

# Contracts Without Promises: Blockchain-Based “Smart Contracts” and the Title-Transfer Theory of Contract

David J. Hoffa\*

## Abstract

*Smart contracts are computer programs used to transfer digital assets according to user-generated specifications. Smart contracts run on decentralized blockchain networks. The fact that smart contracts, a new means for parties to digitally trade, greatly eliminate ex ante promissory obligations in favor of the actual execution of contracts through a single legal instrument presents a fundamental issue for a contract law paradigm based upon promissory obligations. Therefore, smart contracts offer a novel opportunity to re-examine the foundations of contract theory. The Title-Transfer Theory of Contract, premised not upon promissory obligations but on the transfer of property titles to scarce resources, saves contract theory from the theoretical issues posed by smart contracts by basing contract theory in the property theory of Rothbardian-libertarian ethics.<sup>1</sup> Because neither smart contracts nor the Title-Transfer Theory of Contracts focus on promissory obligations, the two are inherently congruent.*

## Introduction

In the 1960’s, in New York City, a young graduate of philosophy from Brooklyn College, Walter Block, sits with his mentor, economist Murray Rothbard. Block asks, “How many libertarians are there in the whole world?” To which Rothbard replies – “twenty-five.”<sup>2</sup>

Over 50 years later, the number of individuals who describe themselves as libertarians has increased, along with their influence. One finds partial proof of this in the fervor shown for Bitcoin and other blockchain-based cryptocurrencies by many libertarians.<sup>3</sup> In 2013, Lui Smyth collected data on Bitcoin users through an online survey.<sup>4</sup> “1,193 responses were collected from

---

\* B.G.S. University of Michigan – Ann Arbor, class of 2018; J.D. Candidate Michigan State University College of Law, expected class of 2021.

<sup>1</sup> Because the terms “ethics” and “morals” are often used interchangeably, it is important to distinguish the difference between them here. “Ethics” denotes a set of rules of conduct which is derived objectively from an external source, and is therefore universally applicable to all people at all times. Stefan Molyneux, *Universally Preferable Behaviour: A Rational Proof of Secular Ethics* 30 (Freedomain 2007), [http://cdn.media.freedomainradio.com/feed/books/UPB/Universally\\_Preferable\\_Behaviour\\_UPB\\_by\\_Stefan\\_Molyneux\\_PDF.pdf](http://cdn.media.freedomainradio.com/feed/books/UPB/Universally_Preferable_Behaviour_UPB_by_Stefan_Molyneux_PDF.pdf), and Hoppe, *infra* note 49. “Morals,” in contrast, denotes one’s own subjective views of right and wrong conduct. ETHICS VS. MORALS, [https://www.diffen.com/difference/Ethics\\_vs\\_Morals#Videos\\_Explaining\\_the\\_Differences](https://www.diffen.com/difference/Ethics_vs_Morals#Videos_Explaining_the_Differences) (last visited Nov. 29, 2019).

<sup>2</sup> MURRAY N. ROTHBARD | WALTER BLOCK at 17:35 – 18:00, (2016), <https://www.youtube.com/watch?v=g-ioFpg4aZs> (last visited Oct. 13, 2019).

<sup>3</sup> Anshu Verma and N.K. Gupta, *Uses of Bitcoin an Exploration of the Bitcoin Community*, 5(9) Int’l J. of Advanced Research in Computer and Comm. Engineering 162, 163 (2016).

<sup>4</sup> *Id.* Although data from COINDESK’S Q2 2018 BLOCKCHAIN SENTIMENT SURVEY, (2018), <https://www.coindesk.com/research/state-of-blockchain-q2-2018?slide=105> (last visited Oct. 13, 2019), shows that

February 12, 2013 through April 4, 2013[] . . . on Bitcointalk.org, Reddit, Twitter, and Google+, [and] the[n the] survey was reposted on related Bitcoin sites.”<sup>5</sup> The survey found that “[a]most half of the sample identified as Libertarian.”<sup>6</sup> This is impressive, given that only about “one-in-ten Americans [in 2014] (11%) describe[d] themselves as libertarian and kn[e]w what the term means.”<sup>7</sup> Moreover, a qualitative view confirms the alignment between cryptocurrency and libertarian values.<sup>8</sup>

Thus, libertarians played an important role in advocating the use of blockchain-based cryptocurrencies. This no doubt fueled, in part, the growing adoption of these technologies by non-libertarians. Although libertarians have decreased in ratio to individuals of other political ideologies who are using Bitcoin and other blockchain protocols, they still remain (when libertarian and anarcho-capitalist are added together) the largest single ideologically-defined group of users.<sup>9</sup> Their influence in the cryptocurrency and blockchain communities has been and will continue to be felt.

---

the ratio of libertarians (+ anarcho-capitalists) to individuals of other political viewpoints has decreased since Smyth’s survey, *supra* note 3, the earlier data remains illustrative of libertarians’ perception that Bitcoin and blockchain technology are uniquely aligned with their values, as well as the fact that these early-adopter libertarians played a substantial role in “mainstreaming” cryptocurrency and blockchain technology.

<sup>5</sup> Verma and Gupta, *supra* note 3, at 163.

<sup>6</sup> *Id.* at 164.

<sup>7</sup> Jocelyn Kiley, IN SEARCH OF LIBERTARIANS, (2014), <https://www.pewresearch.org/fact-tank/2014/08/25/in-search-of-libertarians/> (last visited Oct. 13, 2019).

<sup>8</sup> Verma and Gupta, *supra* note 3, at 163. (In Smyth’s survey, “[r]espondents were asked, ‘In 140 characters (or so), what is your favorite aspect of Bitcoin?’”

The following quotes are representative of the statements submitted by libertarians about Bitcoin:

- —Bitcoin could one day allow freedom from the State. It is not subject to manipulation or coercion. It is simply a medium for voluntary exchange. (United States, 20 years old)
- —Freedom!, nobody can forbid me to buy/sell bitcoins, there's no government regulations on that. Here in Argentina we CAN'T buy foreign currencies as a saving/investment and Bitcoin is a workaround. [sic] (Argentina, 28 years old)
- —Taking away the power of the money supply from centralist states which will start the long path to their disbandment and the rise of the first true free market in history. (Netherlands, 27 years old)

*Id.* at 167).

Indeed, the creator of Bitcoin, Satoshi Nakamoto, stated that it is “very attractive to the libertarian viewpoint if we can explain it properly.” Henrik Karlström, *Do libertarians dream of electric coins? The material embeddedness of Bitcoin*, 15(1) *Distinktion: Scandinavian J. of Soc. Theory* 23, 29 (2014) (Nakamoto in communications with cypherpunk Hal Finney, <http://www.mail-archive.com/cryptography@metzdowd.com/msg10001.html>.)

<sup>9</sup> COINDESK, *supra* note 4.

Since Bitcoin, the first blockchain, was released in 2008,<sup>10</sup> attempts have been made to realize the technology's potential. For example, the blockchain protocol Ethereum attempts to increase blockchain transactions' complexity,<sup>11</sup> allowing for "smart contracts" – i.e., "user-defined program[s] running on top of a blockchain."<sup>12</sup> These "add[] layers of information onto [blockchain-based] transactions."<sup>13</sup> This provides Ethereum transactions with greater complexity, tailored to the choices of users, rather than the limited transaction types Bitcoin offers.<sup>14</sup> Of particular note for this paper is that smart contracts "[i]n a significant sense [do not involve promissory obligations],"<sup>15</sup> even though traditional contract theory holds such to be contract's basis.<sup>16</sup> "The smart contract sets in motion machinery that the parties cannot subsequently prevent. The smart contract is not fulfilled by some further action of a contracting party, but rather by the completion of this mechanical process."<sup>17</sup> This "raises . . . questions about the conventional definitions of contracts."<sup>18</sup> Given the role libertarians have played in advocating blockchain technology, libertarian contract theory may help answer these questions.<sup>19</sup>

---

<sup>10</sup> Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, (2008), <https://bitcoin.org/bitcoin.pdf>.

<sup>11</sup> Vitalik Buterin, A NEXT-GENERATION SMART CONTRACT AND DECENTRALIZED APPLICATION PLATFORM, WHITE PAPER, (2014) <https://github.com/ethereum/wiki/wiki/White-Paper> (last visited on Oct. 19, 2019)

<sup>12</sup> Matthew N.O. Sadiku et al., *Smart Contracts: A Primer*, 5(5) *J. of Scientific and Engineering Research* 538, 539 (2018).

*But see* Jeffrey M. Lipshaw, *The Persistence of "Dumb" Contracts*, 2(1) *Stan. J. of Blockchain L. and Pol'y*, (2019), (Advanced Online Publication) <https://ssrn.com/abstract=3202484>. Lipshaw focuses his examination on a continuum between "dumb" and "smart" contracts, where ambiguities of contractual terms are eliminated as one moves from dumb to smart. This categorization means that "smart contracts" need not be electronic or blockchain-based. Because this paper focuses on "smart contracts" as they exist within the world of computers and blockchain technology, and because such is the reason the term has received so much attention, this paper uses the term "smart contracts" in its technological, blockchain context.

<sup>13</sup> *Id.* at 538.

<sup>14</sup> Shuai Wang et al., *An Overview of Smart Contracts: Architecture, Applications, and Future Trends*, 2018 IEEE Intelligent Vehicles Symposium 108, 108 (2018) (stating that "Bitcoin can only be considered as the prototype of smart contracts. Newly emerging blockchain platforms such as Ethereum embrace the idea of running user-defined programs on the blockchain, thus creating an expressive customized smart contract with the help of Turing-complete programming language"); *see also* Maher Alharby and Aad van Moorsel, *Blockchain-Based Smart Contracts: A Systematic Mapping Study*, Fourth Int'l Conference on Computer Sci. and Info. Tech. 125, 126 (2017) (stating that "Bitcoin has limited programming capabilities . . . [so it] does not support the creation of complex distributed applications"). For more on blockchain and smart contract technology, *see infra*, Parts II(A)-(B)).

<sup>15</sup> Kevin D. Werbach and Nicolas Cornell, *Contracts Ex Machina*, 67 *Duke L.J.* 313, 340 (2017).

<sup>16</sup> Restatement (Second) of Contracts § 1 (defining contract as "a promise . . . for the breach of which the law gives a remedy, or the performance of which the law in some way recognizes as a duty").

<sup>17</sup> Werbach and Cornell, *supra* note 15. "As [smart contracts] are adopted, or used in lieu of traditional contracting, [they] will force courts, legislatures, and other legal actors to confront difficult questions about the applications of basic contract doctrines." *Id.* at 318.

<sup>18</sup> *Id.* at 342.

<sup>19</sup> Working towards a rigorous application of libertarian contract theory to blockchain and smart contracts may be particularly important at this time, given how blockchain technology, originally envisioned to cut against centralized state power, *see, e.g.*, Verma and Gupta, *supra* note 8, is increasingly being considered for use by anti-libertarian

The aforementioned Rothbard has been influential upon modern libertarianism, with an identifiable portion exceptionally influenced by his work.<sup>20</sup> This paper will refer to this group and their generally shared philosophy as “Rothbardianism.” It is important to make this designation before proceeding, because “libertarianism” is an amorphous term which can be quite difficult to define and use consistently.<sup>21</sup> Because “Rothbardianism” is a more precise and consistent label, this paper will use it for clarity.

Rothbard has been dubbed as “Mr. Libertarian.”<sup>22</sup> Many modern libertarians, but particularly those who support Austrian economic theory, hail him as having made pioneering contributions to economics, philosophy, political theory, and historical studies.<sup>23</sup> However, one exceptional contribution Rothbard made,<sup>24</sup> along with his associate Williamson Evers,<sup>25</sup> which is sometimes overlooked even by his supporters, is the Title-Transfer Theory of Contract (TTTK).<sup>26</sup> This is a novel formulation of theoretical foundations of contract theory, basing it squarely within Rothbardian property theory.<sup>27</sup> Particularly noteworthy is that the TTTK rejects the traditional view that contracts are legally enforceable promissory obligations.<sup>28</sup> Rather, because Rothbardians emphasize private property rights in scarce resources as the indispensable

---

state and international institutions. *See generally, e.g.*, Marcia Narine Weldon and Rachel Epstein, *Beyond Bitcoin: Leveraging Blockchain to Benefit Business and Society*, 20 Transactions 837, 903 (2019) (stating that “[t]he United Nations, OECD, and GRI are already exploring blockchain for a variety of use cases”).

