Notebooks' (2019) 31(1) Rethinking Marxism 42.

[64] *Your Response v Datateam Business Media* (n 5) [26].

[65] By way of example, see the Theft Act 1968, s 4(1), the Proceeds of Crime Act 2002, s 340(9)(c), and the Fraud Act 2006, s 5(2)(b).

existence is still shrouded in doctrinal mystery. Sure enough, the ultimate threat would still loom large: if *Whinney* were to be reaffirmed by the Supreme Court and appeal to the category of 'intangibles' expressly undercut, cryptocurrencies could quickly be expunged from the proprietary compass.[66] However, a crucial point must be noted. The *Whinney* challenge stands *only* as long as we concede that cryptocurrencies are neither things in possession nor things in action. Our point is that we should not make this concession.

Against the Statement and the bulk of legal scholarship, we argue that cryptocurrencies are things in action. The argument we provide to this effect is structured as follows: Firstly, we show that cryptocurrencies are smart-contractual rights, that is, everyone holding a 'coin' has ultimately a smart-contractual right or, that is the same, a cryptographic faculty to spend (or unlock) the coin itself. This holds true both in the UTXO model (where each user's coin is nothing but an unspent transaction output) and in the account-based model (where each user's coin reflects their balance in the system). Secondly, we show that smart-contractual rights can indeed be considered contractual rights, in light of recent developments and of the Statement itself. Thirdly and lastly, by showing that cryptocurrencies are ultimately contractual rights, we conclude that they can indeed be classified as things in action. Therefore, they can be property irrespective of the fate of *Whinney* and its alleged doctrinal bipartition.

IV. Cryptocurrencies as Smart-Contractual Rights

In this section, we will support the following claim: in cryptocurrencies, the 'coins' can be identified with, and ultimately *are* smart-contractual rights. In fact, as our argument will show, cryptocurrencies are always underpinned by a specific class of smart contracts. We can only appreciate this point once we acknowledge the technical similarity in how cryptocurrencies and smart contracts are implemented. This technical fact, albeit discussed in the specialist literature,[67] has seemingly gone unnoticed in English legal scholarship. As a result, its far-reaching implications for the legal categorisation of cryptocurrencies have never been explored. Although a very similar argument can be made in general for all *cryptoassets*, we will focus on cryptocurrencies for the purposes of this article.

Let us start from the basics. In order to implement cryptocurrencies, we have to answer the fundamental question of how to algorithmically represent money. Generally, this can be done via two algorithmic models: the Unspent

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[66] See also Michael G Bridge and others, *Law of Personal Property* (Sweet & Maxwell 2018) paras 7–128.

[67] Simon Geiregat, 'Cryptocurrencies Are (Smart) Contracts' (2018) 34(5) Computer Law & Security Review 1144; Buterin (n 23) 36.

Transaction Output (UTXO) model and the account-based model.[68] The choice between the two depends on a technical property (so-called 'statefulness') that a given blockchain may or may not have.[69] Informally, the difference between the two models roughly maps onto the one between banknotes and debit cards. In the case of banknotes, as with UTXOs, money is represented by a set of notes of a certain denomination currently in one's possession. On the other hand, with debit cards, money is represented at any given time by a balance associated with one's account.

A. UTXOs AS SMART-CONTRACTS

The UTXO model is most notably used in Bitcoin and was first introduced by Satoshi Nakamoto. In these types of blockchains, the total supply of coins is represented by the set of currently valid UTXOs, that is, the *results* of transactions confirmed by the network which have not been spent yet. In particular, each transaction contains inputs and outputs (adding up to the same value), and each input must refer to a previous unspent output. Thus, double-spending can be detected when two or more competing transactions seek to spend the same output. A balance for a party can here be understood as the sum of the unspent outputs currently in their wallet.

