Exploring the Assetisation and Financialisation of Non-fungible Tokens (NFTs): Opportunities and Regulatory Implications

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Abstract

This article explores the emerging phenomenon of use cases for Non-fungible Tokens (NFTs) in novel forms of crypto-finance, a stage we call 'NFT financialisation', that can be developed from stages of consumption and commoditisation of NFTs, which are increasingly observed. Despite the emerging contests regarding property rights conferred by NFTs, the needs for commoditisation and financialisation in NFT markets would likely shape the delineation and framing of such rights in order for users to exploit the asset potential of NFTs. We argue that an institutional response is timely and beneficial for NFT financialisation. Financial regulatory governance can provide the institutions of market certainty and order, also fostering the clarification and standardisation of property framing underlying NFTs. We explore aspects of financial regulatory governance for supporting the investment mobilisation of NFTs and suggest that these provide insights too for the broader regulatory agenda for crypto-finance, including novel forms of fund-raising and Decentralised Finance (DeFi). Such financial regulatory governance involves reform and we provide a critical discussion of the EU's Markets in Crypto-assets Regulation in relation to NFT financialisation. We also suggest that NFT financialisation reinforces the need for financial regulatory agencies to confront the challenges that crypto-finance brings, in relation to unconventional products and services, by reconsidering the limitations of their scope and mandates.

Introduction

In the world of blockchain-based digital revolution, the recent market growth for 'non-fungible tokens' has been remarkable, estimated at about USD$25bn in sales in 2021.[1] 'Non-fungible tokens' (NFTs) are usually created based on the ERC-721 template[2] that allows for unique identification and metadata coding, producing digital tokens that are distinct and not interchangeable.[3] These are distinguished from fungible tokens developed for blockchain networks that serve payment purposes, such as ether in the Ethereum blockchain, and asset-type tokens pre-sold for developmental projects at initial coin offerings (ICOs),[4] usually built upon the ERC-20 template.

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[1] 'NFT sales hit $25 billion in 2021, but growth shows signs of slowing' (Reuters, 11 Jan 2022), hhttps://www.reuters.com/markets/europe/nft-sales-hit-25-billion-2021-growth-shows-signs-slowing-2022-01-10/#:~:text=NFT%20sales%20volume%20totalled%20%2424.9,record%20who%20owns%20the%20NFT.
[2] Thomas N Doty, 'Blockchain Will Reshape Representation of Creative Talent' (2019) 88 UMKC L Rev 351.
[3] EU Blockchain observatory and Forum, 'NFT- Legal Token Classification' (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3891872.
[4] S Adhami et al, 'Why do Businesses Go Crypto? An Empirical Analysis of Initial Coin Offerings' (2018) 100 Journal of Economics and Business 64; the debates in characterising the nature of ICOs and their pre-sold tokens can be found in Jonathan Rohr and Aaron Wright, 'Blockchain-based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets' (2019) 70 Hastings Law Journal 463; TL Hazen, 'Tulips,

'Non-fungible' tokens have been used to represent: ownership of creative works, many of which are digital; gaming artefacts; and even rights in real-world assets, such as 'slices' of rights in real estate or high-value assets. Such real economy assets may be large or high value, and tokenisation allows rights in them to be 'sliced' and fractionallised so as to be co-financed and co-owned by a body of investors.[5] In other use cases, an NFT is created to represent a kind of 'digital twin' of a real-world asset. This might be for purely informational purposes, or it might be intended to enable dealings with the rights in the 'real world'.[6] The arrival of this technology has been described as being capable of commercialising new rights,[7] as well as creating a new asset class altogether.[8]

The assumed 'property' in the NFT is arguably what underpins the market value of NFTs at the moment. Where digital art or gaming artefacts are concerned, the NFT is perceived as digital representation of ownership, creating value for collectors and transferring fair value to creators of such collectibles.[9] 'Ownership', however, seems frequently to be understood by market participants in a general rather than a legal-technical sense,[10] and sceptics doubt that the 'property' in the NFT that can be exploited or enjoyed by collectors amounts to anything much at all.[11] What rights can be articulated with regard to NFTs is a question underpinned by the contestation of interests related to the different use cases for NFTs, discussed in Section A. This is hardly surprising as the commoditisation of new rights would likely give rise to legal debates on their characterisation.

Where tokenisation of real-world assets is concerned, it is also concerning as to how slices of rights in real estate or fractionalised ownership can be implemented and legally recognised. Does co-ownership of a residential property give rise to x number of days of exclusive enjoyment, or exclusive enjoyment of a room? Further, how is governance over common features to be exercised? Uncertainties not only exist in legal characterisation of

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Oranges, Worms, and Coins - Virtual, Digital, or Crypto Currency and the Securities Laws' (2019) 20 North Carolina Journal of Law and Technology 493; Philipp Maume and Matthias Fromberger, "Regulation of Initial Coin Offerings: Reconciling U.S. and E.U. Securities Laws" (2019) 19 Chicago Journal of International Law 548; Alex Collomb, Primavera de Fillippi and Klara Sok, 'Blockchain Technology and Financial Regulation: A Risk-Based Approach to the Regulation of ICOs' (2019) 10 European Journal of Risk Regulation 263; Yuliya Guseva, 'A Conceptual Framework for Digital-Asset Securities: Tokens and Coins as Debt and Equity' (2020) 80 Md L Rev 166.

[5] 'Which real-world assets are being tokenised?' and 'What are non-fungible tokens and how do they work?' (Financial Times, 30 Nov 2021), https://www.ft.com/content/ac33fb51-53a4-49a0-a4c4-fb92dc6ee241; https://www.ft.com/content/852b7961-51ee-43a3-8caf-f39bb479655c; 'Asset Tokenization: The Most Significant Innovation in Real Estate in 100 years' (2 July 2019) at https://medium.com/@ghhasenstab/asset-tokenization-the-most-significant-innovation-in-real-estate-in-100-years-64d229bdd890.

[6] This is a somewhat crude, but heuristically useful, short-hand to distinguish 'real world' objects, which may be physical or intangible, such as bank account money or legal obligations from in-game 'money' or obligations. Many such 'real-world' objects are digital.

[7] See Section A.

[8] Ibid.

[9] Tonya M Evans, 'Cryptokitties, Cryptography, and Copyright' (2019) 47 AIPLA Q J 219.

[10] See, eg, https://support.godsunchained.com/hc/en-us/articles/1500006242742-What-does-true-ownership-mean-Don-t-I-own-items-in-other-games- (accessed 20 March 2022).

[11] Kelvin Low, 'The Emperor's New Art: Cryptomania, Art & Property' (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3978241; Molly Roberts, 'The Darker Side of Non-fungible Tokens' (The Washington Post, 18 March 2021); 'What's Wrong with This Picture?' (The Economist, 20 March 2021).

novel renditions of 'property' or rights underlying NFTs, but also in the legal characterisation of NFTs themselves.

Despite the developmental nature of legal characterisation of rights relating to NFTs and their represented 'objects', market value has accelerated for NFTs. NFTs are being explored in the innovative space for blockchain-based finance, a phenomenon known as 'Decentralised Finance' or DeFi[12] in order to support different ways of monetising or liquefying the asset values in NFTs. In this paper, we argue that use cases of NFTs are being developed from a stage of *commoditisation* to a stage of *financialisation*. Despite contestable notions of 'property' in the characterisation of rights exercisable in relation to different types of NFTs, there is demand to generate 'capital' value out of NFTs. The financialisation of NFTs discussed in this paper ultimately involves derivations of fungible assets out of the principal 'capital' of NFTs. In this manner we argue that there is a role for financial regulatory governance to be engaged with NFT financialisation, and that this extension of governance would ultimately shape the parameters of legal characterisation for NFTs.

Section A proposes three dominant use cases for NFTs, namely: (i) consumption of the NFT, (ii) commercialisation of the subject matter underlying the NFT, and (iii) assetisation of the NFT in relation to access to finance (loosely referred to as 'NFT financialisation' in this paper). The first two use cases bring to fore debates regarding proprietary qualities of NFTs in order to situate the basis of their value. The 'capital or asset' value of NFTs presumably rests on this basis in order to give rise to NFT financialisation.

Section B situates the financialisation of NFTs within the sociological trend of continuous assetisation of infinite possibilities of subject matter. 'Capital mobilisation' is an anthropological trend reflecting the inherent human need for economic mobilisation and liberty, and this has played out in the commoditisation of digital objects in games, and now in permissionless blockchains. We perceive permissionless blockchains and their generation of commodities and assets as a positive development and argue that an institutional response for support and governance is needed.

We argue in Section C that financial regulatory policy should address NFT financialisation, and that regulators should not merely regard it as a fringe movement or as beyond their perimeter as 'non-financial' subject matter often underlies NFTs. Building upon earlier work by one of us[13] calling for the broad universe of crypto-finance to be subject to a considered and comprehensive framework for regulatory policy, we argue that financial regulation is able to provide an institutional response to emerging developments that is constructive, consistent with the human desire for economic mobilisation and financial opportunities while providing governance as a public good based on social trust in its institution.[14] In particular, financial policy-makers' approach to crypto-finance has been hitherto worryingly

[12] See Sections A, C.

[13] Chapter 7, Iris H-Y Chiu, *Regulating the Crypto-economy* (Oxford: Hart Publishing 2021), earlier version in 'Regulating Crypto-finance: A Policy Blueprint' (ECGI Working Paper 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3805878.

[14] Neil Fligstein, 'Markets as Politics. A political-cultural approach to market institutions' (1996) 61 American Sociological Review 656–673.

limited.[15] Section D provides sketches a way forward for regulatory architecture and provides concluding thoughts.

Section A: The Use Paradigms of NFTs

NFTs have been minted in relation to artworks such as the digital collage of '5,000 days' created by Beeple and sold by auction house Christie's for USD$69 million,[16] as well as in relation to collectible images and digital creations such as cryptokitties[17] and Cyberpunks.[18] The marketplaces for NFTs range from mainstream institutions such as established art auctioneers as well as new digital and gaming platforms that facilitate peer-to-peer commerce in NFTs.[19] Against this background, it could be questioned why this article should discuss NFTs and financial regulators. NFTs are 'non-fungible' and would seem to be worlds apart from fungible financial instruments over which financial regulators exercise jurisdiction. However, NFTs of fractionalised interests in real estate may be regarded as closely resembling 'Real Estate Investment Trusts' which are recognised as regulable by financial regulators. Further, new ways of connecting NFTs to financial transformation would compel regulators to respond.[20] In this manner, even if financial regulators do not have jurisdiction over housing markets or the markets for collectible wine, cars or antiques, organised financial intermediation conduct over such assets can be regulable.[21]

Based on empirical observation, the connection between NFTs and financial activity is an emerging phenomenon. In relation to real-world assets, NFT liquefication and trading are already observed on permissioned blockchains.[22] In the mainstream economy, non-financial

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[15] Financial regulators are most focused on innovations that reference mainstream financial assets, such as pegged stablecoins to mainstream currencies or assets, eg IOSCO Committee on Payments and Market Infrastructures, 'Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements' (Oct 2021), https://www.iosco.org/library/pubdocs/pdf/IOSCOPD685.pdf; Financial Stability Board, 'Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements' (Oct 2020), https://www.fsb.org/2020/10/regulation-supervision-and-oversight-of-global-stablecoin-arrangements/; HM Treasury, 'UK Regulatory Approach to Cryptoassets and Stablecoins: Consultation and Call for Evidence' (Jan 2021), https://www.gov.uk/government/consultations/uk-regulatory-approach-to-cryptoassets-and-stablecoins-consultation-and-call-for-evidence. That said, the Financial Stability Board is signalling open-ness to considering the risks of crypto-finance more broadly as scale and interrelatedness with mainstream finance have increased, see Financial Stability Board, Assessment of Risks to Financial Stability from Crypto-assets (16 Feb 2022), https://www.fsb.org/wp-content/uploads/P160222.pdf.

[16] 'Beeple sold an NFT for $69 million' (11 March 2021), https://www.theverge.com/2021/3/11/22325054/beeple-christies-nft-sale-cost-everydays-69-million.