<sup>20</sup> *See* Llewellyn H. Rockwell Jr., ROTHBARD'S LEGACY, (2010), <https://mises.org/library/rothbards-legacy> (last visited Nov. 17, 2019); and Llewellyn H. Rockwell Jr., MURRAY N. ROTHBARD: A LEGACY OF LIBERTY, <https://mises.org/library/murray-n-rothbard-legacy-liberty> (1996) (last visited Nov. 17, 2019) (outlining Rothbard's contributions to economics, political theory, philosophy, and historical studies).

<sup>21</sup> *E.g.*, many would consider the novelist-philosopher Ayn Rand to be “libertarian” because of her support for limited government and free-market capitalism. *See* Ayn Rand et al., *Capitalism: The Unknown Ideal* (New American Library, 2d ed. 1967) (1966). However, she and many of her closest associates have publicly spoken out against libertarianism. *See, e.g.*, Peter Schwartz, *Libertarianism: The Perversion of Liberty*, *The Voice of Reason* 311-33 (Leonard Peikoff ed., New American Library 1988). As this shows, what a “libertarian” is can be unclear. Indeed, both Rand and Rothbard lived in New York City, sharing a brief correspondence before differences between them led to a permanent falling out. Mack Fox, AYN RAND AND MURRAY ROTHBARD: A LOVE/HATE RELATIONSHIP, <https://think-liberty.com/philosophy/ayn-murray-lovehate-relationship/> (last visited Nov. 16, 2019).

<sup>22</sup> Jeff Riggenbach, MR. LIBERTARIAN, MURRAY N. ROTHBARD, (2010), <https://mises.org/library/mr-libertarian-murray-n-rothbard> (last visited Dec. 19, 2019). Indeed, Rothbard wrote the libertarian manifesto itself. Murray N. Rothbard, *For a New Liberty: The Libertarian Manifesto* (Ludwig von Mises Inst., 2d ed. 2006) (1973).

<sup>23</sup> Rockwell, *supra* note 20.

<sup>24</sup> Murray N. Rothbard, *The Ethics of Liberty* 133-148 (NYU Press, 2d ed. 1998) (1982).

<sup>25</sup> Williamson Evers, *Toward a Reformulation of the Law of Contracts*, 1(1) *J. of Libertarian Stud.* 3 (1977).

<sup>26</sup> STEPHAN KINSELLA, REFLECTIONS ON THE THEORY OF CONTRACT (PFS 2017) at 13:59 – 14:24, (2017), <https://www.youtube.com/watch?v=JqjgmqpQkgU> (last visited Dec. 19, 2019).

<sup>27</sup> *Id.* at 8:04 – 10:30.

<sup>28</sup> *Id.* at 2:33 – 3:22. *See also supra*, note 16.

component of a peaceful society and the rule-of-law, the TTTK argues that contracts are simply voluntary transfers of property titles in scarce resources.<sup>29</sup>

The TTTK's rejection of promissory obligations as the basis for contract theory makes it particularly interesting when considering blockchain-based smart contracts. "[Because] [s]mart contracts are both committing to something in the future, but not exactly making a promise . . . this complication raises more questions about the conventional definitions of contracts than it does about whether smart contracts are contracts."<sup>30</sup> This paper provides a self-contained justification of the TTTK, and then argues that blockchain-based smart contracts, with their non-promissory nature, call for a reexamination of the TTTK. If this theory were implemented, the law would become more congruous with smart contracts, at a time when they are undergoing increased use and importance. Although there is scholarly literature receptive to smart contracts as being complementary to conventional methods of contracting rather than supplanting them,<sup>31</sup> because smart contracts focus primarily on the actual transference of title to digital assets,<sup>32</sup> some

---

<sup>29</sup> *Id.*, *supra* note 27.

<sup>30</sup> Werbach and Cornell, *supra* note 15, at 341-42. They state that "smart contracts would be contracts as long as they manifest an exchange of concrete obligations. They would be contracts as long as they are meant to alter concretely the normative relation between the parties. . . . [Are they? Yes.] Though they might not constitute promises per se, smart contracts are voluntary mechanisms that purport to alter the rights and duties of the parties." *Id.* at 340-41. This broad statement is technically true under the TTTK. For example, when two parties transfer title to property, because one has a legal obligation to not violate the property rights of the other, *see infra*, note 58, then transference of property titles between them necessarily implies a reorganization of the parties' legal obligations. However, this paper hopes to apply a more precise, property-based definition of contracts, the TTTK, to smart contract technology, showing that this definition is superior in its handling of legal issues regarding smart contracts than either promise-based theories or views employing broader definitions of what contracts are.

<sup>31</sup> *E.g.*, Max Raskin, *The Law and Legality of Smart Contracts*, 1(2) *Geo. L. Tech. Rev.* 305, 340-41 (2017) (stating that "[o]ne way of reducing uncertainty is by situating the new in the old. While there may be many barriers to the adoption of smart contracts, legal uncertainty need not be one of them. Courts need not upend extant jurisprudence to accommodate smart contracts"); and Jerry I-H Hsiao, "*Smart*" *Contract on the Blockchain – Paradigm Shift for Contract Law?*, 14 *US-China L. Rev.* 685, 694 (2017) (concluding with, "will smart contract bring a paradigm shift to the contract law? Probably not in the near future, and we will see more traditional contract and smart contract coexisting to supplement each other but not to replace the other.")

<sup>32</sup> Buterin, *supra* note 11 (stating that:

"[C]ontracts" in Ethereum should not be seen as something that should be "fulfilled" or "complied with, [in the sense of a legal agreement.] . . . [R]ather, they are more like "autonomous agents" that live inside of the Ethereum execution environment, [] executing a specific piece of code when "poked" by a [user].)

*See also* Karen E.C. Levy, *Book-Smart, Not Street-Smart: Blockchain-Based Smart Contracts and The Social Working of Law*, 3 *Engaging Sci., Tech., and Soc'y* 1, 3 (2017) (stating that "smart contracts aim to collapse contract formation and enforcement into a single instrument"); and Jeremy M. Sklaroff, *Smart Contracts and the Cost of Inflexibility*, 166 *U. Pa. L. Rev.* 263, 276 (2017) (stating that "smart contracts are more like apps than contracts, fully collapsing the distinction between agreement formation and execution" (citations omitted)).

*See also* Raskin, *supra* note 31, at 321 (stating that "[t]he novel issue of smart contracts is what happens when an agreement can be enforced not by public law enforcers, but through the terms and mechanisms set forth in the terms of the [electronically codified] contract itself").

of which denote title to real-world scarce resources,<sup>33</sup> the TTTK offers a theoretical framework within which smart contracts can find a better fit than has been found within analyses implementing traditional contract theory.<sup>34</sup>

Before entering this paper's main argument, four caveats are worth stating. First, this paper does not argue that blockchain-based smart contracts will replace all other methods for contracting.<sup>35</sup> Rather, it merely holds that smart contracts' promiseless nature offers an opportunity to reconsider the role of promissory obligations in contract theory. Smart contracts very well could be made more effective by mixing them with other means of contracting, creating so-called "hybrid agreements,"<sup>36</sup> and there may be circumstances where it is best to not employ smart contracts.<sup>37</sup> An in-depth examination of these practical considerations is beyond this paper's scope. Second, this paper does not argue that the TTTK will necessarily rise along with smart contracts' increased use. The future is uncertain, leaving the question of how smart contracts will develop to be answered by the fruits of the thoughts and choices of individuals.<sup>38</sup>

---

<sup>33</sup> Primavera De Filippi and Aaron Wright, *Blockchain and the Law: The Rule of Code 75* (Harv. U. Press 2018); *see also, e.g.*, Pete Rizzo, SWEDEN TESTS BLOCKCHAIN SMART CONTRACTS FOR LAND REGISTRY, COINDESK, <http://www.coindesk.com/sweden-blockchain-smartcontracts-land-registry> (2016) (last visited Nov. 17, 2019).

<sup>34</sup> *See generally* Raskin, *supra* note 31, at 305-41; Levy, *supra* note 32, at 4 (stating that "[s]mart contract technology . . . depends on a thin conceptualization of what law does, and how it does it – by focusing on the technical form of contract, to the exclusion of the social contexts within which contracts operate, and the complex ways in which people use them"); Hsiao, *supra* note 31; and Sklaroff, *supra* note 32, at 263-303. *But see*, for a countervailing position against the view that smart contracts are unambiguous, James Grimmelman, *All Smart Contracts Are Ambiguous*, Cornell U. Legal Stud. Research Paper Series (2019), <http://ssrn.com/abstract=3315703> (arguing that the nature of computer programming language, and the fact that blockchains and smart contracts are ultimately created and managed by humans, makes them inherently ambiguous).

<sup>35</sup> *See generally* Lipshaw, *supra* note 12, for an examination of the technical problems facing smart contracts in being able to consider real-world situational uncertainties when they're drafted and, therefore, when they execute. *See also* Levy, *supra* note 32, at 11 (stating that "[a]s a policy matter, [] we ought to think carefully about the feature of the social setting in which smart contracts are permitted to operate, the degree to which they might preclude other means of enforcing obligations, and the social and normative implications of this foreclosure"); Sklaroff, *supra* note 32, at 279-302 (arguing that smart contracts are too inflexible for their own worth); Harry Surden, *Computable Contracts*, 46 U.C. Davis L. Rev. 629, 636 (2012) (stating, from the view that contracts made with computer data offer novel opportunities to reduce transaction costs, that "some – but not all – contractual terms or conditions can be meaningfully represented in terms of data and rules for the purpose of automated assessment. Indeed, these approaches may apply to a relatively small subset of contracting subjects"); and Werbach and Cornell, *supra* note 15, at 363 (stating that "[a]t best, smart contracts might reduce the need for contract litigation," but will not replace contract law entirely).

<sup>36</sup> De Filippi and Wright, *supra* note 33, at 76-78. *See also* Hsiao, *supra* note 31.

<sup>37</sup> For a criticism of perceived efficiencies of smart contracts, due to their lack of flexibility in the creation and enforcement of contracts, *see* Sklaroff, *supra* note 32, and Levy, *supra* note 34. *But see* Surden, *supra* note 35, for a view that while computer-based contracts offer new opportunities for efficiency, they are not well-fit for use in all contracting situations.

<sup>38</sup> Ludwig von Mises, *Theory and History: An Interpretation of Social and Economic Evolution* 379 (Ludwig von Mises Inst. 2007) (1957) (concluding by stating that:

The fallacy inherent in predicting the course of history is that the prophets assume no ideas will ever possess the minds of men but those they themselves already

---

know of. Hegel, Comte, and Marx, to name only the most popular of these soothsayers, never doubted their own omniscience. Each was fully convinced that he was the man whom the mysterious powers providently directing all human affairs had elected to consummate the evolution of historical change. Henceforth nothing of importance could ever happen. There was no longer any need for people to think. Only one task was left to coming generations—to arrange all things according to the precepts devised by the messenger of Providence. In this regard there was no difference between Mohammed and Marx, between the inquisitors and Auguste Comte.

Up to now in the West none of the apostles of stabilization and petrification has succeeded in wiping out the individual's innate disposition to think and to apply to all problems the yardstick of reason. This alone, and no more, history and philosophy can assert in dealing with doctrines that claim to know exactly what the future has in store for mankind.)

*See also* Hans-Hermann Hoppe, *On Certainty and Uncertainty, Or: How Rational Can Our Expectations Be*, 1 Rev. of Austrian Econ. 10, 49-79 (1997). Applied to the issue of smart contracts, this theoretical insight regarding uncertainty comports with the statement that “[s]mart contracts may or may not transform the world, but they provide real benefits and seem likely to enjoy significant adoption over time.” Werbach and Cornell, *supra* note 15, at 317.