In this framework, a transaction works as follows. Suppose Alice has two 10 Bitcoins UTXOs in her wallet (a balance of BTC20) and she wants to send BTC15 to Bob. She can create a transaction with her two UTXOs as inputs, and as outputs BTC15 for Bob and BTC5 as her change. After the transaction is settled, these outputs will become the new UTXOs in their respective wallets. Since only Alice can spend her coins, the spender(s) must prove cryptographical ownership of the UTXO in order to build the transaction. This is typically done by providing a digital signature of the output with a specific private key, but possibly by a more complicated criterion (such as providing multiple signatures), which is specified by

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[68] 'Ethereum Design Rationale' (*Ethereum Wiki*) <https://eth.wiki/en/fundamentals/design-rationale> accessed 4 November 2020. For alternative models, see Colin LeMahieu, 'RaiBlocks: A Feeless Distributed Cryptocurrency Network' 8 <https://content.nano.org/whitepaper/Nano_Whitepaper_en.pdf> accessed 4 November 2020; Serguei Popov, 'The Tangle' (2018) <https://assets.ctfassets.net/r1dr6vzfxhev/2t4uxvsIqk0EUau6g2sw0g/45eae33637ca92f-85dd9f4a3a218e1ec/iota1_4_3.pdf> accessed 4 November 2020. It is worth noting that the arguments we make can be also applied to these cases, but are omitted for brevity.

[69] Statefulness refers to whether a blockchain acts only as a method of timestamping transactions, or it also explicitly associates a "state" with each block.

the UTXO itself. No matter the spending criterion, the coins 'can only be either spent or unspent'.[70]

Since spent coins cannot be spent again, each UTXO cryptocurrency offers only one cryptographically-enforceable right: *to* spend, *or* unlock, *the coins only once, at any time, by using it as an input in a transaction after satisfying the pre-agreed criterion*. Sure enough, by 'right', we do not yet mean 'legal right'. What we mean is simply that spending your coin is something that the platform recognises as cryptographically legitimate: you just have the possibility of doing so.[71] Whether you have the faculty of spending or unlocking a coin is something determined through cryptographic computations, executed under the consensus of a peer-to-peer network and in a decentralised and trustless way. We will now show that this right to spend or unlock the coin is in fact smart-contractual. To do so, it is necessary to clarify what is meant by 'smart contract'.

Surely, giving an exact definition of a smart contract is impracticable owing to the historical evolution of the term. Given the relevance of the project, we will follow the informal definitions given in Ethereum: namely, that of smart contracts as 'cryptographic boxes that contain value and only unlock it if certain conditions are met,' or pieces of code implementing arbitrary rules to directly control digital assets.[72] It seems evident that UTXOs meet both these definitions: they encode the conditions under which coins may be spent. It follows that we may consider the UTXOs a special class of smart contracts.

Besides, it is worth noting that some blockchains allow users to *specify* the unlocking conditions for the outputs by expressing them in custom ('mini') programming languages. Such UTXOs are often referred to as 'contracts'.[73] They are also mentioned in the Ethereum White Paper, which states that "even without any extensions, the Bitcoin protocol actually does facilitate a weak version of a concept of smart contracts".[74] Therefore, we reach our desired conclusion. If UTXOs are just smart contracts, each 'coin' under the UTXO model is ultimately

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[70] Buterin (n 23) 12.

[71] This is why a common motto by cryptocurrency users is 'not your keys, not your coins'. As a legal example of this, see the US Case *Archer v. Coinbase, Inc*. 53 Cal App 5th 266 (2020).

[72] Buterin (n 23) 13.

[73] 'Contracts — Bitcoin' <https://developer.bitcoin.org/devguide/contracts.html> accessed 4 November 2020.

[74] Buterin (n 23) 11.

just a smart-contractual right: having a Bitcoin (or any other UTXO cryptocurrency) just means having a smart-contractual right to unlock an output.

B. Accounts as smart-contracts

We are yet to show that the same holds true for account-based cryptocurrencies. In this model, each agent in the network is assigned a balance, a non-negative number representing the quantity of assets in their possession.[75] To parallel the example above, suppose Alice has 20 Ether (monetary units in Ethereum) as her balance, and wishes to transfer ETH15 to Bob, whose current balance is ETH10. Seeing that the amount transferred is not greater than the balance, the network will approve the transaction, subtracting ETH15 from Alice's balance and adding them to Bob's. The resulting balances are ETH5 for Alice and ETH25 for Bob.