[17] https://www.cryptokitties.co/; Charlotte Ducuing, 'How to Make Sure My Cryptokitties Are Here Forever? The Complementary Roles of Blockchain and the Law to Bring Trust' (2019) 10 European Journal of Risk Regulation 315.

[18] https://www.cyberpunk.net/gb/en/.

[19] Such as Nifty Gateway, https://niftygateway.com/; OpenSea, https://opensea.io/. Further, marketplaces for cryptocurrencies and cryptoassets of the fungible type have also diversified into providing NFT marketplaces, such as Okex, https://www.okex.com/defi/nft/markets and Binance, https://www.binance.com/en/nft/home.

[20] What are non-fungible tokens and how do they work?' (Financial Times, 30 Nov 2021), https://www.ft.com/content/852b7961-51ee-43a3-8caf-f39bb479655c.

[21] Sect. 235, UK Financial Services and Markets Act 2000 that provides for collective investment schemes of 'property', widely defined, to be regulated, see *Asset Land Investment Plc v The Financial Conduct Authority* [2016] UKSC 17; *Brown 7 Ors v Innovator One Plc and Ors*[2012] EWHC 1321.

[22] P Laurent, T Chollet, M Burke and T Seers, 'The Tokenization of Assets is Disrupting the Financial Industry. Are You Ready?' (Deloitte & Touche, 2019) at

items such as physical art has long been regarded as having investment value in the market, as well as intrinsic value in terms of its creative accomplishment aspects and social value/heritage aspects.[23] Technological advancements have now made it possible to create and render art and collectibles digitally. Further, the global gaming industry has grown significantly over recent years,[24] bringing with it new forms of digital-only commoditisation, such as in-game creations and objects, which are being further innovated upon in permissionless blockchains. Online marketplaces powered by smart contracting have global reach and provide access to instant commerce for the buy and sell sides, and blockchain technology opens up the space of peer-to-peer transactions. These developments are able to vastly transform opportunities for monetising the commodity in non-financial items that are made susceptible to digital representation. Where the channels, interfaces and opportunities for monetisation become scaled in the crypto-economy for non-financial items, we could reach a stage of 'financialisation' of such commodities. There is substantial interest in connecting NFTs with DeFi,[25] which is a collective term referring to different types of peer-to-peer financial innovations[26] purportedly not involving financial intermediaries (or at least the incumbent ones). This space is not subject to formal or systematic regulatory categorisation or extension at the present time. There is also interest in connecting NFTs with mainstream financial services and activities.[27]

It could be argued that we are still far away from the 'financialisation of everything' that could be brought about by NFTs tokenising various forms of rights in every possible object. However, it is important at this stage of development to ground the phenomenon of NFT financialisation. To do so, we first turn to a key debate—nature of rights created by non-fungible tokenisation, in particular, what may be characterised as 'property' capable of being owned and subsequently mobilised as 'asset'? This is important because clarity regarding 'property' rights might be the first step to establishing the 'capital' or 'asset' value of NFTs.

The Controversial Nature of NFTs

Not all NFTs are necessarily the same from the perspective of property law. Differentiating broadly between cryptoassets (including NFTs) that do and do not represent 'offchain' value, respectively, is helpful for structuring analysis in the first instance. Where there is an offchain relation to the NFT, it can be argued that 'technologically-neutral' treatment is the right approach, as the nature of the right tokenised or digitally represented need not change the nature of the right in relation to the offchain object. A timeshare of holiday property is not different just because it is 'tokenised' using blockchain technology rather than some

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https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/lu-tokenization-of-assets-disrupting-financial-industry.pdf.

[23] 'Introduction' in Michael Findlay, *The Value of Art* (Penguin Random House 2012).

[24] 'Global Gaming Industry Value Now Exceeds $300 Billion, New Accenture Report Finds' (29 April 2021), https://newsroom.accenture.com/news/global-gaming-industry-value-now-exceeds-300-billion-new-accenture-report-finds.htm.

[25] Such as Niftex, https://landing.niftex.com/ or Nftfy, which facilitate fractionalisation of NFTs for investment purposes, https://www.nftfy.org/; or NFTfi, https://nftfi.com/ which is a platform facilitating NFT collateralised loans.

[26] 'Collateralized NFTs and Stablecoins: Solving Decentralized Finance' (Stably, 5 May 2021). See Financial Stability Board (2022), pp15-18 on an overview of DeFi.

[27] 'NFTs in trade finance: the next frontier or bad idea?' (21 July 2021), https://www.gtreview.com/news/fintech/nfts-in-trade-finance-the-next-frontier-or-bad-idea/ as an example.

other data structure. However, tokenisation facilitates possibilities of slicing a greater variety of real-world substantial assets than previously thought,[28] such as 'fractionalised ownership' of an antique. It is not the technology of tokenisation that gives rise to the question 'what rights are created' in fractionalised ownership. With or without the application of tokenisation technology, the concept of such fractionalised ownership is not impossible, and the nature of 'rights' created[29] are often determined by contractual bargaining.[30]

Other NFTs, by way of contrast, are apparently standalone digital objects.[31] The nature of such NFTs pulls us into questions of categorisation,[32] and, ultimately, into basic questions about what attributes make purely digital objects fitting objects of property rights at all.[33] At base, such NFTs raise similar problems to their fungible counterparts such as bitcoin. In our view, they should be recognised as fitting objects of property rights notwithstanding their digital nature, but the exact details of how they fit into the schematic of English (or any other) property law is an ongoing debate. As a standalone digital object, bitcoin has now been recognised as 'property' by an English court.[34] This is based on the court's acceptance of bitcoin being intangible property with qualities of being 'definable', 'of permanent existence', 'capable of being exclusively controlled' and 'assignable'.[35]

Not all NFTed standalone digital objects enjoy the same characteristics. An NFT of a cryptokitty for example, is a unique digital hash of an image file created using in-game 'DNA'

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[28] 'Which real-world assets are being tokenised?' (Financial Times, 30 Nov 2021), https://www.ft.com/content/ac33fb51-53a4-49a0-a4c4-fb92dc6ee241.

[29] For example, the nuances in rights conferred by timeshare purchases are discussed at https://www.athlaw.co.uk/the-difference-between-timeshare-and-fractional-ownership/#:~:text=Timeshare%20Ownerships,-A%20timeshare%20gives&text=Within%20a%20timeshare%20agreement%2C%20the,is%20through%20a%20points%20system..

[30] See for example, fractionalised rights over a pool of mineral assets for exploration, James E. Key, 'The Right to Royalty: Pooling and the Capture of Unburdened Interests' (2010) 17 Tex Wesleyan L Rev 69.

[31] In the evocative language of the Liechtenstein Token and Trusted Technology Service Provider Act (*Gesetz über Token- und Vertrauenswürdige Technologie-Dienstleister*) of 2020, a token is a 'container' into which an open-ended suite of rights can be packed—or none at all.

[32] E.g., in English law, is any given NFT a chose in action, a chose in possession, or a third category that remains to be defined? See UK Jurisdiction Taskforce, *Legal Statement on Cryptoassets and Smart Contracts* (November 2019), para [70]; the reference is from *Colonial Bank v Whinney (1886)* 11 App Cas 426. In our view, it is quite possible that current law reform efforts (especially the Law Commission of England and Wales project https://www.lawcom.gov.uk/project/digital-assets/) will result in the establishment of a third category of personal property. See also J.G. Allen, 'Cryptoassets in Private Law' in Iris Chiu and Gudula Deipenbrock (eds.), *Routledge Handbook of Financial Technology and Law* (Routledge 2021), Ch 17; Cf the view set out in Michael Bridge, Louise Gullifer, Kelvin Low and Gerard McMeel, *The Law of Personal Property* (3rd Edition, Sweet & Maxwell 2021), [8-049] which calls the debate 'unproductive'.

[33] In particular, attributes like 'rivalrousness', 'excludability', 'transferability', and so forth. See, e.g., *Henderson v Walker* [2019] NZHC 2184, [263]-[270] per Thomas J. In our view, these attributes relate to the cryptoeconomic design and governance structures of blockchain networks that (i) remove blockchain-based digital assets from the arbitrary will of the persons involved and (ii) make them 'instantiated data objects' that are *inter alia* rivalrous and excludible. This point pre-empts a forthcoming paper by Peter Hunn and J.G. Allen on 'instantiated data objects'. See also David Michels, 'The New Things: Property Rights in Digital Files?' (2022) *Cambridge Law Journal* (forthcoming).

[34] *AA v Persons Unknown and Bitfinex* [2019] EWHC 3556 (Comm), also *Ruscoe v Cryptopia Ltd (in Liquidation)* [2020] NZHC 728.

[35] Based on the qualities accepted in the UK Jurisdiction Taskforce (2019), paras 49-53.

combinations to digitally produce a 'kitty'. The digital creature is unique beyond merely an image file, which is its rendering. It is arguably definable and it is certainly assignable within the context of an in-game rule system. The unique digital hash for each kitty, ie the NFT of each kitty, is also saleable in secondary markets. This makes them appear very object-like, and accordingly quite property-like. Kitty-holders' use rights are subject, however, to in-game licensing terms[36] and kitties' 'permanent existence' is debatable.[37] Although transactions with respect to each kitty are validated over the Ethereum blockchain, which maintains a tamper-proof distributed ledger of transaction records, the distributed ledger record does not provide evidence of the existence of any particular kitty or its present owner. Those records are maintained by Dapper Labs, the company offering the cryptokitties game, which resides as a decentralised application on the Ethereum blockchain. Dapper Labs' control over its application creates a layer of centralised power over users subject to terms. Analysing all of these characteristics in together, then, the rights held by a cryptokitty NFT-holder is a bundle of rights for in-game purposes and limited licenses off-game. It may be subject to debate whether there are sufficient 'property' qualities in these NFTs. However, this debate is not new, and it fundamentally reflects the debate about the 'property' nature of intellectual property.[38] This debate is important and also a work in progress, but is beyond the scope of full exploration in this article.

NFTs of physical or digital art raise similar questions regarding what rights are held by the NFT-holder and whether they amount to 'property rights'. Commentators acknowledge that such NFTs are coded in such a way as to confer unique identity, excluding others from claiming the same 'ownership'.[39] However, as Low argues,[40] there is nothing to prevent an artist from creating a second, third or more hashed files of the same digital art image; each NFT, though unique, is questionable as to what it confers the NFT holder. Moreover, the enjoyment of digital artwork is essentially non-rivalrous, as anyone can pull up a digital image of the creative work in question.[41] Further, the ability to access (or display) the underlying work is not necessarily with either the artist or the NFT purchaser, but in the control of third party servers provided by online applications, platforms and services.[42] It has therefore rightly been questioned whether such lack of control over the rendering of the underlying artwork affects the substance of rights enjoyed by the NFT holder. The ability of distributors[43] and creators to affect the rights held by NFT holders is arguably extensive. It is the norm that owners of NFTs are likely to be limited[44] in terms of their rights to

[36] Eg the licensing agreement for cryptokitties restricts purchasers' commercial exploitation rights of the art up to USD$100,000 a year, see https://www.cryptokitties.co/terms-of-use.

[37] Charlotte Ducuing, 'How to Make Sure My Cryptokitties Are Here Forever? The Complementary Roles of Blockchain and the Law to Bring Trust' (2019) 10 European Journal of Risk and Regulation 315.

[38] Julie E. Cohen, 'Property as Institutions for Resources: Lessons from and for IP' (2015) 94 Tex. L. Rev. 1.

[39] Joshua Fairfield, 'Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property' (2021) Indiana Law Journal, https://ssrn.com/abstract=3821102; Juliet M Moringello and Christopher K Odinet, 'The Property Law of Tokens' (2022), Florida Law Review, forthcoming, https://ssrn.com/abstract=3928901.

[40] Low (2021).

[41] Joao Marinotti, 'Tangibility as Technology' (2021) 37 Ga St U L Rev 671; Molly Roberts, 'The Darker Side of Non-fungible Tokens' (The Washington Post, 18 March 2021).

[42] Ibid; Moringello and Odinet (2022).

[43] Eg artists are facilitated by platforms and applications to create NFTs, and some properties may be standardised but there is also discretion for artists to restrict rights, for e.g. to lock content that would not be revealed to anyone else, see https://support.opensea.io/hc/en-us/articles/360063498313-How-do-I-create-an-NFT-.