*See also* Ludwig von Mises, *Human Action: A Treatise on Economics* 42 (Ludwig von Mises Inst., Scholar’s ed. 1998) (1949) (in defending the use of methodological individualism in the social sciences, Mises states:

It is uncontested that in the sphere of human action social entities have real existence. Nobody ventures to deny that nations, states, municipalities, parties, religious communities, are real factors determining the course of human events. Methodological individualism, far from contesting the significance of such collective wholes, considers it as one of its main tasks to describe and to analyze their becoming and their disappearing, their changing structures, and their operation. And it chooses the only method fitted to solve this problem satisfactorily.

First we must realize that all actions are performed by individuals. A collective operates always through the intermediary of one or several individuals whose actions are related to the collective as the secondary source. It is the meaning which the acting individuals and all those who are touched by their action attribute to an action, that determines its character. It is the meaning that marks one action as the action of an individual and another action as the action of the state or of the municipality. The hangman, not the state, executes a criminal. It is the meaning of those concerned that discerns in the hangman's action an action of the state. A group of armed men occupies a place. It is the meaning of those concerned which imputes this occupation not to the officers and soldiers on the spot, but to their nation. If we scrutinize the meaning of the various actions performed by individuals we must necessarily learn everything about the actions of collective wholes. For a social collective has no existence and reality outside of the individual members' actions. The life of a collective is lived in the actions of the individuals constituting body. There is no social collective conceivable which is not operative in the actions of some individuals. The reality of a social integer consists in its directing and releasing definite actions on the part of individuals. Thus the way to a cognition of collective wholes is through an analysis of the individuals' actions.

This paper merely addresses theoretical issues of contract law in light of a new, promiseless method of contracting. Third, the TTTK would not, in effect, lead to radically different results than contract law produces now.<sup>39</sup> Therefore, this paper merely attempts to advocate for a new conceptual paradigm of contracts, leaving many particulars of how the theory would be borne out in practice beyond its scope. Lastly, this paper does not argue, as some have, that blockchain and smart contract technology will render contract enforcement institutions obsolete.<sup>40</sup> Rothbardianism advocates for the existence of legal institutions, albeit in form and substance quite different from the prevailing statist paradigm.<sup>41</sup> Therefore, because blockchain technology can and will be under the auspices of whatever legal regime is in place, it is important to implement contract theory which is better aligned with the nature of blockchain and smart contract technologies. Adoption of the TTTK would be a step in this direction.

Part I explains the TTTK and its justification, first outlining libertarian property theory and then moving to the TTTK as such. Part II gives a technological overview of blockchain technology, followed by the same for smart contracts. Part III then argues that the TTTK is theoretically more congruous with smart contracts' nature, due to the theory's view that the transference of property titles is contract, while smart contracts focus on the transference of title to digital assets, both eschewing promissory obligations. Part IV fields objections to this thesis. This paper concludes by suggesting directions which future scholarship can take in building off this paper's work.

## I. The Title-Transfer Theory of Contract: What is it, What Justifies it and What Purpose Does it Serve?

Before reaching a justifiable basis for contract theory, one must make certain foundational theoretical considerations. It is futile to analyze contract theory without first understanding fundamental insights about the nature of the world and humans. Without such, we

---

The methodological individualist approach is an important foundation in formulating and applying the TTTK. *See infra* Parts I(A) – (B), and III).

<sup>39</sup> Kinsella, *supra* note 26, at 22:27 – 23:14 (stating that:

In essence, what you can see is that there's almost no difference in result [between] this Rothbardian and Evers view of contract and the way the law really operates. . . . The way the law really operates is – they say that contracts are binding promises and binding obligations, but in reality, all the courts do is award damages, or award a piece of real estate. So, all the court really does is enforce the transfer of title to property. They never force people to abide by their obligations. So why say that there is a breach of contract - with damages and money - why not make them what they are? Why not regard contracts as what they are (which is transfers of property)? (Transcribed from video-lecture)).

<sup>40</sup> *E.g.*, see Sklaroff, *supra* note 32, at 274 (stating that some “commentators have gone as far as predicting (and sometimes rejoicing at) the imminent death of contract law. Smart contracts ‘eliminate the need for legal enforcement;’ they represent ‘a technical alternative’ to the legal system itself” (citing Werbach and Cornell, *supra* note 15, at 339, and Alexander Savelyev, *Contract Law 2.0: “Smart” Contracts As the Beginning of the End of Classic Contract Law*, 26(2) *Info. & Comm. Tech. L.* 116 (2017)).

<sup>41</sup> *E.g.*, see Linda and Morris Tannehill, *The Market for Liberty* (Ludwig von Mises Inst. 2007) (1970).



cannot know the role contracts play in society.<sup>42</sup> Part I(A) first lays out the theoretical considerations which justify the TTTK. Part I(B) then explains implications of the TTTK which are particularly important when applying it to blockchain and smart contract technology.

## A. Foundational Considerations: The Problem of Social Order and Its Answer – Rothbardian Property Theory

Hans-Hermann Hoppe has offered a clear and succinct explication of the foundational considerations undergirding contract theory. In *The Economics and Ethics of Private Property*,<sup>43</sup> he describes a thought experiment dubbed “The Problem of Social Order.”<sup>44</sup>

Robinson Crusoe, alone on his island,<sup>45</sup> can do whatever he pleases. For him, the question concerning rules of orderly human conduct—social cooperation—simply does not arise. Naturally, this question can only arise once a second person, Friday, arrives on the island, yet even then, the question remains largely irrelevant so long as no scarcity exists. . . . Whatever Crusoe does with [non-scarce] goods, his actions have repercussions neither with respect to his own future supply of such goods, nor with regard to the present or future supply of the same goods for Friday (and vice versa). Hence, it is impossible that there could ever be a conflict between Crusoe and Friday concerning the use of such goods. A conflict

---

<sup>42</sup> Even adherents of traditional contract theory make this point. *E.g.*, see Levy, *supra* note 32, at 5 (stating that “[t]he social context of law as lived is key for understanding what law is ‘doing’ in any particular situation. This is particularly acute in the private law context (contracting).”)

<sup>43</sup> Hans-Hermann Hoppe, *The Economics and Ethics of Private Property: Studies in Political Economy and Philosophy* 381-88 (Ludwig von Mises Inst., 2d ed. 2006) (1993).

<sup>44</sup> *Id.* at 381-82.

<sup>45</sup> See also Rothbard, *supra* note 24, at 29 (discussing the theoretical usefulness of “Crusoe Economics:”

One of the most commonly derided constructions of classical economic theory is “Crusoe Economics,” the analysis of an isolated man face-to-face with nature. And yet, this seemingly “unrealistic” model . . . has highly important and even indispensable uses. It serves to isolate man as against nature, thus gaining clarity by abstracting at the beginning from interpersonal relations. Later on, this man/nature analysis can be extended and applied to the “real world.” The bringing in of “Friday,” or of one or more other persons, after analysis of strictly Robinsonian isolation, then serves to show how the addition of other persons affects the discussion. These conclusions can then also be applied to the contemporary world. Thus, the abstraction of analyzing a few persons interacting on an island enables a clear perception of the basic truths of interpersonal relations, truths which remain obscure if we insist on looking first at the contemporary world only whole and of a piece. If Crusoe economics can and does supply the indispensable ground-work for the entire structure of economics and praxeology – the broad, formal analysis of human action – a similar procedure should be able to do the same thing for social philosophy, for the analysis of the fundamental truths of the nature of man vis-a-vis the nature of the world into which he is born, as well as the world of other men. Specifically, it can aid greatly in solving such problems of political philosophy as the nature and role of liberty property, and violence. (Footnotes omitted).

becomes possible only if goods are scarce, and only then can there arise a problem of formulating rules which make orderly, conflict-free social cooperation possible. . . .

. . . [I]n the realm of scarcity, there must be rules that regulate . . . everything scarce so that all possible conflicts can be ruled out.<sup>46</sup>

Because all conflict between people is ultimately concerning the allocation and use of scarce physical resources,<sup>47</sup> with such scarcity encapsulating both human bodies and external resources,<sup>48</sup> this is the fundamental problem which contract theory must take account.

Hoppe proceeds to formulate the solution to this problem.

Everyone is the proper owner of his own physical body as well as of all places and nature-given goods that he occupies and puts to use by means of his body, provided only that no one else has already occupied or used the same places and goods before him. This ownership of “originally appropriated” places and goods by a person implies his right to use and transform these places and goods in any way he sees fit, provided only that he does not thereby uninvitedly change the physical integrity of places and goods originally appropriated by another person. In particular, once a place or good has been first appropriated by (in John Locke’s phrase) “mixing one’s labor” with it, ownership in such places and goods can be acquired only by means of a *voluntary contractual transfer of its property title from a previous to a later owner*.<sup>49</sup> (Emphasis added)

---

<sup>46</sup> Hoppe, *supra* note 44.

<sup>47</sup> *Id.*

<sup>48</sup> *Id.* at 382-83.

<sup>49</sup> *Id.*

*See also* Rothbard, *supra* note 24, at 133 (stating that “[t]he right of property implies the right to make contracts about that property: to give it away or to exchange titles of ownership for the property of another person.”)

Hoppe continues on to lay out the absurdity of adopting any other solution to the problem of social order, stating:

Isn’t it simply absurd to claim that a person should not be the proper owner of his body and the places and goods that he originally, i.e., prior to anyone else, appropriates, uses and/or produces by means of his body? Who else, if not he, should be their owner?

. . . If a person A were not the owner of his own body and the places and goods originally appropriated and/or produced with this body as well as of the goods voluntarily (contractually) acquired from another previous owner, then only two alternatives exist. Either another person B must be recognized as the owner of A’s body as well as the places and goods appropriated, produced or acquired by A, or else all persons, A and B, must be considered equal co-owners of all bodies, places and goods.

In the first case, A would be reduced to the rank of B’s slave and object of exploitation. B is the owner of A’s body and all places and goods appropriated,

Hoppe then offers the ultimate theoretical justification for self-ownership, property rights, and homesteading of resources as the solution to the problem of social order – argumentation ethics.<sup>50</sup>

Whether or not persons have any rights and, if so, which ones, can only be decided in the course of argumentation (propositional exchange). Justification—proof, conjecture, refutation—is argumentative justification. Anyone who denied this proposition would become involved in a performative contradiction because his denial would itself constitute an argument. Even an ethical relativist must accept this first proposition[.]<sup>51</sup>

. . . [E]verything that must be presupposed in the course of an argumentation— as the logical and praxeological<sup>52</sup> precondition of argumentation—cannot in turn be argumentatively disputed as regards its

---

produced, and acquired by A, but A in turn is not the owner of B’s body and the places and goods appropriated, produced and acquired by B. Hence, under this ruling two categorically distinct classes of persons are created—Untermenschen such as A and Übermenschen such as B—to whom different “laws” apply. Accordingly, such a ruling must be discarded as a human ethic equally applicable to everyone qua human being (rational animal). From the very outset, any such ruling can be recognized as not universally acceptable and thus cannot claim to represent law. For a rule to aspire to the rank of a law—a just rule—it is necessary that such a rule apply equally and universally to everyone.

Alternatively, in the second case of universal and equal co-ownership, the requirement of equal law for everyone is fulfilled. However, this alternative suffers from another even more severe deficiency, for if it were applied, all of mankind would instantly perish. (And since every human ethic must permit the survival of mankind, this alternative must be rejected.) Every action of a person requires the use of some scarce means (at least the person’s body and its standing room), but if all goods were co-owned by everyone, then no one, at no time and no place, would be allowed to do anything unless he had previously secured every other co-owner’s consent to do so. However, how could anyone grant such consent if he were not the exclusive owner of his own body (including his vocal cords) by means of which his consent must be expressed? Indeed, he would first need others’ consent in order to be allowed to express his own, but these others cannot give their consent without having first his, etc.

Hoppe, *supra* note 43, at 382-84. *See also* Rothbard, *supra* note 24, at 45-47.