We can here reiterate the reasoning followed above for UTXOs. We can identify each coin under the account model as a cryptographically-enforceable right (or faculty) *to spend any fraction of the balance at any time by providing a digitally signed transaction with the private key that controls the account*. Since this happens under the consensus of the blockchain network and the account serves as a cryptographic 'box' holding the asset, the account itself meets the given definitions of a smart contract. Again, we reach our desired conclusion. If blockchain accounts are just smart contracts, then the 'coins' under the account-based model are nothing but smart-contractual rights: briefly put, having some Ether (or any other account-based cryptocurrency) just means having a smart-contractual right to spend or unlock a fraction of one's balance.

V. Smart-Contractual Rights as Contractual Rights

In the preceding section, we have shown that 'coins' are always ultimately smart-contractual rights, both in the UTXO model and in the account-based model. We now turn to the second critical point in our argument: namely, that cryptocurrencies are also *contractual* rights by virtue of their smart-contractual nature.

No authority has settled the status of smart contracts in English law.[76] Nevertheless, the Legal Statement handed down by the UK Jurisdictional Taskforce (explored above) notes that smart contracts are most likely to be treated as traditional contracts, and enforced as such, by English courts.[77] The Statement registers a few main features of smart contracts: (i) automaticity; (ii) use of a networked system

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[75] Gavin Wood, 'Ethereum: A Secure Decentralised Generalised Transaction Ledger' (2014) 3 <https://ethereum.github.io/yellowpaper/paper.pdf> accessed 4 November 2020.

[76] For a useful overview of the topic, see Larry A DiMatteo, Michel Cannarsa and Cristina Poncibò, *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2019).

[77] UK Jurisdictional Taskforce (n 5) para 136.

relying on cryptographic authentication, decentralisation and consensus to execute contractual performance and; (iii) obscurity of contractual terms to those unfamiliar with the relevant programming language.[78] In the Statement's view, none of these features should disbar smart contracts from being enforceable just like conventional contracts.[79] Contract law is ultimately about enforcing promises and does not require contracts to have a particular form.[80] As a consequence, the fact that the smart-contractual promises are meant to be executed automatically or in a 'mechanistic way' should make no difference to their legal enforceability.[81] Nor should one think that there is simply no scope for the law to operate with smart contracts. Sure enough, smart contracts may prevent intentional non-performance (or make it very much harder) and leave smaller room for factual disputes or conflicting interpretations of terms. Still, unpredicted events external to the platform (e.g., a system failure) may affect contractual execution, and the code may sometimes yield unexpected or unintended outcomes. In either case, any ensuing dispute may be settled only by legal means and should therefore be amenable to adjudication.

Although it usually does not require contracts to have any given form, English law will enforce only those promises that satisfy the traditional conditions for the formation of a contract: agreement (that is, offer and acceptance), intention to be legally bound and consideration.[82] Some smart contracts may satisfy all these conditions; others may not. The smart contracts underlying cryptocurrencies usually will. Consider the scenario where Alice acquires a UTXO.[83] Alice is (objectively) accepting the terms of the platform she chooses to transact on, whatever that may be: all participants in the network will 'promise' Alice to allow her to unlock any of her unspent transaction outputs (UTXO) if she satisfies the underlying cryptographic criteria, and she will promise the same to any other participant on the platform.[84] The agreement is inferred by the parties, *objectively* accepting the code and transacting on its basis.[85] Similarly, consideration is established through the parties' mere exchange of 'promises'.[86] Admittedly, it may

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[78] ibid para 135.
[79] ibid paras 136-148.
[80] ibid.
[81] ibid para 136.
[82] ibid para 137.
[83] The same applies by analogy to the Accounts model, and therefore to all cryptocurrencies exhaustively.
[84] Promises are not express, but they rarely can be in smart contracts running on decentralised systems. As the Legal Statement suggests, new contractual scenarios will require new (and unusual) forms of conduct to be considered: UK Jurisdictional Taskforce (n 5) para 146.
[85] UK Jurisdictional Taskforce (n 5) para 148.
[86] See above (n 84).