[44] See Fairfield (2021).

commercially exploit the underlying work. Creators[45] or the platform or application intermediaries who interpose their rights in effect only provide purchasers of NFTs with licenses of limited use of the underlying works. In sum, purchasers of NFTed art, like crypto-kitty NFT holders, are conferred with limited rights, and the limited quality of such rights can raise doubts as to what 'property' underlies the NFT to become assetisable and financialised.

That said, the position of 'limited quality of rights' is arguably no worse than where a purchaser buys a physical limited edition print of an original oil painting. The intellectual property in the oil painting lies with the creator who has the right to make say, 300 prints of the original, each signed and assigned a number x/300. The holders of prints 1/300 and 15/300 have purchased essentially similar objects which they presumably may hang in their homes or other spaces. It is highly likely that print-holders have little or limited rights to commercialise the art in the print. The enjoyment of the art in the print is also non-rivalrous in relation to the physical or digital copies of its image. Despite the highly limited nature of rights each print-holder has, there is doubt that print-holders value their 'property' to the amount of consideration they paid. It is also likely indisputable that there would be some secondary market value to each print on eBay (or a more specialist platform). In this manner, 'digital tokenisation' is an incremental addition to the already-existing debates regarding what rights may be articulated over art and its 'copies', again reflecting the debate regarding 'property' concepts in intellectual property itself.[46]

While greater legal certainty surrounding the 'property status' of any given sort of NFTs would be conducive to the ascription of value to novel asset types, the case of bitcoin itself shows that market participants ascribe value to assets well in advance of the law. Even where the nature of rights is being clarified 'on the go', the commoditisation and financialisation of 'subject matter' rolls onward. The 'capital value' of objects is being realised for economic mobilisation and development in innovative, technology-driven ways even before those objects' property status is settled (as Section B discusses).

Further, the dynamic working-out of questions such as property status can be positively helpful to our understanding of the law itself, both in a legal-technical and in a legal policy sense. The delineation and clarification of rights conferred on NFT-holders is an exercise of contest of interests plays out in markets, society and the law, ultimately shaping legal developments relevant to the mobilisation of NFTs as assets and financial instruments. This is consistent with Pistor's theory that the objects that become 'assets' and 'financial instruments' are ultimately framed by legal coding.[47] In this light, we argue that the use cases for NFTs generate the dialectics for contests of interests. We suggest a paradigm of three use cases of NFTs that show how market-led forces can facilitate the evolution of their legal characterisation. It may be instinctive to think that the use cases would be determined by the nature and articulation of property rights in NFTs based on existing classifications. However, we argue that legal characterisation is organic in nature and will respond to market-led forces.

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[45] Lauren van Haaften-Schick and Amy Whitaker, 'From the Artist's Contract to the Blockchain Ledger: New Forms of Artists' Funding using NFTs, Fractional Equity, and Resale Royalties' (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3842210.

[46] Cohen (2015).

[47] Katharina Pistor, *The Code of Capital* (NJ: Princeton University Press 2019), pp13-15.

The Three Use Paradigms for NFT and How They Shape the Nature of NFTs

In our view, the three paradigmatic use cases for NFTs are: (i) consumption of NFTs, (ii) commercial exploitation of the non-financial 'object' underlying the NFT, and (iii) the assetisation of NFTs for access to financial activities, which we call 'NFT financialisation'.

First, NFTs can be 'consumed'. Questions may be asked as to 'what' is consumed. It can be argued that the NFT, ie the unique hashed string of digital data, is the subject of consumption. Consumption of the NFT does not however mean entitlement to enjoy or exploit the underlying work. In the consumption use case, NFT purchasers' limited rights are not practically problematic if they are content just to boast of owning the NFT, for example, of Beeple's '5,000 days' collage,[48] regardless of what that 'ownership' gives them. Despite a narrow conception of this use case, empirical research suggests that many NFTs are purchased as an end in themselves, as secondary market trading does not seem to be rife.[49] Further, empirical research suggests that open NFT markets are at their most buoyant in tandem with rises in value of key cryptocurrencies such as bitcoin and ether. This may suggest that NFT sales in open markets, usually concluded in cryptocurrency, is a result of the wealth effect of cryptocurrency appreciation,[50] therefore supporting the phenomenon of (conspicuous[51]) consumption 'as an end in itself'.

The consumption use paradigm is one that is arguably unstable and in flux, as purchasers of NFTs may not only wish to consume in the limited manner described above, but may consider exploiting their rights for gain. The move from a consumption to commercialisation paradigm may take place if less 'wealthy' crypto-holders, hence, more consumers in general, start consuming NFTs. For example, gaming consumers may purchase lower value NFTs and consider their commercialisation and financialisation opportunities,[52] especially if these are increasingly mobilised on DeFi, an easily accessible space on permissionless blockchains. An NFT collector may also wish to display a digital image of a work in a museum built in a blockchain-based virtual world-building game like 'Decentraland'[53] and charge for third parties' virtual 'enjoyment'.[54] In Pistor's theoretical paradigm,[55] the needs for objects to be monetised drive legal coding that facilitates such purpose. Bottom-up forces in the social

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[48] Simon MacKenzie and Diãna Berzina, 'NFTs: Digital Things and Their Criminal Lives' (2021) Crime Media Culture 1 on NFT purchasers and 'showing off'.

[49] De-rong Kong and Tse-chun Lin, 'Alternative Investments in the Fintech Era: The Risk and Return of Non-fungible Token (NFT)' (2021), https://ssrn.com/abstract=3914085.

[50] Michael Dowling, 'Is Non-Fungible Token Pricing Driven by Cryptocurrencies?' (2021) Finance Research Letters, https://doi.org/10.1016/j.frl.2021.102097; Lennart Ante, 'The Non-Fungible Token (NFT) Market and its Relationship with Bitcoin and Ethereum' (Blockchain Research Labs working paper, 2021), https://ssrn.com/abstract=3861106.

[51] The term was coined by Thorsten Veblen, *The Theory of the Leisure Class* (Macmillan 1899).

[52] 'Crypto-gamification: How NFTs Disrupt the Gaming Industry' (Apr 2021), https://www.binance.com/en/blog/nft/crypto-gamification-how-nfts-disrupt-the-gaming-industry-421499824684903037. However, NFTs that are minted for profit by gaming corporations may not gain traction with the gaming community, see 'Why gamers are turning their backs on NFTs' (Financial Times, 18 Jan 2022), https://www.ft.com/content/a0defed4-60d8-4221-8abc-4e70245c1726.

[53] See https://decentraland.org/.

[54] J Kastrenakes, 'Nyan Cat is being sold as a one-of-a-kind piece of crypto art' (26 March 2021), https://www.theverge.com/2021/2/18/22287956/nyan-cat-crypto-art-foundation-nft-sale-chris-torres.

[55] Pistor (2019).

and market relations surrounding the commoditisable object shape the framing of legal relations such as in 'property law'.[56]

Behind the doctrinal categories and processes of property law is a vast, complex, and invisible set of social relations enabled by technological processes (whether more or less sophisticated).[57] The 'outputs' of these processes constitute the objects of economic and financial transactions.[58] The common law concept of 'property' is not generally concerned with describing the *objects* in which persons can hold property rights. As one textbook observes, property lawyers take little interest in the objects of property rights (eg, land, ships, machinery, animals) and focus instead on 'abstract notions such as the "fee simple" in land, trust funds, stocks and shares, security interests, title, and documents of title.'[59] These instruments are the 'legal coding' expressed in Pistor's theoretical paradigm and relate the object in question to the rest of the economy and enable them to lead an 'invisible, parallel life alongside their material existence.'[60]

This relative neglect of 'things' stands in contrast to the tendency in civil law systems to focus on the objects in which one can hold property rights—paradigmatically, the concept of the 'thing' as the object of *erga omnes* rights.[61] Digital objects require closer scrutiny as 'things', and the Civilian idiom is useful in that exercise.[62] However, despite its antiquated origins in the feudal system, the common law's preoccupation with 'bundles of rights' evidenced by documents provides a fundamental insight into the nature of property law and its extension into digital realms. An 'estate in fee simple', for example, is a normative object; it relates to a feature of the physical world (a portion of the earth's surface),[63] but the estate *qua* thing is a product of the law. In some ways, this draws attention to the reflexive constitution of 'things' and 'rights in things' more clearly than the civil law's focus on 'thing-ness'. 'Things' are just those objects of reality—physical and also social—in which persons can have 'rights'.

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[56] Rosa M. Garcia-Teruel, Héctor Simón-Moreno, 'The Digital Tokenization of Property Rights. A Comparative Perspective' (2021) 41 Computer Law and Security Review 105543; Fairfield (2021).

[57] For example, a wax seal on a medieval document was a kind of privacy technology: see R.W. Percival, "The Great Seal" (1948) 1(4) *Parliamentary Affairs* 40.

[58] See generally Uskali Mäki, 'Economic Ontology: What? Why? How?' in Uskali Mäki (ed.), *The Economic World View: Studies in the Ontology of Economics* (Cambridge University Press 2001), Ch 1; see also Alain Pottage, 'Introduction: the Fabrication of Persons and Things' in Alain Pottage and Martha Mundy, *Law, Anthropology and the Constitution of the Social* (Cambridge University Press 2009), Ch 1; Barry Smith, 'Searle and De Soto: The New Ontology of the Social World' in Barry Smith, D.M. Mark and Isaac Ehrlich (eds.), *The Social Construction of Reality and the Mystery of Capital* (Open Court 2008), Ch 3.

[59] F.H. Lawson and Bernard Rudden, *The Law of Property* (3rd Edition, Oxford University Press 2002), 5.

[60] ibid.

[61] See Lyria Bennett Moses, "The Applicability of Property Law to New Contexts: From Cells to Cyberspace" (2008) 30(4) Sydney Law Review 639, 640. Civil law systems tend to operate with closed lists (both of the objects in which one can have property rights and of the rights which one can have in any object). See generally Christian von Bar (J.G. Allen trans.), *Things: The Foundations of Property Law* (Oxford University Press 2022 forthcoming), para [58]-[64], [155]-[167], [325]-[326].

[62] See J.G. Allen, "Translator's Introduction" in ibid.

[63] On the nature of land units as 'normative objects with a physical substrate', see ibid, para [179-[180] ('Land units are things with a physical substrate, but are nonetheless at base normative things. They are like the geometric figures that would appear if one traced a grid pattern over the surface of the earth with a computer programme. Land units in property law are, in the last instance, products of imagination. They are not naturally existing, that is, separated from each other by their physical properties. Their individualisation is the consequence of legal intervention.').

The English scholar of Roman law, David Nasmith, drew a distinction between 'natural' and 'artificial' things—the former existing by nature and the latter having a social construction. Again, he rightly observed that the law was mainly concerned with the latter category:

> [W]hen finding or coming in contact with any natural object, [the first act of the law] is to subjugate it, to take it out of the sphere of the *natural,* to place it within the pale of the *legal,* to label or to name it, and to assign to it legal attributes. The lawyer, as lawyer, does not regard the field, the horse, or the heir-loom, as a thing of beauty or of pleasure, but as [an object] of property, of which its peculiar characteristics are mere incidents. His attention is centred upon the means of acquiring legal interests in it, upon determining and defining what those interests are, and upon ascertaining in what way or ways they may be alienated or lost. As the merchant regards origin and quality solely as matters of value, so the lawyer considers them as mere elements of rights, duties, and obligations.[64]

In other words, the framing of NFTs as a package of delineations, reservations and sharing of rights is a healthy market-led development and not an objection to property characterisation. New legal framing of rights will take place, and will be shaped by contests between the different sides of the market and by forces that ascribe market value to such rights, for the purposes of commoditisation or assetisation (in order to give rise to financialisation). In this manner, the emerging characterisation of 'what rights NFTs give rise to' is not a hindrance to the development of commercialisation or financialisation of NFTs, as those developments in turn feed into the shaping of the nature of rights that the market demands and prices accordingly.