<sup>50</sup> For more on argumentation ethics, *see generally* N. Stephan Kinsella, *New Rationalist Directions in Libertarian Rights Theory*, 12(2) *J. of Libertarian Stud.* 313 (1996).

<sup>51</sup> Hoppe, *supra* note 43, at 384.

<sup>52</sup> *See* Mises, *Human Action supra* note 38, at 11-12 (stating that:

The field of [praxeology] is human action, not the psychological events which result in action. It is precisely this which distinguishes the general theory of human action, praxeology, from psychology. The theme of psychology is the internal events that result or can result in a definite action. The theme of praxeology is action as such.

Mises, the seminal Austrian-school economist of his era and the mentor of Murray Rothbard, argues in this treatise that the deductive science of human action – praxeology – is the proper basis for economic science).

validity without one becoming thereby entangled in an internal (performative) contradiction. Propositional exchanges are not made up of free-floating propositions but constitute a specific human activity. Argumentation between Crusoe and Friday requires that both possess, and mutually recognize each other as possessing, exclusive control over their respective bodies (their brain, vocal cords, etc.) as well as the standing room occupied by their bodies. No one could propose anything and expect the other party to convince himself of the validity of this proposition or else deny it and propose something else unless his and his opponent's right to exclusive control over their respective bodies and standing rooms were already presupposed and assumed to be valid. . . .

. . . Furthermore, it would be equally impossible to engage in argumentation and rely on the propositional force of one's arguments if one were not allowed to own (exclusively control) other scarce means . . . If [not], then we would all immediately perish and the problem of justifying rules simply would not exist. Hence, by virtue of the fact of being alive property rights to other things must be presupposed as valid, too. . . .

And if a person were not permitted to acquire property in these goods and spaces by means of an act of original appropriation, i.e., by establishing an objective (intersubjectively ascertainable) link<sup>53</sup> between himself and a particular good and/or space prior to anyone else, but if instead property in such goods or spaces were granted to late-comers, then no one would be permitted to ever begin using any good unless he had previously secured such late-comers' consent. Yet how can a late-comer consent to the actions of an early-comer? Moreover, every late-comer would in turn need the consent of other still later-comers, and so on. That is, neither we, nor our forefathers, nor our progeny would have been or will be able to survive if one were to follow this rule.<sup>54</sup>

Summarizing Hoppe's argument: scarcity of physical resources defines the world; all interhuman conflict is because of this scarcity; therefore, for humans to engage in peaceful social cooperation, individual self-ownership and private property rights, provable to society via an

---

<sup>53</sup> See N. Stephan Kinsella, *A Libertarian Theory of Contract: Title Transfer, Binding Promises, and Inalienability*, 17(2) *J. of Libertarian Stud.* 11, 27 (2003) (clarifying this "objective link" concept by stating:

the very purpose of property rights in scarce resources is to prevent conflicts over the use of resources. Thus, property rights have an unmistakably public aspect: the property claimed has boundaries visible (manifested) to others. One essential aspect of property is that it publicly demarcates one's bounds of ownership so others can avoid using it. If the bounds are secret and unknowable, conflicts cannot be avoided. To know that a thing is owned by another and to avoid uninvited use of the other's property, the property's borders must be publicly known. (Citations omitted).

This "objective link" concept will play an important role later in this paper, when the topic turns to why blockchain-based smart contracts and the TTTK complement each other *See infra* Part III(B)).

<sup>54</sup> Hoppe, *supra* note 43, at 384-87.

objective link between the property and its owner, are indispensable social norms, as revealed by apodictic premises underlying both human action generally and argumentation in particular.

## B. Contract Theory Derived from Property Theory – The TTTK and its Implications

Even before examining the TTTK as such, one begins to see the role contract plays within Rothbardian property theory. Self-ownership<sup>55</sup> necessarily extends to property rights in scarce, external resources via a manifested, objective link<sup>56</sup> between the owner and resource. This property right in external resources must necessarily extend to the right to use and dispose of such property as they see fit,<sup>57</sup> as long as such is peaceful, not infringing upon others' property rights.<sup>58</sup> This right to property disposition includes voluntary conveyance unto others.<sup>59</sup> This is contract – an owner's clear disposition of their property, transferring title to another, moving the objective link to the property from the old to the new owner.

This paper now turns to consider six implications of this theory that need to be understood before applying it to smart contracts. These are: i.) enforcement; ii.) alienable vs. inalienable rights; iii.) the death of reliance interests; iv.) restitution as a default remedy in contract suits; v.) fraud and breach of product warranty; and vi.) partial title transfers and duties which “run with the property” under the TTTK.

### *i. Enforcement*

If a contract is merely the actual transfer of title to property, then what would it mean to “enforce” a contract? Rothbard states that:

the right to contract is strictly derivable from the right of private property, and therefore that the only enforceable contracts (i.e., those backed by the sanction of legal coercion) should be those where the failure of one party to abide by the contract implies the theft of property from the other party. . . . But this can only be true if we hold that validly enforceable contracts only exist where title to property has already been transferred, and therefore where the failure to abide by the contract means that the other party's

---

<sup>55</sup> *Id.*

<sup>56</sup> Kinsella, *supra* note 53.

<sup>57</sup> *Id.* (stating that “homesteaded property was at one time acquired. It can, therefore, also be abandoned. One is not stuck with something forever just because one once homesteaded it. But acquiring and abandoning both involve a manifestation of the owner's intent”). *See also* Rothbard, *supra* note 49.

<sup>58</sup> Hoppe, *supra* note 43, at 383 (stating that “[t]his ownership of ‘originally appropriated’ places and goods by a person implies his right to use and transform these places and goods in any way he sees fit, provided only that he does not thereby uninvitedly change the physical integrity of places and goods originally appropriated by another person”).

<sup>59</sup> Kinsella, *supra* note 53.

property is retained by the delinquent party, without the consent of the former (implicit theft).<sup>60</sup>

To flesh this out, Rothbard offers a hypothetical regarding two parties to a loan contract for \$1,000 at 10% interest, with repayment due in one calendar year.<sup>61</sup>

Our contention here is that mere promises are not a transfer of property title; that while it may well be the moral thing to keep one's promises, [enforcing morality] is not and cannot be the function of law (i.e., legal violence) in a libertarian system.<sup>62</sup> . . . Jones must pay Smith \$1100 because

---

<sup>60</sup> Rothbard, *supra* note 49.

<sup>61</sup> *Id.* at 133-34.

<sup>62</sup> This view espoused by Rothbard here – that contract law should not enforce any possible morality there may be in keeping one's promises – is in direct contrast to the position taken within Charles Fried, *Contract as Promise: A Theory of Contractual Obligation 1-2* (Oxford U. Press, 2d ed. 2015) (1981) (stating that:

“[t]he promise principle . . . is the moral basis of contract law. . . . [T]he law of torts and the law of property recognize our rights as individuals in our persons, in our labor, and in some definite portion of the external world, while the law of contracts facilitates our disposing of these rights on terms that seem best to us”).

Fried's work is interesting because of its attempt justify promissory obligations as the basis of contract from a classical liberal viewpoint, *id.* at 2, 7, while Rothbard's mentor, Mises, was himself a classical liberal who authored *Liberalism: In the Classical Tradition* (Cobden Press and The Found. for Econ. Educ., Inc., 3d ed. 1985) (1927). Fried's argument fails because he holds trust in promises to be a value in itself, Fried at 8, while basing the reason for this in the fact that such trust is a widely accepted social norm, *id.* at 17, claiming that this appeal to convention is a Kantian, rather than utilitarian, argument. *Id.* However, placing inherent value in trust is not sound under Austrian economic theory, *see* Mises, *Human Action*, *supra* note 38, at 95-96 (stating that “in the frame of a theoretical science of human action, . . . [a]ny examination of ultimate ends turns out to be purely subjective and therefore arbitrary.” This paper hopes to similarly frame contract theory to focus more theoretically on humankind as such, transcending mere subjective value-judgments, in contrast to Fried's appeal to a subjectively-valued convention as being the moral proposition to undergirding a legal system). Moreover, although Fried claims to reject utilitarianism, Fried at 16, the fact that his argument for the value of promissory trust rests on an appeal to popular sentiment, *id.* at 17, makes it seem more like a practical, moralistic argument rather than a deontological, ethical one. Indeed, even Kant himself “constructed [a] theor[y] of the law of contracts based on property titles rather than on promise.” Evers, *supra* note 25, at 7. Thus, Fried's theory is a fallacious mixture of deontology and utilitarianism, and, because it relies on social convention, parties who do not share the social convention of promissory trust but would still like to contract with each other would not be able to do so. Therefore, Fried's theory would act against the liberal ideal of freedom of contract which he states is his goal to promote, Fried at 2, 7, revealing that Fried has not reached a principle which is foundational enough to allow for contract theory to be based within the nature of humankind generally. *See supra* Part I(A).

*See also* Rothbard, *supra* note 24, at 138 (stating that:

“[i]t may be considered more moral to keep promises than the break them, but any coercive enforcement of such a moral code, since it goes beyond the prohibition of theft or assault, is itself an invasion of the property rights of the [promisor] and therefore impermissible in a libertarian society.” (emphasis added))

*But see* Murray N. Rothbard, *Law, Property Rights, and Air Pollution*, 2(1) *Cato J.* 55 (1982) (stating, in an explication of the role of ethics in tort and criminal law, that:

he had already agreed to transfer title, and that nonpayment means that Jones is a thief, that he has stolen the property of Smith. In short, Smith's original transfer of the \$1000 was not absolute, but conditional, conditional on Jones paying the \$1100 in a year, and that, therefore, the failure to pay is an implicit theft of Smith's rightful property.<sup>63</sup>

Therefore, contract enforcement is the use of legal coercion to ensure that parties retain exclusive possession and control of property to which they have rightful title.

But what things are actually transferrable under the TTTK framework?

---

[i]f ethics is a normative discipline that identifies and classifies certain sets of actions as good or evil, right or wrong, then tort or criminal law is a subset of ethics identifying certain actions as appropriate for using violence against them. The law says that action X should be illegal, and therefore should be combatted by the violence of the law. The law is a set of "ought" or normative propositions).

Therefore, Rothbard does not hold that ethics plays no role in contract law or in the law more generally. Rather, he merely places the ethical epicenter within individuals' property rights in scarce resources, rather than in the keeping of promises. The core contradiction of Fried's promise-based model is revealed by his above statement that "the law of contracts facilitates our disposing of these rights on terms that seem best to us," which he makes after formerly stating that the moral basis of contract is promise. If Fried holds that contract law facilitates the disposition of property rights – indeed, this is the very position taken by the TTTK – then why then is the moral basis of contract law the keeping of promises, rather than respect for property rights as such?

Moreover, Fried in this above quote states that "the law of torts and the law of property recognize our rights as individuals in our person, in our labor. . . ." For an explanation of why this conception of owning one's labor is flawed, under Rothbardian property theory, see N. Stephan Kinsella, *Against Intellectual Property* 41-42 (Ludwig von Mises Inst. 2008) (stating that:

By focusing on creation and labor, rather than on first occupancy of scarce resources, as the touchstone of property rights, IP advocates are led to place undue stress on the importance of "rewarding" the labor of the creator, much as Adam Smith's flawed labor theory of value led to Marx's even more deeply-flawed communist views on exploitation. See, e.g., Murray N. Rothbard, *Economic Thought Before Adam Smith: An Austrian Perspective on the History of Economic Thought*, vol. 1 453 (Edward Elgar, 1995) [(stating that] "[i]t was, indeed, Adam Smith who was almost solely responsible for the injection into economics of the labour theory of value. And hence it was Smith who may plausibly be held responsible for the emergence and the momentous consequences of Marx"[]). Even otherwise sound thinkers sometimes place undue stress on the importance of labor to the homesteading process and its ability to be "owned." Rothbard himself, for instance, implies that an individual "owns his own person and therefore his own labor." [Murray N. Rothbard, *Egalitarianism as a Revolt Against Nature and Other Essays* 101 (Ludwig von Mises Inst., 2d ed. 2000) (1974)]; see also Rothbard, [*supra* note 24, at] 49. It is a misleading metaphor to speak of "owning one's labor" (or one's life or ideas). The right to use or profit from one's labor is only a consequence of being in control of one's body, just as the right to "free speech" is only a consequence, or a derivative, of the right to private property, as Rothbard recognized in *The Ethics of Liberty*, [*supra* note 24, at 113-20]).