seem harder to establish the parties' intention to be legally bound, all the more so given that the users may often not even know each other's identity. However, the Statement itself suggests a nice way out: that is, analogising this contractual scenario to unincorporated associations (like clubs). Here, the association itself has no legal status, but all its members contract with the membership taken as a whole: crucially, their intention to be legally bound is objectively inferred from their decision to join the association in awareness of its rules. The Statement uses this analogy to conclude that the parties to a Decentralised Autonomous Organisations (or 'DAOs', defined by one party publicly deploying a platform – i.e., a code – and other parties transacting on the basis of the smart contract running the platform) should be contractually bound to each other. Ironically, Bitcoins can be considered the first fully-operational DAO, and all platforms underlying cryptocurrencies under our previous analysis can too.[87] What is more, the Statement reminds us of a fundamental point: "as the 'contracting' diverges further from traditional contractual models, less conventional conduct will need to be considered".[88]

All things considered, the smart contracts running cryptocurrencies in both the UTXO and account-based models are most likely to be treated and analysed as enforceable contracts. It follows that, if the cryptocurrencies themselves are shown to be smart-contractual rights (as we showed above), then they are also proven to be *contractual* rights.

VI. Contractual Rights as Property

So far, we have established two critical points: namely, that (i) cryptocurrencies (or 'coins') are smart-contractual rights; and, by way of corollary, that (ii) cryptocurrencies are contractual rights too. We now turn to our last point and final link in our argumentative chain: namely, that it follows from their characterisation as contractual rights that cryptocurrencies are *property*.

This last point is not a problematic one to make. It is an undisputed proposition of law that contractual rights are things in action.[89] In *Torkington v Magee*, things in action were indeed described as "all personal rights of property which can only be claimed or enforced by action and not by taking physical possession".[90] It nicely follows that, if cryptocurrencies are contractual rights, then they are things in action too. On this view, it is doctrinally straightforward to conclude that

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[87]   Ying-Ying Hsieh and others, 'Bitcoin and the Rise of Decentralized Autonomous Organizations' (2018) 7 Journal of Organization Design 14.

[88]   UK Jurisdictional Taskforce (n 5) para 146.

[89]   See also WS Holdsworth, 'The History of the Treatment of "Choses" in Action by the Common Law' (1920) 33(8) Harvard Law Review 997.

[90]   *Torkington v Magee* [1902] 2 KB 427, 430 (Channell J).

cryptocurrencies are property. Our contribution to the debate is precisely that this conclusion stands *regardless* of the fate of *Whinney* and its *prima facie* bipartition of property into things in possession and things in action only.

VII. Conclusion

In the present article, we offered an easy, yet largely overlooked solution to the crypto-property puzzle. Namely, to treat cryptocurrencies as things in action. Finding that cryptocurrencies reflect no legal rights, most scholars and the Legal Statement itself quickly dismiss the things-in-action option out of hand. This move is unwarranted. By closer technical inspection, cryptocurrencies are shown to be *smart-contractual* rights: each 'coin' is ultimately a cryptographically-enforceable faculty to unlock an output in the UTXO model or spend any fraction of one's balance in the account-based model. If smart contracts are treated like ordinary contracts, rights under smart contracts are nothing but mere contractual rights. We showed that the smart contracts running cryptocurrencies are most likely to be treated as enforceable contracts. It follows that, by virtue of their smart-contractual nature, cryptocurrencies are indeed contractual rights and, therefore, things in action. Our hope is that this may prove a doctrinally-watertight way of concluding that cryptocurrencies can be property: and crucially, one that does away with the need to interpret very loosely, or even turn a blind eye to, Fry LJ's judgement in *Colonial Bank v Whinney*. We no longer have to overstretch the category of 'things in action' or rely on an undefined category of 'intangibles' to fit the crypto-universe into English property law discourse. By virtue of their smart-contractual (and thereby, contractual) nature, cryptocurrencies are already property in their own right.