In this light, we predict two market-led developments. One is that the coding of consumption or utility rights in NFTs undergo more innovation through bilateral bargaining, which will in turn be shaped by market valuation for transactions of such NFTs. It is already observed that gaming NFTs minted by established gaming corporations that limit users' rights and free marketability of NFTs are not popular.[65] Hence, demand side market forces may compel NFT creators and distributors to offer sufficiently attractive rights to purchasers such as allowing greater interoperability and marketability on permissionless blockchains outside of the gaming system. Such market forces shape delineations and framing of rights relating to NFTs in a bottom-up manner.

The second market development is greater standardisation, reflecting dominant market demands, arguably towards 'weaker' reserved rights underlying NFTs, compensated by greater potential for NFTs to be commoditised and financialised. Such standardisation may occur in a more top-down manner, either by industry representative organisations or ultimately via law or regulation, such as financial services regulation. The transformation of financial instruments depends heavily on developments in regulatory standardisation, for trading or in Pistor's terms, for the purposes of 'convertibility'. Debt instruments, shares, derivatives, carbon emission allowances,[66] for example, are relatively standardised by regulatory fiat and legal coding.[67] Many financial instruments arguably have inherently ambiguous qualities in terms of underlying rights, such as shareholders' governance or dividend expectations in case of equity securities. Debts are also capable of assignment immediately, although enforcement rights (which underpins their nature as choses in

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[64] David Nasmith, *The Institutes of English Private Law Volume II* (Butterworths 1875), 303.

[65] See n65.

[66] Critically discussed, Kelvin Low and Jolene SW Lin, 'Carbon Credits As EU Like It: Property, Immunity, TragiCO2medy?' (2015) Journal of Environmental Law 1-29.

[67] Pistor (2019), chs 4, 6, 7.

action) only arise where there is an action upon default, making the chose contingent in nature and seemingly contrary to the certainty required for property rights. In this manner, 'inherently ambiguous' qualities pertaining to underlying rights have not impeded the capability of asset financialisation in the case of popular financial instruments. In this manner, standardisation, such as by regulation, can over time add clarity not just to qualities of convertibility but also to the qualities of underlying rights. An example would be the development of shareholders' corporate governance rights (underlying equity securities) that have developed over time in Anglo-American jurisdictions.[68]

Market demand to financialise NFTs would likely drive an accompanying demand for standardisation of the nature of NFTs in order to improve their liquidity. Standardisation of crucial economic characteristics or rights facilitate certainty and confidence in the creation of multiple legal relations over the asset. For example, NFTs can be used as collateral to secure credit, and the platform NFTfi Loans[69] provides an example of a matching service that lines up lender and borrower on a peer-to-peer basis. In a fractionalised manner, an NFT can form the basis for the issue of fungible tokens backed by the value of the NFT,[70] in order for the NFT holder to raise funds amongst a wider section of 'investors' in the NFT. Such fund-raising provides opportunities for the NFT creator to realise remuneration or an NFT holder to 'cash out', and mobilises an investment market in the fractionalised tokens for the purposes of trading, further collateralisation, 'staking'[71] etc, especially in the universe of DeFi. Investment assetisation is likely to grow the market for NFT purchasers, a phenomenon that would be welcomed by creators and distributors. Investment assetisation of NFTs also provides opportunities for a greater range of NFTs to become attractive.

In our view, increasing market demand for commoditisation of NFTs towards turning them into investment assets would likely drive the second phenomenon above. This would not prevent the first phenomenon for tailor-made use cases primarily involving consumption. The second phenomenon is observed in technological development of token standards for NFTs, such as the development of semi-fungible or composable Ethereum token standards, discussed below. The second phenomenon is also supported by economic and sociological theories explaining the passage of commoditisation and assetisation as essential aspects of human endeavour (Section B).

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[68] Eg Jennifer Hill, 'Visions and Revisions of the Shareholder' (2000) 48 American Journal of Comparative Law 39; also the development of Corporate Governance and Stewardship Codes globally that bolster shareholders' expectations of good governance and monitoring of corporations, see Alvaro Cuervo-Cazurra and Ruth V Aguilera, 'The Worldwide Diffusion of Codes of Good Governance' in Anna Grandori (ed), *Corporate Governance and Firm Organization* (Oxford: OUP 2014), ch14; Dionysia Katelouzou and Matthias Siems, 'The Global Diffusion of Stewardship Codes' (2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3616798.

[69] https://nftfi.com/.

[70] Fractionalisation is discussed in Section C.

[71] 'Staking' is an activity in the decentralised finance universe where holders of cryptotokens provide, on a loan basis, their tokens in liquidity pools in order to make markets for trading and swapping. They obtain a fungible token from the protocol in exchange providing for remunerative, trading and redemption rights. See Fabian Schär, 'Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets' (2021) 103(2) Federal Reserve Bank of St. Louis Review 153-74.

Technological developments now provide standards for NFT coding to accommodate hybrid forms including fungible elements for trading or liquefication.[72] The Ethereum 998 standard provides for internal composability so that fungible and non-fungible 'assets' or 'sub-tokens' can be held in one token, like a portfolio. This raises questions for the simplistic categorisation of cryptoassets into 'fungible' or 'non-fungible' tokens, with only the former attracting financial regulators' interest. The Ethereum 1155 standard allows fungible and non-fungible tokens to be registered to the same address and smart contract, therefore even more clearly showing that the line between a 'non-financial' object and its commoditisation/assetisation/financialisation is blurring.

The next Section situates NFT assetisation in economic and sociological theories promoting economic mobility and liberalisation. The crypto-economy is able to accelerate these processes, giving rise to the need for an institutional response. Section C discusses how financial regulatory policy ought to provide such institutional response.

Section B: NFT Assetisation as an Inevitable Economic and Sociological Development

The commoditisation of objects for exchange is an inherent feature of social life. It is not only relevant that exchange is embedded in social life and relations;[73] how objects become commoditised (which is essentially a construction of value) is 'reflective and constitutive of social partnerships and struggles for pre-eminence'.[74] 'Struggles for pre-eminence' refer to processes for the fabrication of value in relation to certain objects, such as by the development of fashionability for such objects,[75] or processes of 'singularisation' where groups of people converge upon a cultural appraisal of certain species of objects and classify them to be of certain eligibility to value.[76] The sociological and anthropological history of commoditisation does not resist novel commoditisation, as value is derived in social contexts and markets. Often, it is the convergence of social groups upon the ascription of value that suffices.[77] The social processes for commoditisation pave the way for development of certain 'standardised' terms in order to facilitate transfer or trade, so that the objects of commoditisation can be monetised.[78] We view law as playing a role that supports and institutionalises the social construction of value, although such construction of value also embeds certain choices made in the political economy.[79] In different times and contexts, the law sometimes leads and sometimes follows, but it always a key player in concert with other social forces. Where the social construction of value leads to financial transformations, regulatory governance arguably contributes to further construction as financial assets or instruments and their mobilisation.

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[72] 'Non-fungible Token Standards: An Overview' (22 May 2021), https://hackernoon.com/non-fungible-token-nft-standards-an-overview-w71y34y3; 'The Non-Fungible Token Bible: Everything you need to know about NFTs' (Opensea.io Blog, 10 Jan 2020), https://opensea.io/blog/guides/non-fungible-tokens/.

[73] Igor Kopytoff, 'The Cultural Biography of Things: Commoditisation as a Process' in Arjun Appadurai (ed), *The Social Lives of Things* (Cambridge: CUP 2014), ch2.

[74] Arjun Appadurai, 'Introduction' in *The Social Lives of Things* (Cambridge: CUP 2014), ch1, p19.

[75] Ibid.

[76] Kopytoff (2014).

[77] Appadurai, Kopytoff (2014).

[78] Ibid.

[79] Pistor (2019).

The commoditisation of NFTs can first be traced to the development of 'social lives' in digital gaming worlds, especially multi-player games where participants take on new identities and roles in an imagined, novel universe and construct social and economic relations there.[80] In Farmville and Animal Crossing for example, in-game digital objects can be commoditised, bought and sold in game environments and secondary markets. Peer-to-peer gaming has evolved with the development of blockchain technology, as imaginative worlds are not only created by curators who maintain centralised control and gamers participate according to the rules of the worlds, but these worlds are now co-created with participants as peers. Cryptokitties is a decentralised marketplace built upon the Ethereum blockchain and is open to sellers of digital art who create tokens of unique 'kitties' as well as to purchasers who buy the NFTs of kitties in order to collect them or engage in the game of breeding kitties.[81] Decentraland is another application built upon the Ethereum blockchain that facilitates the creation of a virtual reality world.[82] In Decentraland, participants may purchase standardised 33 by 33 feet of virtual land plots upon which they could build and develop as they please. Participants are incentivised to develop attractive establishments in order to commoditise virtual goods or services they create to earn the currency of the world, denoted in MANA. NFTs of gaming objects such as titles to land in Decentraland can be commoditised on the Ethereum blockchain generally.[83]

NFTs extend beyond gaming universes, as tokenisation can be used to digitalise any 'property' as discussed in Section A. Permissionless blockchains such as Ethereum are developing into economic spaces for peer-to-peer commerce in various areas,[84] and the exploration of commoditisation of novel objects is a natural development of market-building.[85] Inextricable to commoditisation of intangible digital objects is their assetisation and financialisation. The value in commodities as 'capital', relating to monetisability and liquidity, can quickly be transformed as blockchain networks amplify market effects.[86] The 'NFTing' of digital objects performs the technological-social framing for capability as an asset or 'capital'. This framing can be reinforced by further institutional and legal support.[87]

From a certain economic perspective, 'capital' should be seen as discrete from objects; capital is abstract, created by social or legal framing that refers to an object's most

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[80] See Karin Knorr Cetina and Barbara Grimpe, 'Global Financial Technologies: Scoping Systems That Raise the World' in Trevor Pitch and Richard Swedberg (eds), *Living in a Material World: Economic Sociology Meets Science and Technology Studies* (MIT Press, 2008), ch 5 on how technologies scope and shape coordination in a network-market context. For a jurisprudential analysis, see also J.G. Allen, 'Law's Virtual Empires: Games Analogies and the Concept of Law' in Jorge Luis Fabra-Zamora, Gonzalo Villa Rosas (eds), *Conceptual Jurisprudence: Methodological Issues, Classical Questions and New Approaches* (Springer 2021), Ch 15.

[81] 'Blockchain, virtual goods and £80,000 cartoon cats: The strange world of CryptoKitties' (New Statesman, 6 Aug 2018) at https://www.newstatesman.com/science-tech/social-media/2018/08/blockchain-virtual-goods-and-80000-cartoon-cats-strange-world.

[82] 'What Is Decentraland?' (28 Oct 2018) at https://coincentral.com/decentraland-mana-beginners-guide/.

[83] 'Virtual real estate plot sells for record $2.4 million' (Reuters, 24 March 2021), https://www.reuters.com/markets/currencies/virtual-real-estate-plot-sells-record-24-million-2021-11-23/.

[84] Ch2, Chiu (2021); S Davidson, P De Fillippi and J Potts, 'Blockchain and the Economic Institutions of Capitalism' (2018) 14 *Journal of Institutional Economics* 639; C Berg, S Davidson and J Potts, *Understanding the Blockchain Economy* (Cheltenham: Edward Elgar 2019) at 'Capitalism after Satoshi', ch9.

[85] Bruce G Carruthers and Sarah L Babb, *Economy & Society* (2nd ed, Boston: Sage 2013); Alex Preda, 'The Sociological Approach to Financial Markets' (2007) 21 Journal of Economic Surveys 506.

[86] Markus K. Brunnermeier, Harold James and Jean-Pierre Landau, 'The Digitalization of Money' (2019) at http://www.nber.org/papers/w26300 on how digitalisation easily facilitates tradeablity and monetisation.