<sup>63</sup> Rothbard, *supra* note 61.

ii. *Alienable vs. Inalienable Rights (or, Transferrable vs. Un-transferrable Rights)*

Whether humans have inalienable rights – i.e., rights which are not subject to contractual transfer – has been a topic of debate among libertarians.<sup>64</sup> Stephan Kinsella argues that ownership of one’s own body is a unique type of property, because it is the only property which is not ultimately derived from homesteading.<sup>65</sup> Rather, it is derived from the fact that humans have an inherent link to and control of their own body.<sup>66</sup> Because this body-ownership is not derived from homesteading, in contrast to external resource ownership, it cannot be alienated from oneself as homesteaded property can.<sup>67</sup> Although the distinction is fine, Kinsella’s formulation differs from Rothbard and Evers’, who hold that because one can never give away their will, i.e. their direct bodily control, they can therefore, practically, never alienate their body from themselves through contract, even though they could so alienate if it were not practically impossible.<sup>68</sup> As Kinsella puts it:

The problem with [Rothbard and Evers’] view is that it assumes that a person’s will has to be transferred in order for him to become a slave, or for others to have the right to control his body. But this is not necessary. Rather, the slave owner need only have the right to use force against the recalcitrant slave. It is true that one cannot alienate direct control of his body; one person can have only indirect control of another’s body. Yet, we own animals, even

---

<sup>64</sup> E.g., see Rothbard, *supra* note 24, at 134-137; Evers, *supra* note 25, at 7; Randy E. Barnett, *Contract Remedies and Inalienable Rights*, 4(1) Soc. Philosophy and Pol’y 179 (1986); George H. Smith, *Inalienable Rights?*, 10(6) Liberty 51 (1997); Walter Block, *Toward a Libertarian Theory of Inalienability: A Critique of Rothbard, Barnett, Smith, Kinsella, Gordon, and Epstein*, 17(2) J. of Libertarian Stud. 39 (2003) (arguing in favor of the validity of voluntary slave contracts); N. Stephan Kinsella, *Inalienability and Punishment: A Reply to George Smith*, 14(1) J. of Libertarian Stud. 79 (1999).

<sup>65</sup> Kinsella, *supra* note 53, at 29-30.

<sup>66</sup> *Id.* at 30.

<sup>67</sup> *Id.* (stating that:

one may be said to own—to rightfully control—one’s body, the same reasoning regarding acquisition, abandonment, and alienability does not apply. The act of acquisition presupposes that there is an individual doing the acquiring, and an unowned thing acquired by possessing it. But how can someone “acquire” his body? One’s body is part of one’s very identity. The body is not some unowned resource that is acquired by the intentional embordering action of some external, already existing acquirer.

Because the body is not some unowned resource that an already existing individual chooses to acquire, it makes little sense to say that it can be abandoned by its owner. And since alienation of property derives from the power to abandon it, the body is inalienable. A manifestation of intent to “sell” the body is without effect because a person cannot, merely by an act of will, abandon his or her body. Title to one’s body is inalienable, and it is not subject to transfer by contract).

<sup>68</sup> Rothbard, *supra* note 24, at 134-137; Evers, *supra* note 25, at 7.



though the animals retain direct control over their actions. The owner exerts indirect control over the animal's actions, e.g., by coercing or otherwise manipulating the animal to get the animal to do what the owner desires.

Likewise, aggressors may be jailed or punished—in short, “enslaved”—by the victim or his agent or heirs. In effect, the aggressor is owned by his victim. This is despite the fact that the jailed aggressor still retains a will and direct control of his body; the jailer can only exert indirect control over him. The “impossibility” of an aggressor alienating his will does not prevent him from alienating title to his body—giving someone else the right to exert (admittedly indirect) control over his body—by committing an act of aggression.

It would seem, therefore, that the impossibility of alienating one's will does not prevent a person from being owned by others, or others from having rights to control the person's body. Thus, the impossibility of alienating the will should not be a barrier to making contracts regarding the right to control one's body.

Rothbard's error was to presume that property ownership implies the power to transfer the property's title. This necessitated the convoluted and flawed impossibility-of-the-will argument in favor of body-inalienability. The modified title-transfer theory proposed here recognizes that the body is “owned” only in the sense that a person has the sole right to control the body and invasions of its borders. But the body is not homesteaded and acquired, and cannot be abandoned by intent in the same way that homesteaded property can.<sup>69</sup>

Thus, alienable vs. inalienable property turns out to be equivalent to homesteaded vs. non-homesteaded property, which is equivalent to property in external resources vs. self-ownership.<sup>70</sup>

### *iii. The Death of Reliance Interests (Absent Voluntary “Performance Bonds”)*

What about a party's reliance upon another's promises? Kinsella has noted that reliance-based contract theories fail because they suffer from a circularity fallacy.<sup>71</sup> However, this does not mean that reliance interests cannot be contractually created voluntarily. Rothbard states that:

---

<sup>69</sup> Kinsella, *supra* note 53, at 31-32 (footnotes omitted).

<sup>70</sup> *Id.*

<sup>71</sup> *Id.* at 20 (stating that:

The theory of detrimental reliance rests on the notion that a promise sets up an “expectation” of performance in the mind of the promisee which induces him to act because he reasonably relies on this expectation. Of course, every time someone acts, he is “relying” on some understanding of reality. This reliance might be quite ridiculous or unreasonable. Thus, all detrimental reliance theories and doctrines inevitably qualify the theory by saying that a promise is enforceable if the promisee reasonably or justifiably relied on the promise. If the reliance is not

The fact that the [promisee] may have made considerable plans and investments on the expectation that the [promisor] would keep the agreement may be unfortunate for the [promisee], but that is their proper risk. The [promisee] should not expect the [promisor] to be forced to pay the penalty for their lack of foresight and poor entrepreneurship.<sup>72</sup>

He quickly qualifies this by stating that “of course, if the [promisor] received an advance payment from the [promisee], then his keeping the money while not fulfilling his part of the contract would be an implicit theft against the [promisee], and therefore the [promisor] must be forced to return the money.”<sup>73</sup> In short, the TTTK forbids imposition of liability on a promisor when they a.) revoke their promise before performance of a unilateral contract by a promisee, even after the promisee has begun or is nearly finished with performance, or b.) revoke a promise for a bilateral contract where no title to property has been conditionally transferred from the

---

reasonable, it is not the promisor’s “fault” that the promisee relied; the promisor could not have anticipated outlandish reliance.

One problem with this theory, however, is its circularity. In deciding whether to rely on a given promise, a reasonable person would take into account whether promises are enforceable. If promises without consideration are known to be unenforceable, for example, it would be unreasonable to rely on it because it is known that the promisor is not obligated to keep his promise! Thus, reliance depends on enforceability. Yet, the detrimental reliance doctrine makes enforceability itself depend on reliance, hence the circularity. As such, conventional theories of contract enforcement are defective.

*See also* F.H. Buckley, *Paradox Lost*, 72 Minn. L. Rev. 775, 804 (1988) (stating that:

Reliance theories are circular when applied in defense of high-fidelity duties. If the institution does not exist, it cannot be justified through promissory reliance, for promisees would not have relied in the same way on promises without the obligations generated by the institution. Promisees would simply adjust their actions in accordance with their lessened expectation of performance and would have only themselves to blame for overreliance (footnotes omitted)).

<sup>72</sup> Rothbard, *supra* note 24, at 138. *See also* Evers, *supra* note 25, at 9 (citing I. Maurice Worsimer, *The True Conception of Unilateral Contracts*, 26(2) Yale L.J. 136, 136-38 (1916), in making the argument that it is the promisee, in the context of a unilateral contract, who properly bears the entrepreneurial risk of a promisor withdrawing an offer after the promisee has begun to work towards meeting the conditions for a transfer of title that were set unilaterally by the promisor. This position contrasts with the legal doctrine of substantial performance. For more on this doctrine, *see generally infra*, note 74). This paper adopts the view of Werbach and Cornell, *supra* note 15 at 343 (footnotes omitted), when they stated that:

Smart contracts . . . are by default unilateral, because only one party places them on the blockchain. That is, the default involves one party specifying a transfer to another if certain conditions are met. Out of this default, one could approximate a bilateral or multilateral contract through the creation of two or more interrelated unilateral contracts. But two unilateral contracts are not precisely the same as a bilateral contract. Fashioning interdependent conditions in a way that would emulate a bilateral contract might be a challenge for smart contracts. But for the purposes of this Article, we will leave this issue aside and generally focus on unilateral contracts, because we think the same basic analysis would apply to bilateral contracts as they might be formulated as smart contracts.

<sup>73</sup> *Id.*

promisee to the promisor for the latter's performance. Rothbard recognizes that this conclusion varies greatly from traditional contract law doctrines, such as substantial performance,<sup>74</sup> and that this may concern traditional contract theory's adherents. To address this, Rothbard introduces what he calls "performance bonds" in bilateral contracts.<sup>75</sup>

For [those] shocked at the consequences of this doctrine, it should be noted that many, if not all, of the problems could be easily surmounted in the libertarian society by the promisee's requiring a performance bond of the promisor in the original agreement. . . . In that case, the [promisor], in the course of agreeing to his future [performance], agrees also to transfer a certain sum of money to the [promisee] in case he fails to [perform]. Since money is, of course, alienable, and since such a contract would meet our title-transfer criterion, this would be a perfectly valid and enforceable contract. . . . Failure to meet the performance bond will then be an implicit theft of the property of the owners. If, then, the [promisee] fail[s] to require a performance bond as part of the agreement, then they must suffer the consequences."<sup>76</sup>

These performance bonds allow, in effect, for quasi-promissory obligations to be vicariously inserted into the TTTK framework via conditional transfers of title to property from the promisee to the promisor. Such is a voluntary payment to hold a promisor to their promise, because if they do not perform, then they would be a thief of the promisee's property, given that the bond-transfer was conditioned upon promised future performance, the non-occurrence of which reverts the property title to the promisee. Thus, the TTTK bases contract theory in Rothbardian property theory, but this provides mechanisms allowing contracting parties to enforce quasi-promissory obligations through conditional property title transfers.

#### *iv. Restitution is the Default Remedy Under the TTTK*

If a contract is enforceable, then what remedy does the TTTK require for implicit theft? The answer is restitution of the property to the rightful owner. After sketching the historical decline of the Medieval performance bond,<sup>77</sup> Rothbard criticizes the concept of compensatory damages in contract.

The unfortunate suppression of the performance bond was the result of a mistaken theory of contract enforcement that the courts had adopted in the first place: namely, that the purpose of enforcement was to compensate the [promisee] for the default of the [promisor] – i.e., to make him as well off as he would have been without the making of the contract. In previous

---

<sup>74</sup> *Id.* See *Jacob & Younger, Inc. v. Kent*, 230 N.Y. 239; 129 N.E. 889 (1921) (setting forth the rule of substantial performance). See also Evers, *supra* note 72.

<sup>75</sup> See also Evers, *supra* note 25, at 6, 9 (similarly addressing the role of "performance bonds" under the TTTK).

<sup>76</sup> Rothbard, *supra* note 24, at 138. For detailed history of penal bonds with conditional defeasances in the Middle Ages and early modern period, upon which Rothbard based the performance bond concept, see A.W.B. Simpson, *The Penal Bond With Conditional Defeasance*, 82 L.Q. Rev. 392 (1966); Joseph Biancalana, *The Development of the Penal Bond with Conditional Defeasance*, 26(2) *The J. of Legal Hist.* 103 (2005); and Rothbard, *supra* note 24, at 138-41.