[87] Which is Pistor's view that the code for capital is law in Pistor (2019).

economically significant qualities.[88] The occupier of a house, for example, has no 'capital' until she has something like a document of title recognised by the state legal system. Once such a document is created, title to the house can be dealt with independently. This allows new dealings with the house in the context of a financial economy—such as collateralising the house (by recording encumbrances on its 'title') or granting another the use of the house while retaining ownership. For Hernando de Soto, for example, 'capital' is created in socio-legal framing of objects such as by titles, pledges, securities, contracts, and so forth that clarify the quality of 'assets'. 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, argues de Soto, you have 'stepped from the material world… into the universe where capital lives'.[89]

The technical role of law in creating 'capital' is inherently connected to the political role of law in regulating it. In our view, an institutional response is needed for 'capital mobilisation' of NFTs and governance implications. We argue that such institutional response is based on the role of financial regulatory policy as providing a public good of order and governance, in a manner that promotes and does not obstruct the potential for economic liberalisation and wealth creation. Open permissionless blockchains such as Ethereum facilitate new forms of economic liberalisation for peer-to-peer economic activity, and new forms of wealth creation in terms of (a) investment appreciation of native currency, such as bitcoin or ether, and (b) the monetisation and potential capital mobilisation of blockchain-based digital objects, such as pre-sold tokens of development apps and NFTs. In a liberal sense, such a development of alternative economic spheres is not unwelcome, and can be a response to developments of heightening inequality in developed capitalist jurisdictions where financial wealth concentrates in the hands of a few.[90]

Drawing upon economic sociologist Fligstein's work,[91] legal and regulatory institutions are foundational for the building of new markets and their stability. NFT financialisation would represent a stage of evolution of NFTs from use cases where bilateral 'private law'-based exchange relations dominate, to a stage where multiple legal relations can be created over the asset of the NFT, therefore requiring the support of greater legal, regulatory and governance certainty. Further, as blockchain phenomena in general move towards the 'mainstream', it would be difficult to prevent the interface between financial assets created on open permissionless blockchains and conventional finance,[92] such as the use of NFT collateral with more established credit institutions. Where the question of what microprudential regulatory treatment should be accorded to NFT collateral, should existing

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[88] See Hernando de Soto, *The Mystery of Capital* (Random House 2010), 48. Cf Timoty Mitchell, 'The work of economics: how a discipline makes its world' (2005) 46(2) *European Journal of Sociology* 297, critiquing de Soto's property rights liberalisation policies but not necessarily undermining de Soto's implicit economic ontology.

[89] Hernando de Soto, *The Mystery of Capital* (Random House 2010), 48. See also J.G. Allen, "Property in Digital Coins" (2019) 8(1) *European Property Law Journal* 64, 91, which this passage paraphrases.

[90] See, eg, Thomas Piketty, *Capital in the Twenty-first Century* (Mass: Harvard University Press, 2014).

[91] Fligstein (1996).

[92] Increasingly observed by FSB (2022). Although such connections between crypto and mainstream finance are identified in relation to global stablecoins and DeFi, the FSB's report indicates acknowledgement of the scaling and importance of these links.

regulatory frameworks resist the investment assetisation of NFTs altogether?[93] This would not only fail to keep pace with innovation;[94] it would also fail to prevent NFT financialisation from arising in shadow, unregulated spaces.

Although Fligstein frames state provision of legal and regulatory institutions as 'politics', and claims that choices made by policy-makers would be affected by political relations and dynamics, the necessity of such politics is not in doubt even if the choices are not always 'right' and may be in need of further adjustment in due course. Section C discusses some key aspects of regulatory governance for NFT financialisation, focusing on investment assetisation of NFTs.

Section C: The Regulatory Governance of NFT Financialisation

This Section fleshes out several *modi* of NFT financialisation and explores how financial regulation can provide governance and order for this phenomenon, in this process developing and clarifying NFTs in terms of their nature, property and qualities. We do not simply seek to extend financial regulation to NFT financialisation but show how financial regulatory frameworks themselves can be reformed. Further, our discussion on NFT financialisation relates to broader aspects of financialisation in relation to crypto-assets and reinforce the case for comprehensive regulatory thinking for the developing universe of crypto-finance.[95]

Financial regulation can provide a public good of standardised protection and delineation of expectations in society's participation in NFT financialisation, if this grows further in scale and interfaces with mainstream financial products. In the UK, although the Financial Conduct Authority (FCA) regulates the conduct of marketing of crypto-products to the retail market by interposing certain duties and frictions in marketing communications and conduct,[96] more comprehensive regulatory governance has been resisted as crypto-products are outside the regulator's perimeter. This position may increasingly become untenable in relation to the public's appetite for participating in crypto-finance.[97] Investors have certain needs that may not be met by private bargaining, [98] such as the public good of investor protection relating to legal duties of protection for assets in financial intermediaries' custody.[99] It is also regulatory provision that sets up customers' minimum protection funds in case of intermediary insolvency.[100] The maintenance of a limited regulatory perimeter can be artificial as this denies customers equivalent levels of protective

[93] For example, banks' holding of cryptocurrency attracts punitive levels of 'capital cost' in micro-prudential regulation, see Basel Committee, 'Prudential Treatment of Cryptoasset Exposures' (June 2021), https://www.bis.org/bcbs/publ/d519.pdf.

[94] 'Finance industry warns against 'unnecessarily restrictive' crypto capital rules' (Financial Times, 21 Sep 2021), https://www.ft.com/content/05675352-3451-4b92-9ef9-b3e769bf30e3.

[95] Overview in Wulf A Kaal, 'Digital Asset Market Evolution' (2021) 46 J Corp L 909.

[96] FCA, Strengthening our Financial Promotion Rules for High Risk Investments, Including Cryptoassets' (2022), https://www.fca.org.uk/publication/consultation/cp22-2.pdf.

[97] See also FSB (2022).

[98] Financial firms may not be incentivised to protect client assets strongly and this is arguably reflected in non-compliance with regulation that confers such protection, as revealed in the series of litigation *Re Lehman Brothers International (Europe)* [2012] UKSC 6.

[99] Eg Art 16(11), EU Markets in Financial Instruments Directive 2014/65/EU (MiFID).

[100] Such as the Financial Services Compensation Scheme, UK.

public goods where they engage with alternative 'capital' (i.e., not conventional financial businesses legitimated by regulators), even if functional similarities exist between conventional and novel forms of capital. Although it may be argued that much of crypto-finance is decentralised and conventional regulation may not be applicable, new service providers and intermediating entities may be observed even if customers' interfaces are more decentralised than compared to a conventional one.[101] Further, the use of automated protocols in many DeFi contexts means that customers may also face limitations in private bargaining. The case for complete self-regulation in crypto-finance is generally doubted.[102]

In this Section we focus on the investment mobilisation of NFTs as an exciting new paradigm of NFT financialisation. First, we explore the fund-raising 'use case' of NFT financialisation, for pre-development and post-development projects and show different financial regulatory tenets that can provide optimal governance for building such investment markets. Next, NFT financialisation has to be supported by secondary markets and the regulatory governance of market operators may be warranted in relation to their power and responsibilities for providing a platform for network interactions. Even in a decentralised setting, regulatory governance can be relevant for securing certain tenets of orderliness, fairness and certainty of expectations in functions that constitute markets.[103] Further, intermediaries who support NFT financialisation in other manners such as custodial provision, staking and DeFi services can be held to standards of responsibility. Although there may be difficulty applying regulation designed to be attached to legal persons in highly decentralised or disintermediated contexts, regulatory tenets remain relevant even if regulatory design needs to be reformed.

NFT-based Fund-raising through Ex Ante Means

NFT financialisation can take place in the form of NFT-based fund-raising. There are arguably two avenues. First, project curators may fund-raise in planning or development, such as for an art project which could then be 'NFTed'. Second, project developers may seek to monetise the completed project via NFT fractionalisation.

Crowdfunding for developing non-financial projects already takes place in the US, UK and EU via certain platform intermediaries. These may be regulated, such as in the US,[104] or may be donation-based platforms that are unregulated in the EU and UK as the latter apply financial regulation only to platform intermediaries who mediate loan-based crowdfunding and crowdfunding for unlisted companies' securities.[105]

In the US, project curators can crowdfund via Kickstarter,[106] a regulated portal, for funds below USD$5 million and offer either with-reward or no-reward options to backers, with just the obligation to provide updates towards the fulfilment of the project. If a project is

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[101] Linn-Anker Sørensen and Dirk Zetzsche, 'From Centralized to Decentralized Finance: The Issue of 'Fake-DeFi'' (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3978815.

[102] Eg SEC Commissioner Caroline Crenshaw, 'Statement on DeFi Risks, Regulations, and Opportunities' (9 Nov 2021), https://www.sec.gov/news/statement/crenshaw-defi-20211109; FSB (2022).

[103] Caroline Bradley, 'Disorderly Conduct: Day Traders and the Ideology of "Fair and Orderly Markets"' (2000) 26 Journal of Corporation Law 63.

[104] The US SEC's crowdfunding regulation is derived from Titles II, III and IV (Regulation A+), JOBS Act 2012 amended in 2021, https://www.sec.gov/smallbusiness/exemptofferings/regcrowdfunding.

[105] The UK's FCA's crowdfunding regulation is found in FCA Handbook COBS 4.7.7ff; 10.2.9ff.

[106] See https://www.kickstarter.com/discover/categories/art where the platform provides each project's description, rewards if any, updates and status, as well as target funding and number of backers.

represented as one to be 'NFTed' upon completion, it is likely to be treated as a non-financial project which proceeds largely along unregulated routes in the UK and EU, unless the project is organised as a private company offering unlisted securities to backers.

Where crowdfunding regulation applies, fund-raisers are not subject to the full gamut of securities regulation requiring an issuer's prospectus.[107] In the UK, crowdfunding platforms are regulated for fund-raising below £8 million, as an exemption from securities regulation. The EU's Crowdfunding Regulation 2020 also applies to loans and transferable securities, with fund-raising limits at 5 million euros. Platform intermediaries bear the brunt of the majority of obligations in all three jurisdictions' crowdfunding regulations as they are a centralised point of facilitation and intermediation, as well as gatekeeping for investor protection. The US, UK and EU regimes aim at an optimal balance between mobilising financial innovation and serving investor protection,[108] but the EU arguably provides for the most extensive range of platform regulation and gatekeeping, in order to ensure investor protection by disclosure and investor eligibility.[109]

If investors in an 'NFTable' project are funnelled out of the crowdfunding regulatory regime, their engagement would only be in the mode of donation-based crowdfunding in the UK or EU. Donation-based crowdfunding for art projects can take place via the platform *Art Happens*,[110] that bring curators of art projects and 'pledgers' together. Such platforms are self-regulatory and platform rules may include funding a project only if its funding target is met. Pledgers may receive rewards or otherwise, as well as updates at the discretion of the project curator. Donation-based crowdfunding meets the project and remuneration needs of artists, and backers participate generally out of altruistic or socially-based intentions,[111] as rewards are generally for consumption and not for financial gain. The self-regulatory nature of non-financial project crowdfunding may entail ease of access for fund-raisers such as artists, but this phenomenon would be regarded as excluded from investment markets, the access to which could broaden funding appeal. It may be argued that a project to be 'NFTed' is clearly one that is aimed for eventual liquefication and backers of such a project should not be locked out of investment-based rights. However, as regulatory regimes take a narrow view on the modus of investment, i.e. that investment is made in return for unlisted companies' securities, *ex ante* fund-raising for an 'NFTable' project falls into a regulatory gap.

Further, an 'NFTable' project can form the basis for pre-development crowdfunding via 'initial coin offerings' (ICOs) which were at their height in 2017 and 2018. Project curators could issue promises of future rights in tokens to the backers of the project. Such future rights are highly unstandardised at the moment as curators can confer a mixture of future rights in utility and enjoyment, and/or certain rights that can be further mobilised for

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[107] EU's Crowdfunding Regulation (EU) 2020/1503.

[108] Eugenia Macchiavello, 'The European Crowdfunding Service Providers Regulation: The Future of Marketplace Lending and Investing in Europe and the 'Crowdfunding Nature' Dilemma' (2021) 32 European Business Law Review 557.

[109] See for eg Art 21.

[110] https://www.artfund.org/get-involved/art-happens/projects#live.

[111] Kévin André, Sylvain Bureau, Arthur Gautier & Olivier Rubel, 'Beyond the Opposition Between Altruism and Self-interest: Reciprocal Giving in Reward-Based Crowdfunding' (2017) 146 Journal of Business Ethics 313; Giancarlo Giudici, Massimiliano Guerini & Cristina Rossi-Lamastra, 'Reward-based Crowdfunding of Entrepreneurial Projects: The Effect of Local Altruism and Localized Social Capital on Proponents' Success' (2018) 50 Small Business Economics 307.

trading or financial gain.[112] However, there would need to be some relation between these fungible pre-development tokens and the ultimate NFT. It is noted that ICOs would likely be regulable under the proposed EU regulation for crypto-assets,[113] although it is unclear if the regulation, shortly discussed, caters for innovations such as being related to a pre-development NFT. Regulating ICOs continues to be subject to debate amongst jurisdictions.[114]

NFT-based Fund-raising through Ex-post Fractionalisation

Project curators may also create an NFT for completed work in order to 'liquefy' the value locked in the NFT by fractionalising the NFT. *Fractional.art* for example provides a platform for artists to fractionalise their NFTs by locking the NFT as collateral in a smart contract and converting into fungible tokens in the artist's wallet. Such fungible tokens can be given away or traded, and the artist can determine the extent of fractionalisation of each NFT therefore retaining majority ownership of the NFT. *Nftfy* also offers fractionalisation services for NFTs. Fractionalisation can be performed on the basis of locking the NFT into a smart contract, giving rise to fungible tokens with governance rights by token-holders. Holders are able to trade the fungible tokens in secondary marketplaces or further deploy these in DeFi, as discussed below. Holders can also exercise governance rights under coded governance protocols including determining how 're-merging' into the NFT should occur. At that time the NFT itself would be unlocked and subdivided fungible tokens would then be burnt.[115] The 're-merging' process is usually coded on the basis of an 'exit price' which token-holders can vote upon as part of their governance rights. Similar fractional protocols are also offered by Niftex.[116] Market-led developments in this manner are able to bring together the preferences of investors and NFT creators in contests regarding the shaping of creators' reservation of rights, the exercise of token-holders' governance rights and exit rights, so that 'rights' development, which eventually forms clarity regarding 'property' rights, can be consistent with the needs for NFT financialisation.

Whether by means of crowdfunding or by NFT fractionalisation for monetisation, non-financial projects can entangle with the production of financial instruments, broadening their appeal to a wide range of backers for these projects, especially financially-motivated ones.

The Application of the EU Markets in Crypto-assets Regulation

It is arguable that where an 'NFTable' project forms the basis for fungible crypto-tokens to be issued, whether in an ICO or as part of NFT fractionalisation, the fungible tokens and

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[112] Dan Chirtoaca, Joshua Ellul and George Azzopardi, 'A Framework for Creating Deployable Smart Contracts for Non-Fungible Tokens on the Ethereum Blockchain' (2020) IEEE International Conference on Decentralized Applications and Infrastructures (DAPPS) 100, DOI 10.1109/DAPPS49028.2020.00012.

[113] See discussion on Markets in Crypto-asset Regulation, below.

[114] See chapters 1, 3 Chiu, *Regulating the Crypto-economy* (2021).

[115] Leonardo Carvalho, 'The Decentralised Fraction' (6 Nov 2020), https://medium.com/nftfy/the-decentralized-securitization-48b62c12d114; Leonardo Carvalho, 'Nftfy User Guide' (9 Nov 2020), https://medium.com/nftfy/nftfy-users-guide-83c72e1b5b21.

[116] https://landing.niftex.com/.

their offers would be subject to the prospective EU Markets in Cryptoassets Regulation[117] (MiCA).

The MiCA defines three types of tokens: the *crypto-asset*, which is defined as not being currently caught within the framework of securities,[118] securitisation,[119] deposit-taking,[120] electronic money[121] and investment[122] regulations; the *asset-referenced crypto-asset* and the *e-money crypto-asset*. In particular, a comprehensive regime for regulating issuers of asset-referenced crypto-assets is provided because of the regulatory attention directed towards 'global stablecoins'[123] such as Facebook's now-shelved project Diem[124] that had been anticipated to upstage global payment systems.[125] The scope of the first-mentioned cryptoassets is wide, and can capture both fractionalised NFT tokens as well as ICOs for pre-development non-financial project funding where future rights in tokens can comprise utility and investment aspects. This regime offers a relatively light-touch framework for regulation, requiring issuer incorporation in a Member State and disclosure to investors according to a prescribed white paper.

The over-inclusive framework for crypto-assets may be a starting point, but it is already facing developments that may challenge its application, as peculiar investor protection issues arising from particular innovations may not be covered. MiCA provides for a one-size-fits-all white paper for all crypto-asset offers, relying on mandatory disclosure as the key investor protection tool. The provisions are sufficiently general and issuers are not pigeonholed into ill-fitting disclosure obligations. However, investor protection becomes reliant upon issuers' willingness to disclose specific issues that matter for their investors. For an NFTable project, the ultimate NFT may have value as a whole that exceeds the sum of its parts. Would pre-development token-holders be able to enjoy investment gains from the NFT's liquefication or otherwise? A disclosure regime does not govern the nature of investors' rights and their investment expectations. Further, exemptions from this regime exist for offers under 1 million euros over 12 months or if made exclusively to a small number of legal persons or only qualified investors. These provisions are excessively derived from securities regulation and its exemptions, and it is queried if these thresholds are appropriate for the different types of crypto-asset offers that may be made, including those based on an NFTable project.

Regulating Offers of Pre-development Tokens Differently from Offers of Fractionalised NFT Tokens

We argue that where fund-raising is carried out for non-financial projects that are to be 'NFTed', whether as ICOs or as unregulated project crowdfunding, there is a need to consider an appropriate regulatory framework in order to eliminate regulatory arbitrage

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[117] European Commission, *Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937* (2020), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0593.

[118] Ie EU Prospectus Regulation (EU) 2017/1129.

[119] Regulation (EU) 2017/2402.

[120] The regime for credit institutions, EU Directive 2013/36/EU.

[121] Directive 2009/110/EC.

[122] Directive 2014/65/EU.

[123] FSB (2020).

[124] https://www.diem.com/en-us/. ''Facebook gives up on digital payments ambitions with Diem' (Financial Times, Jan 27, 2020), https://www.ft.com/content/e237df96-7cc1-44e5-a92f-96170d34a9bb.

[125] IOSCO CPMI (2021).

and to address investors' expectations that are framed towards the ultimate NFT. There may be a need to disallow projects that are represented as 'NFTable' to be fund-raised on donation crowdfunding platforms as reference to potential liquefication of the project as an asset would make its 'non-financial' characterisation disingenuous. We consider that pre-development tokens issued to fund-raise for an NFTable project should fall with MiCA's scope but that MiCA can benefit from moving away from excessive derivations from securities regulation and providing for the peculiar risks that are faced by investors in such tokens.

The predominant regulatory framework for securities issuance is mandatory disclosure, but the application of such a regulatory framework has over time been premised on a few assumptions: observable and auditable track record of fund-raisers, especially in financial performance, comprehensiveness and legal consequences regarding the accuracy of mandatory disclosures. These assumptions frame investor protection in certain ways: protection lies in *ex ante* decision-making by investors, based on quality information that is comprehensive. For pre-development projects, these assumptions are doubtful as information may be a work in progress and not comprehensive at the outset, and less capable of auditability.

In an earlier work, one of us proposes a bespoke regime for regulating tokenised offers of pre-development projects, which is the subject of most ICOs.[126] First, regulation can play the role of mandating tokens to be standardised, ie, not only being fungible, but conferring the same mixture of utility and/or investment rights. This is a fundamental tenet ensuring that funders obtain the same bargain for the same consideration. Where pre-development tokens are issued for an NFTable project, issuers should provide clarity if the pre-development tokens would relate to the NFT in any manner, such as rights based on references to the NFT's market or investment value or transactions involving the NFT.[127] Further, it is proposed the limits of mandatory disclosure be recognised as it cannot be complete. Investors should optimally be protected by rights of ongoing monitoring and accountability for project progress and smart contract protocols can provide refund rights under non-viability circumstances. This regime can similarly apply to tokenised offers for funding other pre-development projects.

We propose a different regulatory framework for NFT fractionalisation. NFT fractionalisation can be likened to securitisation carried out for mainstream financial assets[128] or the curation of 'collective investing' which can relate to 'non-financial' property.[129] Both techniques are 'asset-based' in nature, and attract investors to buy into 'sliced' rights. These sliced rights pertain either to certain future income or appreciation expectations. The financial regulatory tenets relevant to such financial transformations are asset-based disclosures, as well as legal duties on the part of those managing any operations of an investment nature.

First, regulation should provide for NFT fractionalisation to produce standardised tokens so that all purchasers of tokens obtain fungible tokens with the same conferment of rights. Second, NFT fractionalisation is based on the investment value of the underlying project, in

[126] Chapter 5, Chiu (2021).

[127] It is early to suggest this but regulators should also pay attention to whether investors' rights in relation to the ultimate NFT are remote or credible, in order to prevent a market for lemons.

[128] 'SEC's 'Crypto Mom' warns selling fractionalized NFTs could break the law' (26 March 2021), https://cointelegraph.com/news/sec-s-crypto-mom-warns-selling-fractionalized-nfts-could-break-the-law.

[129] S235, UK Financial Services and Markets Act.

terms of intrinsic as well as market value, hence there is scope for mandating comprehensive mandatory disclosure regarding the NFT and its underlying project [130] in terms of the protocols governing fractionalisation, rights coded in these protocols and the nature and prospects of assetisation of the underlying project. There is a need to fully account for how the NFT provides for rights in relation to exploiting the underlying project in order to inform of the potential value the NFT would generate. In this manner, governing the fractionalisation of NFTs may allow financial regulation to assume a role that ultimately assists in the development and standardisation of the 'legal rights in property' in NFTs that would be commensurate with investors' expectations. It may be argued that financial regulation should not regulate the nature of products, as product regulation is not the norm. However, we have observed the development of limited forms of product regulation in financial regulation, such as where composition regulation of investment funds is introduced for the UCITs,[131] in order to ensure their liquidity, or where sustainably-labelled investment funds must demonstrate the achievement of sustainable outcomes in addition to financial ones.[132] In this manner, fractionalised NFT tokens, which are particular asset-based financial products, should provide credibility in relation to its 'connection' to the nature of the asset that generates investment value.

Finally, as NFT fractionalisation involves locking up the NFT in exchange for fungible fractionalised tokens, hence creating a 'community' of 'co-owners' who share in similar investment expectations, the rights of the community should be subject to clear governance *vis-à-vis* the creator of the NFT and any entity that controls the governance protocols for the fractionalisation and re-merging of the NFT. Regulatory frameworks can provide for minimum standards and meta-level principles for governance standards. It may be argued that, if NFT fractionalisation and governance takes place using a Decentralised Autonomous Organisation (DAO)[133] format, it may be difficult for regulatory standards to apply to a highly disintermediated paradigm where there are no 'responsible' legal persons to which to attach obligations. High levels of automation such as the DAO can pose challenges to regulatory design, but there is no theoretical resistance to regulation supplying certain standards of conduct. Hence, regulators must increasingly consider the possibility of Suptech,[134] ie, the embedment of regulatory standards into code in an *ex ante* manner, through an authorisation regime that includes code vetting, such as inspired by the Maltese Innovative Technological Arrangements Act.[135]

Regulation of NFT Platform Intermediaries

Next, we turn to various services or applications that support NFT financialisation and argue that it is important to consider appropriate regulatory governance for these. Platform or application providers may transform their marketplaces for NFTs as goods into a business model for financial intermediation. They provide a one-stop shop for NFT creation, fractionalisation and secondary market trading. Marketplaces that provide for secondary trading of fractionalised fungible tokens are akin to performing a function of 'listing'

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[130] Eg Art 7 of the EU's Securitisation Regulation (EU) 2017/2402.
[131] Eg Art 50, EU UCITs Directive 2009/65/EU.
[132] Arts 8-11, EU Sustainability Disclosure Regulation 2019/2088.
[133] See n138 infra.
[134] S Zeranski and IE Sancak, 'Digitalisation of Financial Supervision with SupTech' (2020) 35 Journal of International Banking Law and Regulation 309.
[135] https://legislation.mt/eli/cap/592/eng/pdf.

fungible assets for sale that could be regarded as having financial or investment value. These marketplaces provide their own rules in relation to membership, trading processes and settlement. Further, private applications or platforms that provide templates for fractionalisation determine the terms of rights and governance in relation to the NFT owner and the fractionalised owners in 'shares' of the NFT. This is akin to a function related to collective investing. *Fractional.art*, for example, is currently a self-regulatory market for fractionalised NFT tokens governed by extensive platform disclaimers that seek to reinforce *caveat emptor* on the part of purchasers/investors.[136]

An operator of a marketplace that maintains certain controls and rules may be regarded as a 'centralised' marketplace operator. These may exert control over a range of users' rights including asset custody, use of marketplaces, execution and settlement of trades. The Canadian securities regulator has extended securities markets regulation over crypto-asset marketplaces where 'deferred' delivery happens, eg, where such marketplaces control custody of assets.[137] The EU MiCA also proposes to regulate marketplace platform intermediaries beyond issues regarding custody of assets. The MiCA provides for regulation of crypto-asset exchanges in relation to listing of assets, participation criteria for all users, policies for trading orderliness, as well as suspensions of crypto-assets, and settlement certainty and efficiency. These provisions may be rather derived from conventional securities markets and although not all applicable, some regulatory tenets are appropriate for governing the power and responsibilities of marketplace operators for NFT secondary trading and fractionalised NFTs, protecting users' fair expectations.