<sup>77</sup> Rothbard, *supra* note 24, at 138-140.

centuries, the courts had felt that “compensation” consisted of enforcing the penal bond; it then became fairly easy for the courts to change their minds, and to decide that court-assessed “damages” were compensation enough, relieving the “harshness” of the voluntarily stipulated penalty. The theory of contract enforcement[, in contrast to tort theory,]<sup>78</sup> should have had nothing to do with “compensation”; its purpose should always be to enforce property rights, and to guard against the implicit theft of breaking contracts which transfer titles to alienable property. Defense of property titles – and only such defense – is the business of [contract] enforcement agencies.<sup>79</sup>

Damages beyond restitution may be awarded in tort for the value of the stolen property if unrecoverable, harm done to the property, and the owner’s lost use of their property. But under the contract itself, the only remedy is the restitution of property to the rightful owner. Specific performance of the services called for by the contract’s terms is not proper under the TTTK because such violates the inalienability of self-ownership.<sup>80</sup>

*v. Fraud and Breach of Product Warranty*

Can implicit theft occur through fraud in contracting, under the TTTK?<sup>81</sup>

Yes, because fraud is failure to fulfill a voluntarily agreed upon transfer of property, and is therefore implicit theft. If, for example, A sells to B a package which A says contains a radio, and it contains only a pile of scrap metal, then A has taken B’s money and not fulfilled the agreed upon conditions for such a transfer – the delivery of a radio. A has therefore stolen B’s property. The same applies to a failure to fulfill any product warranty. . . . [W]arranties of products would be legally enforceable, not because they are “promises,” but because they describe one of the entities of the agreed-upon contract. If the entity is not as the seller describes, then fraud and hence implicit theft have taken place.<sup>82</sup>

---

<sup>78</sup> For an explanation of the role of compensation in tort law under Rothbardian property theory, see Rothbard, *Law, Property, and Air Pollution*, *supra* note 62.

<sup>79</sup> Rothbard, *supra* note 24, at 140. For an expanded critique of the compensation concept in contract law, see Rothbard, *supra* note 24, at 203-06, 238-51.

<sup>80</sup> Evers, *supra* note 25, at 7.

<sup>81</sup> See James W. Child, *Can Libertarianism Sustain a Fraud Standard*, 104(4) *Ethics* 722, 722 (1994) (arguing that “the basic moral principles of libertarianism do not support a prohibition of fraud”).

<sup>82</sup> Rothbard, *supra* note 24, at 143. See also Kinsella, *supra* note 53, at 34. For more on fraud from a libertarian perspective, see Randy E. Barnett, *Rational Bargaining Theory and Contract: Default Rules, Hypothetical Consent, the Duty to Disclose, and Fraud*, 15(3) *Harv. J.L. & Pub. Pol’y* 783 (1992); and Barnett, *The Sound of Silence: Default Rules and Contractual Consent*, 78 *Va. L. Rev.* 821 (1992).

vi. *Partial Title-Transfer and Duties Which “Run with the Property”*

Rothbard argues that, under the TTTK, the title owner is able to transfer a portion of the title in some property to another while retaining the rest.<sup>83</sup> An example is an author selling a book, with such sale conditioned upon the purchaser not reselling or copying the book.<sup>84</sup> If the purchaser copies or resells the book, then the condition upon which they received their portion of the title is violated, reverting undivided title to the seller and making the purchaser a thief.

However, this ability to transfer partial title is limited by the fact that property rights only apply when there is an objective-link<sup>85</sup> between some existing property and an existing, living person.<sup>86</sup>

[R]estrictive covenants to property in which, for example, a developer sells all the rights to a house and land to a purchaser, except for the right to build a house over a certain height or of other than a certain design[ would

---

<sup>83</sup> *Id.* at 146.

<sup>84</sup> *Id.*

<sup>85</sup> See Kinsella, *supra* note 53.

<sup>86</sup> Although Rothbard takes a classical, natural rights-based approach to similar issues of social theory, this position – that a property-generating objective link can only be established between an extant scarce resource and a living person – is derivable from the *a priori* of argumentation offered by Hoppe, *supra* note 43, at 384-86 (stating that:

property rights must necessarily be conceived of as originating as a result of definite individuals acting at definite points in time and space. Otherwise, it would be impossible for anyone to ever say anything at a definite point in time and space and for someone else to be able to reply. Simply saying that the first-user-first-owner rule of the ethics of private property can be ignored or is unjustified implies a performative contradiction, for one’s being able to say so must presuppose one’s existence as an independent decision-making unit at a given point in time and space).

Rothbard himself recognized Hoppe’s argumentation ethics as a groundbreaking contribution to libertarian theory, stating that:

Prof. Hans Hoppe, a fairly recent immigrant from West Germany, has brought an enormous gift to the American libertarian movement. In a dazzling breakthrough for political philosophy in general and for libertarianism in particular, he has managed to transcend the famous is/ought, fact/value dichotomy that has plagued philosophy since the days of the scholastics, and that had brought modern libertarianism into a tiresome deadlock. Not only that: Hans Hoppe has managed to establish the case for anarchocapitalist, Lockean rights in an unprecedentedly hard-core manner, one that makes my own natural-law/natural-rights position seem almost wimpy in comparison.

Murray N. Rothbard, BEYOND IS AND OUGHT (Ludwig von Mises Inst. 2010) (1988), <https://mises.org/library/beyond-and-ought> (last visited Oct. 20, 2019). For more on the natural rights vs. argumentation ethics approaches to libertarian theory, see Robert P. Murphy and Gene Callahan, *Hans-Hermann Hoppe’s Argumentation Ethics: A Critique*, 20(2) J. of Libertarian Stud. 53 (2006), contrasting with Stephan Kinsella, DEFENDING ARGUMENTATION ETHICS: REPLY TO MURPHY AND CALLAHAN, <https://www.anti-state.com/stephan-kinsella/> (2002) (last visited Nov. 17, 2019).

be valid and enforceable].<sup>87</sup> The only proviso is that there must, at every time, be some existing owner or owners of all the rights to any given property. In the case of a restrictive covenant, for example, there must be some owners of the reserved right to build a tall building; if not the developer themselves, then someone who has bought or received this right. If the reserved right has been abandoned, and no existing person possesses it, then the owner of the house may be considered to have “homesteaded” this right, and can then go ahead and build the tall building. Covenants and other restrictions, in short, cannot simply “run with the property” forever, thereby overriding the wishes of all living owners of that property.

This proviso rules out entail as an enforceable right. Under entail, a property owner could bequeath this land to his sons and grandsons, with the proviso that no future owner could sell the land outside the family (a deed typical of feudalism). But this would mean that the living owners could not sell the property; they would be governed by the dead hand of the past. But all right to the property must be in the hands of the living, existing persons. It might be considered a moral requirement for the descendants to keep the land in the family, but it cannot properly be considered a legal obligation. Property rights must only be accorded to and can only be enjoyed by the living.<sup>88, 89</sup>

---

<sup>87</sup> As a side note, here we can see that courts, adjudication, and default-rules still play a role for contract law within a TTTK-based system. The question of how tall is too tall, or what design is precluded, or what was meant by some conditional set upon a transfer of title are questions which in real life could easily fall into gray areas that a necessarily simple baseline theory cannot account for at the outset. The discovery procedure offered by a legal system based on the accumulation of case-law jurisprudence in a jurisdiction through the application of a baseline theory remains indispensable, in order for future, similar conflicts to be settled with increased peace and efficiency. For more on the importance of this discovery procedure in a libertarian judicial system, *see generally* Gregory B. Christensen, *Law as a Discovery Procedure*, 9(3) *Cato J.* 497 (1990). Through this process over time, certain default-rules are formulated, which allow for common understandings of the usage of language within a jurisdiction, and even perhaps the moral tenets of the jurisdiction’s community, to be reflected with the contract law jurisprudence of a jurisdiction – i.e., default-rules act as a linguistic and moralistic superstructure which is built upon the foundational ethical substructure of Rothbardian property theory. For more on contractual default-rules from a libertarian perspective, *see* Barnett, *supra* note 82.

<sup>88</sup> Rothbard, *supra* note 24, at 146.

<sup>89</sup> Before continuing, it is worth noting that traditional, promise-based theories on contract themselves bear within them title-transfer principles, Kinsella, *supra* note 39, including: 1.) the doctrine of consideration, and; 2.) traditional contract law’s preference for damage awards over specific performance as a remedy for breach of contract.

### 1. The Doctrine of Consideration

Rothbard states that “[t]he current requirement that there must be ‘consideration’ for a promise to be enforceable is a philosophically confused injection of title-transfer principles into” traditional contract theory. Rothbard, *supra* note 24, at 147 nt. 18; *see also* Evers, *supra* note 25, at 4 (stating that:

The doctrine of consideration introduces considerable logical discord into the law of contracts. The idea of consideration has its roots in the older idea that a breach of contract was a form of theft or injury to a property right. This clashes directly with the predominant view, after the creation

---

of assumpsit, according to which a breach of contract is the breaking of a promise.

Even proponents of the promise-based theory of contract recognize this discord between traditional contract law and the view that it is ethically compulsory for one to keep their promises. *E.g., see* Seana Valentine Shffrin, *The Divergence of Contract and Promise*, 120 Harv. L. Rev. 708, 709-10 (2007) (stating that “the moral rules of promise typically require that one keep a unilateral promise, even if nothing is received in exchange. By contrast, contract law only regards as enforceable promises that are exchanged for something . . .”). This shows that traditional contract theory is ultimately based upon the transfer of title to property, because only if such first occurs will the law then enforce a promise. But this is, in effect, no more than a compelled performance bond – i.e., it is a doctrine which compels parties trading promises to trade some title to property, conditioned upon future performance of the promise. For more on performance bonds under the TTTK, *see supra* notes 75 and 76. Because consideration creates theoretical discord within traditional contract law, it would be best if promissory obligations were removed from contract theory, because such obligations cannot occur without some preceding transfer of title, making the title-transfer the primary operative force engendering the enforceability of the contract. Under the TTTK, then, if contracting parties want to enforce their mere promises, all they need to do is transfer title to some property, conditioned upon the future performance of the promise. If such future performance does not occur, then the title to the property already conditionally transferred reverts back to the transferor, making the transferee an implicit thief liable under force of law to return the property, along with any other damages agreed to as a condition to the now-reverted transfer. Thus, the title-transfer theory bases contract in property theory, which allows for voluntary mechanisms to enforce promissory obligations via performance bonds, thereby replacing the doctrine of consideration. This supports Kinsella’s contention that, in practice, the TTTK would not look much different from the law of contracts as applied today. *See* Kinsella, *supra*, note 39. Performance bonds would likely become commonplace in contract negotiations under a TTTK regime, in order for parties to hedge against the risk of others’ failure to perform promises made.

## 2. Damages (Transfer of Title) are the Generally Preferred Remedy for Breach of Contract

The inability of the title-transfer theory to enforce promises might be seen, by some, as a defect of the theory. They predict chaos and the loss of the ability to have binding commitments. However, . . . even in modern legal systems, there is almost never enforcement of contractual obligations “to do” things. The primary enforcement mechanism utilized is to order the party in breach of contract to pay money damages to the other party, not to perform the promised service. The inability to “enforce” promises in today’s legal system has not resulted in the death of contract.

The same result can be obtained under the title-transfer theory of contract by using conditional title-transfers to provide for “damages” to “enforce” promises to perform. When a contract to do something is to be formed and the parties want there to be an incentive for the specified action to be performed, the parties agree to a conditional transfer of title to a specified or determinable sum of monetary damages where the transfer is conditional upon the promisor’s failure to perform. This provides a result similar to today’s system where the party who fails to perform owes monetary damages to the other party.

Kinsella, *supra* note 53, at 25. On this issue of traditional contract law’s preference for damages over specific performance as a remedy for breach of contract, even proponents of the promissory theory of contract have recognized this doctrinal divergence between traditional contract law and the view that keeping one’s promises is ethically compelled. *See, e.g.,* Shffrin, *The Divergence of Contract and Promise*, at 722-23 (stating that:

Contract law’s dominant remedy is not specific performance but expectation damages. Usually, the financial value of the performance is

## II. Blockchain and Smart Contract Technology – A Technological Overview

Having established the TTTK and its relevant implications, this paper now provides a technological overview to explain what the TTTK will be applied to. First, a basic description of blockchain technology is offered, followed by the same for blockchain-based smart contracts.