We suggest that regulatory governance can be extended to govern areas where marketplaces exert power that affect the shaping of investment value, rights and expectations, such as in relation to admission to trading, safeguarding the integrity of marketplaces in terms of disclosure and management of conflicts of interest, trading /settlement certainties in terms of delivery versus payment, as well as monitoring of market abuse and gatekeeping responsibilities that provide a common good to users. Further, user protection lies in certainties such as the marketplace's resistance against abusive practices like wash trading, business continuity, protection from loss in relation to negligence, cyberhacking, etc. Inspiration can also be borrowed from the regulation of crowdfunding platforms in terms of control, gatekeeping duties and reporting obligations.[138]

However, many marketplaces in the blockchain universe are constituted by automated protocols and appear decentralised. Clements[139] critically discusses whether decentralised protocols are susceptible to regulation. Users of such protocols face issues of user protection, although concerns regarding systemic stability may be limited. Users who engage with decentralised protocols trust these protocols on a *caveat emptor* basis, and only deal with their counterparties. Developers of such protocols seem not exactly in the

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[136] https://fractional.art/disclaimer.

[137] 'CSA Staff Notice 21-327 Guidance on the Application of Securities Legislation to Entities Facilitating the Trading of Crypto Assets' (16 Jan 2020), https://www.bcsc.bc.ca/Securities_Law/Policies/Policy2/PDF/21-327__CSA_Staff_Notice__-_January_16__2020/.

[138] Elisabetta Lazzaro and Douglas Noonan, 'A Comparative Analysis of US and EU Regulatory Frameworks of Crowdfunding for the Cultural and Creative Industries' (2021) 27 International Journal of Cultural Policy 590.

[139] Ryan Clements, 'Emerging Canadian Crypto-Asset Jurisdictional Uncertainties and Regulatory Gaps' (2021) 37 Banking and Finance Law Review, https://ssrn.com/abstract=3891809.

picture. It remains questionable to what extent protocol developers or providers exercise some form of responsibility, such as for protocol maintenance, problem-solving etc. This issue is especially pertinent to DeFi, discussed below. In particular, there is no clarity as to who bears responsibility for defects in protocol and vulnerability to hacking.[140]

Where platforms run on automated protocols dealing with collateral locking and top-ups, wallet to wallet interactions, etc, it is arguable that regulatory techniques embedding law into code could be applied.[141] Such regulatory techniques would demand that automated protocols be built by design to integrate regulatory concerns, such as user protection rights, transaction certainties, reversal of transaction conditions, anti-money laundering verification, etc.[142] The design and production of automated protocols are points in time where users' rights would be shaped and affected, hence an *ex ante* instead of an ongoing approach to regulation can be warranted. Regulators would need to be able to undertake code vetting and review, therefore placing new demands on regulatory expertise. This may however be an inevitable development.

Regulating Custodial Service Providers

A particular service of importance to NFT financialisation would be custodial services. This is crucial to NFT investors as the rights to digital ownership are often inextricably linked to the right to access the digital asset. In a landscape of self-regulatory custodial services, crypto-token holders can be left unprotected in cases of disruption or discontinuity of access, or where hacking or theft occur.[143] Further, token-holders may be left as unsecured creditors in the event of insolvency of the custodial service provider.[144]

The EU MiCA proposes to regulate crypto-asset service providers that cater for custodial services. These are defined as service providers that have control over access to crypto-assets and are governed in relation to (a) clear provision of the nature of service to identified customers, including the applicable law of contract; (b) mandatory recording and reporting obligations in relation to assets under custody; (c) mandatory obligations to maintain security policies and appropriate internal governance procedures, with absolute liability for loss of assets through cyberhacking or theft; (d) mandatory segregation of customer assets and (e) facilitation of access by customer to assets. Custody service providers include centralised trading exchanges and operators as discussed above as well as those involved in 'brokerage' of crypto-asset transactions[145] and in giving advice regarding

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[140] It is recounted that 169 hacking incidents have taken place in relation the DeFi protocols, with approximately USD$7 billion lost. 'Cointelegraph Consulting: Recounting 2021's biggest DeFi hacking incidents' (3 Nov 2021), https://cointelegraph.com/news/cointelegraph-consulting-recounting-2021-s-biggest-defi-hacking-incidents.

[141] Roger Brownsword, *Law, Technology and Society* (Oxford: Routledge 2019) on 'the technocratic' approach to regulatory transformation, which embeds regulation into technology, p197.

[142] Raphael Auer, 'Embedded Supervision: How to Build Regulation Into Blockchain Finance' (BIS Working Paper 2019), https://www.bis.org/publ/work811.htm.

[143] 'How secure are digital assets?' (Financial Times, 30 Nov 2021), https://www.ft.com/content/6cea9227-aaa2-4850-ac7a-b2ca18cccbe3.

[144] 'Inside the Bizarre Upside-Down Bankruptcy of Mt. Gox' (22 March 2018), https://www.theverge.com/2018/3/22/17151430/bankruptcy-mt-gox-liabilities-bitcoin.

[145] The broker regulation template is also proposed in Dennis Chu,"Broker-Dealers for Virtual Currency: Regulating Cryptocurrency Wallets and Exchanges." (2018) 118 Colum. L. Rev 2323.

crypto-assets. These are similar to existing obligations imposed on conventional financial intermediaries who have custody of client monies and assets.[146]

In relation to service providers for NFTs and fractionalised NFTs, there is a need to consider extending the tenets of financial regulation designed to protect users benefiting from custodial services.[147] An NFT custodial services provider may be regarded as outside of the scope of financial regulation such as MiCA. However, as providers offer the same wallets that can be used to pay out cryptocurrency and receive NFTs in exchange, it is arguably contrived to draw a firm line between custodial services for NFTs and those for fungible crypto-tokens.

Many wallet applications are highly decentralised and do not purport to maintain control and access to users' cryptoassets. Many wallet applications can be downloaded onto a smartphone and they provide users with recovery seed phrases in order to safekeep in case of loss of access. In this way, users are in control of their wallets in terms of sending instructions for receipt of tokens and for transactions out of the wallet. It remains dubious to what extent such application providers are wholly externalised from users' activities and cannot be pinned down for user protection responsibilities. Wallet providers often tie up with other services, such as centralised crypto-exchanges or DeFi services in order to offer users convenient gateways into those platforms. In that respect, should affiliated platform operators to decentralised wallets be responsible for relevant aspects of user protection, in a similar manner as centralised operators discussed above, if they exercise functional influence over such users? Further, if software updates and protocol maintenance are provided by a wallet application, can it really be said that there is no centralised form of management over the wallet services? The MiCA's definition of custodial service providers in relation to control over access to assets may be too narrow, and it would be important to consider appropriate governance standards for a range of wallet application providers along a spectrum of centralised control and maintenance. Highly decentralised services can be subject to regulatory designs involving embedded compliant code, as mentioned above.

Visions of NFT Financialisation and Decentralised Finance

NFT financialisation and fractionalisation are being supported by innovations in DeFi which open up various channels for NFTs and NFT fractionalised tokens to be monetised and liquefied.

DeFi activities involve peer-to-peer financial engagements based on trust in automated protocols,[148] facilitating activities that allow gains from financial intermediation to be captured by users directly, bypassing centralised intermediaries who would, in conventional finance, take a cut of the transactional values. For example, holders of NFTs can stake them in a liquidity pool for yield generation purposes.[149] Staking is an activity where financial

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[146] Eg Art 16(11), MiFID.

[147] Anastasia Solitopoulou and Stéphanie Ligot, 'Legal Challenges of Cryptocurrencies: Isn't It Time to Regulate the Intermediaries?' (2019) 5 European Company and Financial Law Review 652; Sarah Jane Hughes and Stephen T Middlebrook, 'Advancing a Framework for Regulating Cryptocurrency Payment Intermediaries' (2015) 32 Yale Journal on Regulation 295.

[148] SM Werner, D Perez, L Gudgeon, A Klages-Mundt, D Harz, WJ Knottenbelt, 'SoK: Decentralized Finance (DeFi)' (2021), https://arxiv.org/pdf/2101.08778.pdf.

[149] Such as offered by Cargo, see 'NFT Staking Launching on the Ethereum Blockchain' (7 Oct 2020), https://medium.com/the-cargo-times/nft-staking-launching-on-the-ethereum-blockchain-46ebb39335fd; also NFTX, https://docs.nftx.io/tutorials/staking; Unicly, https://www.unic.ly/.

asset holders could provide liquidity for a 'fee' while also retaining the freedom to speculate on swapped assets. Such activity would be the functional equivalent of institutional market making in conventional finance. Liquidity pool platforms for fungible cryptocurrency and crypto-assets are starting to develop financial intermediation services for fractionalised NFTs. These liquidity pools purport to be decentralised, governed by their token holders who vote according to governance protocols, providing automated protocols for the operation of the pools. For example, Sushiswap and Unicly have jointly developed auction markets for secondary trading of fractionalised NFTs.[150] Fractionalised NFTs, being fungible tokens, could in due course participate in liquidity pools for fungible tokens such as on Sushiswap or Uniswap. Decentralised liquidity provision potentially democratises market-making for any crypto token-holder and any crypto-token can potentially be financially transformed into an asset. However, the appearance of decentralisation and automated protocols without any central involvement in these pools may be misleading.[151]

Platforms for cryptoasset staking and liquidity transformations are commercial in nature and provide leadership in financial innovations.[152] Hence, it may be misleading to say that there are no intermediaries in DeFi, and only networks that are disintermediated and accessed by users on a peer-to-peer basis. The impression that DeFi is totally decentralised has been questioned as 'fake' by some commentators[153] who point out different extents of control or power exercisable by platform developers or certain groups of governance token holders. Platforms such as KIRA curate NFT baskets where less high-value NFTs can be deposited in order to exchange for fungible tokens that can be used further for trading or staking. Such financial innovations involve a form of investment management. Protocols are provided for curating baskets and referencing market value, such as by oracles. There is responsibility for protocol maintenance, oracle review and perhaps troubleshooting. The curation of financial innovation can be traced back to responsible business entities or individuals facilitating DeFi activities. Further, the control over automated protocols may be in the hands of governance token holders which could be a select group.[154] In this manner, there may be 'responsible persons' in the form of developer entities and governance token holders who can be susceptible to identification and be subject to responsibilities for the governance of automated protocols and the protection of users.[155] DeFi marketplaces are not as flat and beyond control as imagined, and the reality is that users are not all equally empowered by governance protocols. In this manner, designing regulatory frameworks may be feasible in the traditional sense of pinning down entities for duties and obligations to

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[150] 'Unicly and SushiSwap form an Alliance to Level Up Fractionalized NFTs' (1 July 2021), https://nftevening.com/unicly-and-sushiswap-form-an-alliance-to-level-up-fractionalized-nft/.