### A. Blockchain Technology<sup>90</sup>

“A blockchain is a distributed database that records all transactions [of digital assets] that have ever occurred in the blockchain[’s] network.”<sup>91</sup> “Each block consists of [data concerning a set of transactions] that occurred on the network,<sup>92</sup> which are placed in “a[ temporally] ordered list[], where each block is identified by its [unique] cryptographic hash[, with e]ach block[’s hash] referenc[ing] the block that came before it.”<sup>93</sup> Given these backwards-facing hash-references, “[o]nce a block is created and appended to the blockchain, the transactions in that block cannot be changed or reverted,”<sup>94</sup> because if that data were to be changed, then the hash of the newly proposed block would not correctly reference back to previous data in the blockchain, putting the network on notice that the ledger has been tampered with.<sup>95</sup>

---

demanded from the promisor, but actual performance is not required (even when it is possible), except in special circumstances. Further, intentional promissory breach is not subject to punitive damages . . . . Notably, U.S. law typically makes damages for emotional distress and attorney’s fees unavailable upon breach.

There are two further examples of the divergence over the significance of performance. First, one cannot obtain an order of specific performance even when one successfully alleges anticipatory repudiation. Even prior to the directed time of performance, a court is unlikely to direct specifically that the promised performance should occur. (Footnotes omitted).

<sup>90</sup> See generally Arvind Narayanan et al., *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction* 1-49 (Princeton U. Press 2016).

<sup>91</sup> Alharby and Moorsel, *supra* note 14.

<sup>92</sup> *Id.*

<sup>93</sup> *Id.*

<sup>94</sup> *Id.* See also Narayanan, *supra* note 90, at 11 (stating that:

In a regular linked . . . series of blocks, each block has data as well as a pointer to the previous block . . . . But in a block chain, the previous-block pointer [is] a hash pointer. So each block not only tells us where the value of the previous block was, but it also contains a digest of that value, which allows us to verify that the value hasn’t been changed. We store the head of the list, which is just a regular hash-pointer that points to the most recent data block).

<sup>95</sup> Narayanan, *supra* note 90, at 11-12 (stating that:



A blockchain is distributed, meaning that it “is replicated and shared among the network’s [connected computer devices],”<sup>96</sup> which are called “nodes.” “All the nodes are connected [and] structure[d] without any authoritative nodes or hierarchy”<sup>97</sup> – i.e., there is no single repository for the ledger’s information. There is no central authority deciding what the ledger says or who can view it.<sup>98</sup> Because of this “joint[] manage[ment] and maintain[ance]”<sup>99</sup> there needs to be a mechanism by which nodes reach agreement regarding both the ledger’s current contents and which proposed, new transactions are recognized. There are “various types of consensus protocols” available to blockchain networks,<sup>100</sup> which attempt to offer “novel solution[s] to the age-old human problem of trust” in coordinating action.<sup>101</sup> Each node bears a

---

To understand why a block chain [is] tamper-evident . . . let’s ask what happens if an adversary wants to tamper with data in the middle of the chain. Specifically, the adversary’s goal is to do it [so] that someone who remembers only the hash pointer at the head of the block chain won’t be able to detect the tampering. To achieve this goal, the adversary changes the data of some block  $k$ . Since the data has been changed, the hash in block  $k + 1$ , which is a hash of the entire block  $k$ , is not going to match up. . . . [S]o we will detect the inconsistency between the new data in block  $k$  and the hash pointer in block  $k + 1$ . Of course, the adversary can continue to try and cover up this change by changing the next block’s hash as well. The adversary can continue doing this, but this strategy will fail when she reaches the head of the list. Specifically, [if] the hash pointer at the head of the list [is stored] in a place where the adversary cannot change it, she will be unable to change any block without being detected.

The upshot is that if the adversary wants to tamper with data anywhere in this entire chain, to keep the story consistent, she’s going to have to tamper with the hash pointers all the way to the end. And she’s ultimately going to run into a roadblock, because she won’t be able to tamper with the head of the list. Thus, by remembering just this single hash pointer, we’ve essentially determined a tamper-evident hash of the entire list).

<sup>96</sup> Alharby and Moorsel, *supra* note 14.

<sup>97</sup> Wang, *supra* note 14, at 109.

<sup>98</sup> It should be noted that there is a distinction to be made between public and private blockchains. As stated in Alharby and Moorsel, *supra* note 14, at 127:

In a public blockchain, any anonymous user can join the network, read the content of the blockchain, send a new transaction, or verify the correctness of the blocks. . . . In a private blockchain, only users with permissions can join the network, write or send transactions to the blockchain. A company or a group of companies are usually responsible for giving users such permissions prior to joining the network.

For the purposes of this paper, we can assume that public and private blockchains work otherwise indistinguishably beyond this centralized barrier to one’s initial access of the network.

<sup>99</sup> Wang, *supra* note 97.

<sup>100</sup> *Id.*

<sup>101</sup> Sadiku, *supra* note 12, at 538. *See also* Wang, *supra* note 97 (in giving examples of consensus mechanisms, states that:

unique public-private key pair.<sup>102</sup> The public key identifies the user, verifying that they have the ability to make the transactions they attempt to make,<sup>103</sup> while the private key acts as a digital signature to authorize transactions concerning digital assets linked to the public key.<sup>104</sup> The ultimate effect and goal of blockchain technology is to create information ledgers which are “tamper-proof, secure, and transparent.”<sup>105</sup>

## B. Smart Contract Technology

“A smart contract is a user-defined [computer] program running on top of a blockchain” network.<sup>106</sup> It is “executable [computer] code . . . [used] to facilitate, execute and enforce the [user-defined] terms of an agreement” between parties on the blockchain.<sup>107</sup> “The main aim of a smart contract is to automatically execute the terms of an agreement once [ user-]specified conditions are met.”<sup>108</sup> It is “a system that releases digital assets<sup>109</sup> . . . once arbitrary pre-defined rules have been met.”<sup>110</sup> It “can be constructed to adjust [its execution and corresponding]

---

Common consensus algorithms include PoW (Proof of Work), PoS (Proof of Stake), and PBFT (Practical Byzantine Fault Tolerance), etc. PoW consensus process (commonly known as mining . . .) is as follows: each node contributes their computing resources to compete solving a . . . mathematical puzzle . . ., the winn[ing] miner broadcasts the mined block to other nodes, [which then] confirm [the proposed block’s] valid[ity]. If the block is validated, other miners would append this new block to their own [copies of the network’s] blockchain[. . .]. [The] DPoS (Delegated Proof of Stake) consensus protocol . . . leverages the power of stakeholder approval voting to resolve consensus issues in a fair and democratic way).

<sup>102</sup> Narayanan, *supra* note 90, at 15-20.

<sup>103</sup> *Id.* at 18-20.

<sup>104</sup> *Id.* at 15.

<sup>105</sup> Sadiku, *supra* note 101. *See also* Alharby and Moorsel, *supra* note 14 (stating that:

[Blockchain technology] allows untrusted participants to communicate and send transactions between each other in a secure way without the need of a trust third party. . . . Once a block is created and appended to the blockchain, the transactions in the block cannot be changed or reverted. This is to ensure the integrity of the transactions and to prevent [the] double-spending [of digital assets] problem.

<sup>106</sup> Sadiku, *supra* note 12.

<sup>107</sup> Alharby and Moorsel, *supra* note 98.

<sup>108</sup> *Id.*

<sup>109</sup> As previously noted, these digital assets can be used to denote title to real-world property. *See supra* note 33.

<sup>110</sup> Alharby and Moorsel, *supra* note 98 (stating that “[f]or instance, Alice sends X currency units to Bob, if she receives Y currency unites from Carl”).

performance obligations”<sup>111</sup> based on information that is stored on the blockchain,<sup>112</sup> or “by using a trusted third-party source – commonly [called] an *oracle*. Oracles [are] individuals or programs that [supply] information from the outside world, thereby providing a means for blockchain-based systems to interact with real-world persons and potentially react to external events.”<sup>113</sup>

Thus, smart contracts, strictly speaking, are not legal contracts,<sup>114</sup> because they are not the transfer of title to property. Rather, they are merely computer code, “a set of Scenario-Response procedural rules and logic”<sup>115</sup> running on a blockchain network, which allow “parties signing a contract . . . [to] agree on contractual details, conditions . . . [,] and the external . . . [Oracles] to use. [T]hen[, when] deploy[ed,] . . . [smart contracts] automate the execution of a contract on behalf of the signatories.”<sup>116</sup> This allows for the “reduc[tion] of certain contracting transaction costs as compared to the traditional paradigm.”<sup>117</sup> It is not until the smart contract’s

---

<sup>111</sup> De Filippi and Wright, *supra* note 33.

<sup>112</sup> See, e.g., the digital currency exchange example, *supra* note 110.

<sup>113</sup> De Filippi and Wright, *supra* note 33 (citations omitted).

<sup>114</sup> See Buterin, *supra* note 32.

<sup>115</sup> Wang, *supra* note 14, at 110.

<sup>116</sup> *Id.* (continuing that:

After the smart contract[ is] signed by all parties, [it] attache[s] to the blockchain in the form of program codes . . . and [is] recorded in the blockchain after being propagated by the [] network and verified by the nodes. Smart contract encapsulates a number of pre-defined states and transition rules, scenarios that trigger contract execution (such as at a given time or a particular event occurs), responses in a particular scenario, etc. The blockchain monitors the real-time status of smart contracts and executes the contract after certain trigger conditions have been met).

<sup>117</sup> Surden, *supra* note 35, at 638.

Although blockchain and smart contracts are ingenious technological feats upon which new and efficient methods for human interaction can be built, Surden, *supra* note 35, at 637 (stating that “[t]he expression of contract terms as data is significant because it enables a suite of novel, computer-based contracting abilities. . . . [T]he computers can perform advanced analytics infeasible in the written-language-based contracting approach” (footnotes omitted)), this does not mean that blockchain and smart contract technology are without problems or room for improvement. “The technology has yet to be fully developed, meaning that the spectrum of possible applications has not been fully explored.” Sadiku, *supra* note 12, at 540.

For more on the current state of these technologies, including current pressing issues and future trends, see Alharby and Moorsel, *supra* note 14, at 129-38; Wang, *supra* note 14, at 108-12 (listing, from 111-12, challenges currently facing smart contract technology); Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, *A Survey of Attacks on Ethereum Smart Contracts*, 2017 Int’l Conference on Principles of Sec. and Tr. 164 (2017), <https://eprint.iacr.org/2016/1007.pdf> (last visited Nov 11, 2019); and Weldon and Epstein, *supra* note 19, at 859-92.

For criticism of smart contracts’ utility in a legal sense, see Levy, *supra* note 34, and Sklaroff, *supra* note 34. See also Surden, *supra* note 35, at 637 (stating that “computable contracting . . . approaches are not suited for contracting scenarios involving significant amounts of uncertainty, abstraction, or complexity. Rather, they are

conditions are met, triggering its execution to transfer title digital assets, that a legal contract, under the TTTK, has been consummated.<sup>118</sup>

### III. Applying the TTTK to Smart Contracts – Why is this Theory a Better Fit for Smart Contracts?

This paper turns now to explain how and why the TTTK is a better fit for smart contracts than traditional, promise-based contract theories, beyond the simple answer that the TTTK is the correct contract theory generally. Part III(A) explains how neither smart contracts nor the TTTK rely on promissory obligations, making them conceptually and practically congruent. Then, Part III(B) addresses how blockchain consensus mechanisms aid in establishing socially visible and recognized objective links between owners and property titles. Last, Part III(C) offers a theoretical sketch of how the TTTK’s prohibitions of theft and fraud apply to contract litigation concerning smart contracts.