[151] Sørensen and Zetzsche (2021).

[152] Kaal (2021).

[153] Sørensen and Zetzsche (2021).

[154] For example participants in the onchain automated protocol for withdrawing stablecoin Dai are not necessarily holders of the governance token MKR. MKR holders participate in governance decisions in MakerDAO which implements the protocols for dai withdrawal and redemption protocols.

[155] At the very least the responsible entity for protocols would be the governance body which may be a DAO, such as MakerDAO, https://makerdao.com/en/. Where the governance body is not 'formalised' into a DAO and may be a community, responsible persons could include all governance token holders, such as the Compound Community, https://compound.finance/governance. It may be queried how responsibility can be attached to such a disparate body of governance token holders, but it can also be argued that regulatory requirements would in turn shape governance structures and the articulation of responsibilities within these structures for compliance purposes.

apply. However, a mixture of approaches in regulation, including *ex ante* vetting of code by regulators may be inevitable in order to achieve mischief prevention and efficiency.

It is arguable that DeFi should resist regulation on the basis that regulation disrupts the efficiency of peer-to-peer financial engagements. However, scaling DeFi transactions makes it both costly and time-consuming on the Ethereum blockchain, therefore making efficiency claims a matter for debate.[156] Further, if offchain solutions are explored for transaction validation and efficiency, then these give rise to aspects of offchain governance and maintenance responsibilities which would be self-regulatory without a form of regulatory governance.[157]

It is highly questionable that regulators should steer clear of DeFi[158] just because it is purported to be peer-to-peer financial engagement and seems not to implicate public or social protection objectives. If more mainstream investors come to regard diversification into crypto-finance as becoming palatable due to the struggles with yield in conventional assets,[159] growing volumes and scale would compel regulators to take a position. It could be argued that regulators can take the position of restricting DeFi to wealthy or sophisticated investors who can bargain for themselves. However, such an approach would necessarily be exclusionary based on a crude presumption of capability.[160] NFT financialisation and their potential implication in DeFi should attract and not deter financial regulators' attention to DeFi. DeFi shows the possibilities of increasing assetisation of digital representations of infinite subject matter for financialisation, expanding a range of marketplaces for new forms of financialised assets. In this manner, commodities can easily be transformed into fungible assets for financial transformation, by possibly anyone, therefore opening DeFi opportunities to democratised participation. DeFi is therefore a new frontier of accelerated or 'hyper' financialisation[161] which should not be ignored. There may be efficiencies for mobilising peer-to-peer financial engagement which can be socially useful, especially for illiquid 'assets', but there would be risks and hazards in a marketplace environment that is not currently subject to institutional governance or expectations. The issues DeFi activities raise date from before the more recent innovations of NFT financialisation. However, NFT

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[156] Adam Greenfield, 'Non-fungible tokens aren't a harmless digital fad– they're a disaster for our planet' (The Guardian, 29 May 2021); Qin Wang, Ruijia Li, Qi Wang and Shiping Chen, 'Non-Fungible Token (NFT): Overview, Evaluation, Opportunities and Challenges' (2021), https://arxiv.org/abs/2105.07447, but see 'Ethereum Closes In on Long-Sought Fix to Cut Energy Use Over 99%' (Bloomberg, 23 May 2021), https://www.bloomberg.com/news/articles/2021-05-23/ethereum-closes-in-on-long-sought-fix-to-cut-energy-use-over-99.

[157] 'Revisiting the on-chain governance vs. off-chain governance discussion' (22 May 2018), https://medium.com/@poolofstake/revisiting-the-on-chain-governance-vs-off-chain-governance-discussion-f68d8c5c606.

[158] 'DeFi Is Like Nothing Regulators Have Seen Before. How Should They Tackle It?' (19 Oct 2021), https://www.coindesk.com/policy/2021/10/19/defi-is-like-nothing-regulators-have-seen-before-how-should-they-tackle-it/; 'Crypto's 'DeFi' Projects Aren't Immune to Regulation, SEC's Gensler Says' (The Wall Street Journal, 19 Aug 2021), https://www.wsj.com/articles/cryptos-defi-projects-arent-immune-to-regulation-secs-gensler-says-11629365401.

[159] 'Institutional Money Is Pouring Into The Crypto Market And Its Only Going To Grow' (Forbes.com, 12 Aug 2021), https://www.forbes.com/sites/lawrencewintermeyer/2021/08/12/institutional-money-is-pouring-into-the-crypto-market-and-its-only-going-to-grow/?sh=3b41d8a01459.

[160] *Ang v Reliantco* [2019] EWHC 879 seems to suggest that an experienced financial professional can still be treated as consumer in relation to crypto.

[161] Chapter 7, Chiu (2021).

financialisation reinforces the need for financial regulators to confront new financial transformations and needs for governance beyond their familiar parameters.

It may be argued that NFT financialisation as described above is overly futuristic and that current trends do not seem to support a high level of financial innovation based on NFTs. For example, the Doge meme 'NFT', which is a tokenised representation of an image of a *shiba inu* dog, sold for 1696.9 ether to an art collective formed as a DAO,[162] a blockchain-based community of token-holders with some common objectives and governance rights.[163] Pleasr.dao, which owns the NFT, has since fractionalised the NFT into 17 billion fungible tokens in order to promote communal ownership of iconic digital art.[164] Although Pleasr.dao states in its vision that it sees fractionalised tokens as becoming part of the DeFi eco-system in due course, no concrete applications for this next step have been articulated.[165]

At the very least, anti-money laundering governance should be extended to DeFi marketplaces,[166] perhaps through a mixture of integrated code protocols and gatekeeping responsibility where it can be reposed. Anecdotal accounts posit that there is a level of wealth in the crypto-economy that is transformed from illicit activities and profits.[167] Moreover, infinite acceleration of assetisation and financialisation activities made possible by DeFi can assist money launderers in their layering processes. Illicit wealth transformed into cryptocurrency holdings can be laundered through token swapping in DeFi staking platforms, as well as purchasing NFTs and then fractionalising them in order to realise proceeds.[168] Regulators need to put the regulatory agenda for DeFi on the table[169] in an age

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[162] 'Iconic 'Doge' meme NFT breaks record, selling for $4 million' (NBC News, 11 June 2021), https://www.nbcnews.com/pop-culture/pop-culture-news/iconic-doge-meme-nft-breaks-records-selling-roughly-4-million-n1270161.

[163] The Decentralised Autonomous Organisation, or DAO is a blockchain-based organisational form that can be distinguished from conventional business forms. The first DAO was pioneered by Slockit.com, see 'The History of the DAO and Lessons Learnt' at https://blog.slock.it/the-history-of-the-dao-and-lessons-learned-d06740f8cfa5?gi=45fc4b2b1f80. The DAO is an evolving organisational form experimented on by different quarters of blockchain-based communities, Wulf A Kaal, 'Decentralised Autonomous Organisations via Blockchain Technology' (2020) 5 Annals of Corporate Governance 101, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3652481&fbclid=IwAR3FUNzIPD4Z7tus_OamvKenGrTWCq4Xi1SpAeKQnREFviVjVGz5vTJHUJY. Some commentators liken this to the partnership form, Ori Oren, 'ICO's, DAO'S, and the SEC: A Partnership Solution' (2018) 2018 Colum Bus L Rev 617, but a number of US State jurisdictions and the European jurisdiction of Malta are offering bespoke organisational legislation for the DAO, see Malta Innovative Technological Arrangements and Services Act 2019; and Vermont's Blockchain-Based limited liability company form, https://legislature.vermont.gov/statutes/chapter/11/025.

[164] https://pleasr.org/#.

[165] Ibid.

[166] Envisaged in the Financial Action Task Forces, *Updated Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers* (2021), https://www.fatf-gafi.org/media/fatf/documents/recommendations/Updated-Guidance-VA-VASP.pdf. The Guidance defines virtual assets broadly and not limited to fungible tokens. The scope of the guidance covers Virtual Asset Service Providers defined broadly in terms of facilitating exchanges, transfers, custody etc of virtual assets. Jurisdictional authorities are encouraged to look at the substance of responsibility in DeFi services and activities, although the Guidance still cannot apply to purely peer-to-peer transactions, see paras 67-69.

[167] 'The rise of crypto laundries: how criminals cash out of bitcoin' (Financial Times, 28 May 2021), https://www.ft.com/content/4169ea4b-d6d7-4a2e-bc91-480550c2f539.

[168] Arte (2021), https://ssrn.com/abstract=3904683 on the potential of wash trading which facilitates money laundering.

[169] Chapter 7, Chiu (2021).

of increasing possibility for digital transformation into fungible tokens that mobilise financial activity.

Section D: A Digital Commodities Financial Regulator and Concluding Thoughts

NFT financialisation provides an illustration for how the digitalisation of any commodity—whether tangible, intangible, situated in the real economy or borne out of the crypto-economy—can give rise to its financialisation by encoding properties that allow the digital token to be monetised, liquefied and assetised. The capital transformation of digital objects from commodity to asset is accelerated in the digital environments of peer-to-peer platforms. In other words, NFT financialisation is close to a vision of the financialisation of anything and everything in the crypto-economy, blurring the regulatory perimeters for financial regulators.

This challenge is not entirely new; commodity products giving rise to financial transformation in the form of futures and derivative contracts was ultimately a phenomenon recognised for regulatory extension in the US.[170] The Commodities and Futures Trading Commission (CFTC) is the regulator with a wide remit over any commodities derivative contract, although it has not engaged in systematic 'product'-based regulation. Nevertheless, its assertion of oversight over certain bitcoin contracts (that are not spot delivered) has allowed the CFTC to extend its remit, albeit in an *ad hoc* fashion, to combat scams in the crypto-economy.[171] The maintenance of the distinction between futures and spot contracts may, however, limit the CFTC's jurisdiction.[172]

This article does not merely call for the CFTC's extension of oversight into all digital tokens that may be based on non-financial subject matter/property. The delineation of oversight and responsibilities between sectoral US regulators is a topic that requires separate treatment[173] but the idea of having a financial regulatory body that oversees financial transformation of non-financial subject matter/property is one that should be embraced in face of the rapid and novel financialisation brought about by the crypto-economy. Such a regulator could be part of an overall financial regulator or could be independent while maintaining close agency cooperation with the securities or conduct of business regulator in a jurisdiction. The installation of such a regulatory body opens up possibilities in terms of a broad and flexible regulatory perimeter, facilitating as well as governing social expectations in new capital transformation. Such a regulator could for example consider if product-based regulation would be beneficial for market participants in asset markets transformed from non-financial subject matter/property. Further, a regulatory body is important for capturing a scope of intermediaries (such as market operators and service providers) for governance treatment, and setting standards even for decentralised structures such as by embedment into code.

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[170] Commodity Exchange Act.

[171] *CFTC v MyBigCoin Pay Inc* (26 Sep 2018), https://www.cftc.gov/sites/default/files/2018-10/enfmybigcoinpayincmemorandum092618_0.pdf; Allen Kogan, 'Not All Virtual Currencies Are Created Equal: Regulatory Guidance in the Aftermath of CFTC v. McDonnell' (2019) 8 Am U Bus L Rev 199.

[172] Giovanni Patti, 'The Regulation of Financial Product Innovation Typified by Bitcoin-Based Derivative Contracts' (2020) Review of Banking and Financial Law, forthcoming, https://ssrn.com/abstract=3380770.

[173] Eg Elizabeth F Brown, 'E Pluribus Unum - Out of Many, One: Why the United States Needs a Single Financial Services Agency' (2005-6) 14 U of Miami Bus Law Rev 1.

The commoditisation and financialisation of NFTs is consistent with mankind's innovative history in the development of markets for capital and financial assets. Clarification of legal rights in novel property should develop along with financial regulatory tenets to provide frameworks for the mobilisation and liberalisation of capital transformation. This article supports and provides a blueprint for regulatory reforms in support of NFT financialisation in the sphere of investment mobilisation. More broadly, NFT financialisation is a lens through which boundary-challenging issues in crypto-finance can be appreciated. More broadly, an institutional response would be optimal for society to engage with such innovation in an open-minded and constructive manner.