#### A. Smart contracts are not based on promissory obligations – rather, they focus on the actual execution of transfers of title to (digital) property

Max Raskin attempts to summarize the libertarian affinity to smart contract technology, stating that, in the libertarian view, “smart contracts use technology to enforce party autonomy in a more effective manner because they prevent external interference. If contractware progresses [so that] there is truly no need for third-party enforcement, there would be no need for a state and the attendant costs that many libertarians see as unjustifiable.”<sup>119</sup> This quote misunderstands, at least, Rothbardian-libertarianism. Rothbardianism is not fundamentally based upon individual autonomy. Rather, it is based upon private property and self-ownership as means to ensure a peaceful society,<sup>120</sup> which is not equivalent to unqualified individual autonomy. Indeed, Rothbardian theorists argue that there are certain inalienable rights, outside of the realm of individual autonomy,<sup>121</sup> and that individual autonomy does not extend to the violation of other’s property rights.<sup>122</sup> Rothbardianism largely emphasizes individual autonomy and freedom of contract, but these are deduced from more foundational theoretical considerations.<sup>123</sup> Therefore,

---

geared toward the subset of contracting in which the application of contract terms is expected to be relatively non-controversial in the ordinary case”); and Werbach and Cornell, *supra* note 15, at 365 (stating that “[t]here are significant practical limitations in replacing human enforcement of agreements with software running on a blockchain. Things simply do not always go according to plan. . . . [and] some contractual terms simply cannot be expressed through formal logic” (footnotes omitted)).

<sup>118</sup> See *supra* Parts I(A)-(B).

<sup>119</sup> Raskin, *supra* note 31, at 335.

<sup>120</sup> *Supra* Part I(A).

<sup>121</sup> See *supra*, note 67.

<sup>122</sup> Hoppe, *supra* note 58.

<sup>123</sup> See *supra* Parts I(A)-(B).

there must be a better explanation for why Rothbardian theory is uniquely aligned with smart contracts' nature.

“The critical distinction between smart contracts and other forms of . . . agreements is enforcement.” Smart contracts do not rely on promissory obligations to do (or refrain from doing) something by a party to an agreement.<sup>124</sup> Rather, they automatically execute a transfer of title to digital assets when the user-defined conditions are met.<sup>125</sup> After a smart contract is appended to a blockchain, parties do not need to promise each other anything – the title-transfer is automatically executed when their voluntarily-set conditions are met.<sup>126</sup> Similarly, the TTTK does not focus on *ex ante* promissory commitments, but on the actual transference of property title.<sup>127</sup> However, this does not mean that under the TTTK, nor when using smart contracts, that execution and enforcement of a contract are entirely collapsed into each other. When parties agree to transfer property title, they may accidentally transfer possession of their property without the recipient's fulfillment of the conditions for title receipt; or, parties may transfer digital assets which denote things which are not ownable under Rothbardian property theory, such as intellectual property.<sup>128</sup> Therefore, the agreement (i.e., the conditions for title transfer) and the contract (i.e., the actual transference of title) are not the same thing. Similarly, regarding smart contracts, the agreement's conditions which the smart contract is meant to manifest may not align with the smart contract's execution. Thus, although smart contract code may be evidence of what conditions the parties agreed to, it is incorrect that say, in the strictest sense, that a smart contract “is the agreement.”<sup>129</sup>

Liability for restitution under the TTTK is based on the retention by one party of some conditionally-transferred property title, even though the conditions have not been met, creating implicit theft.<sup>130</sup> Thus, strictly speaking, there can be no “breach of contract” under the TTTK as the term is traditionally understood.<sup>131</sup> This directly mirrors the nature of disputes arising from unintended outcomes caused by faulty smart contracts, where digital assets are transferred because the code's technical conditionals have been met while the parties' actual contractual conditions have not. In such a case:

---

<sup>124</sup> Werbach and Cornell, *supra* note 15.

<sup>125</sup> Buterin, *supra* note 11.

<sup>126</sup> Alharby and Moorsel, *supra* note 14, at 127.

<sup>127</sup> *Supra* Parts I(A)-(B).

<sup>128</sup> For a rejection of intellectual property rights under Rothbardian property theory, *see* N. Stephan Kinsella, *Against Intellectual Property* (Ludwig von Mises Inst. 2008).

<sup>129</sup> Werbach and Cornell, *supra* note 15, at 344. Thus, it is not so that, regarding smart contracts, “everything beyond the code is just commentary,” *id.* at 350. Even though “[t]he code is a necessary part of [a smart contract] agreement itself,” *id.*, it is not the case, under the TTTK, that there is “no room for a separate written agreement to specify the parties' intent.” *Id.*

<sup>130</sup> *See supra* Parts I(B)(i) and (iv).

<sup>131</sup> Kinsella, *supra* note 39.

the aggrieved party will need to go to the court to remedy a contract that has already been executed or is in the process of being performed. . . . [T]he remedy must come after the fact to undo or alter the agreement in some way.<sup>132</sup>

Given that smart contracts offer a means of contracting which is a “[novel] hybrid between ex ante commitment [when smart contract code is appended to a blockchain] and ex post enforcement [after the code has executed],”<sup>133</sup> the TTTK’s focus on title-transfer, removing ex ante commitments from contract theory in favor of ex post enforcement when a transfer of possession occurs without a corresponding transfer of title, provides a framework which fundamentally aligns with smart contracts’ novelties. Under the TTTK, smart contracts can execute actual contracts by executing the transference of title to scarce digital property;<sup>134</sup> and because a party can sue only after an unintended transference of possession to property without the corresponding title transfer has occurred, the TTTK is more in line with the fact that disputes over smart contracts can arise only after execution of the smart contract.<sup>135</sup> Traditional contract theorists have yet to elucidate such a synergy between smart contracts and traditional contract theories.<sup>136</sup>

---

<sup>132</sup> Raskin, *supra* note 31, at 322.

It must be remembered that smart contracts are not in themselves transfers of property titles; rather, they are just computer programs, tools to be used to offer a new way for parties to make and effectuate their contracts. Buterin, *supra* note 32. Therefore, it is theoretically possible under the TTTK for a smart contract to either incompletely or incorrectly reflect the independent contractual terms of the parties. E.g., if a smart contract erroneously transfers more digital assets to a party than agreed to by the parties’ contractual terms, and these independent terms outside of the smart contract’s operative conditions can be proven, then the recipient would be required, under a TTTK legal regime, to return the extra assets. *See infra* Part III(C).

<sup>133</sup> Werbach and Cornell, *supra* note 15, at 341-42.

<sup>134</sup> Therefore, it is incorrect to state, as Sklaroff does, that smart contracts are “without a formal legal contract.” Sklaroff, *supra* note 32, at 279.

<sup>135</sup> *Supra* notes 130 and 132.

<sup>136</sup> *See* Raskin, *supra* note 31, Hsiao, *supra* note 31, and Levy, *supra* note 32, for examples of scholarship showing a lack of synergy between traditional contract theories and the nature of smart contracts.

As stated above, *supra* note 74, the TTTK does not accept the contract law doctrine of substantial performance, because such focuses on reliance and promissory obligations, rather than the transfer of title to property. Raskin states that even though:

The performance phase is made easier with smart contracts . . . [a] potential problem . . . comes with imperfect performance. . . . The common law doctrine of substantial performance permits a contract to be recognized even if the performance does not fully comport with the express terms laid out. This is the kind of leeway that a computer program cannot recognize because it involves an outcome that was not contemplated and specified by the parties.

Raskin, *supra* note 31, at 326 (footnotes omitted). Therefore, because the TTTK does not adopt the doctrine of substantial performance in the first place, it is in a better theoretical position to handle this aspect of smart contracts.

## B. The Immutability and Consensus Mechanisms of a Blockchain makes Establishing an Objective Link between Owner and Property Easier

An important aspect of the property-based TTTK is that it serves to establish objective links between owners and their property, allowing the legal system and the society at large to know and recognize who owns what scarce resources, in order to avoid conflicts over their use.<sup>137</sup> Appending property title data to a blockchain would allow, at very low cost,<sup>138</sup> for title to be checked on the ledger to determine whether some property is owned and, if so, who owns it and how they came to own it.<sup>139</sup> This is bolstered by the fact that consensus mechanisms determine what is appended to a blockchain,<sup>140</sup> meaning that whenever a party's property title is appended such occurs because the network's community accepts the title or transaction as valid. This consensus among the community satisfies the objective link, public demarcation aspect of private property titles.<sup>141</sup> This efficiency in establishing publicly-accepted private property titles would make one of the TTTK's key goals – i.e., decreasing disputes over the legal right to use scarce resources, and making such disputes easier to adjudicate<sup>142</sup> – more practical. Therefore, the TTTK's focus on property ownership offers not only a better theoretical framework within which smart contracts can rest, due to their focus on title-transfer rather than promissory obligations.<sup>143</sup> On top of this, blockchain-based smart contracts make it easier for the TTTK, if widely adopted, to make property title claims clearer to the public, thereby reducing conflicts and increasing the efficiency of property and contract dispute adjudication. This could be made even more effective if adjudicative agencies themselves were to leverage blockchain technology to manage property title records.<sup>144</sup>

---

*See also* Werbach and Cornell, *supra* note 15, at 368 (stating that “many of the rules [of traditional contract law] are in tension with smart contracts’ mechanism of automatic [] enforcement”).

<sup>137</sup> *See* Kinsella, *supra* note 53.

<sup>138</sup> Surden, *supra* note 35, at 635 (stating that when “records [are] available electronically, monitoring the contract [can] be both more automated and more efficient”). *See also* Werbach and Cornell, *supra* note 15, at 317 (stating that “firms can achieve significant cost savings and efficiency gains when using computers to automate contracting”).

<sup>139</sup> *Id.*

<sup>140</sup> Wang, *supra* notes 99 and 101; Sadiku, *supra* note 101.

<sup>141</sup> *See* Kinsella, *supra* note 53.

<sup>142</sup> *See supra* Part I(A).

<sup>143</sup> *See supra* Part III(A).

<sup>144</sup> *See, e.g.,* Rizzo, *supra* note 33.

## C. Fraud and Product Warranty Under the TTTK Justify ex post Adjudication of Smart Contract Disputes

Raskin states that the libertarian “believers in smart contracts think that these benefits can be appreciated without judicial recognition and enforcement because smart contracts can supplant traditional judicial systems enforced by a centralized state.”<sup>145</sup> Again, he is mistaken. Although Rothbardian theorists do advocate against the state<sup>146</sup> in favor of private legal institutions,<sup>147</sup> this does not mean that Rothbardian theory calls for smart contracts to be without any judicial recognition. Because the TTTK prohibits fraud and enforces product warranties,<sup>148</sup> when applied to smart contracts it requires a system of ex post adjudication of disputes that arise when the execution of a smart contract does not comport with the parties’ express contractual terms,<sup>149</sup> assuming that such were provably consummated through some other instrument.<sup>150</sup> “Contract law is a remedial institution. Its aim is not to ensure performance ex ante, but to adjudicate the grievances that may arise ex post.”<sup>151</sup> Therefore, though it may be the case that “[s]mart contracts are not intended to be enforced by a court, . . . that [is] not to say that . . . the parties intend them to be unenforceable” as such.<sup>152</sup> Indeed, one could argue that all parties entering any contract hope that the deal will execute without resorting to judicial intervention.

---

<sup>145</sup> Raskin, *supra* note 31, at 338 (citations omitted). This view is mirrored by Sklaroff when he states that the motivations behind blockchain technology was “the same goals as technologies that came before – autonomy from inefficient and corruptible institutions, an insistence on the primacy and desirability of private social ordering, and frustration with the law and lawyers.” Sklaroff, *supra* note 32, at 267-68 (citations omitted). *See also* Werbach and Cornell, *supra* note 15, at 339.

<sup>146</sup> *See, e.g.*, Rothbard, *supra* note 24, at 161-197.

<sup>147</sup> Tannehill, *supra* note 41.

<sup>148</sup> Rothbard, *supra* note 82.

<sup>149</sup> *Id.*

<sup>150</sup> *See infra*, Conclusion, for more on how future scholarship applying the TTTK should address the roles that the contract law doctrines of the parol evidence rule, statute of frauds, and default rules should play in a smart contract context.

<sup>151</sup> Werbach and Cornell, *supra* note 15, at 318 (footnotes omitted). Expanding on this, they state that contract law:

exists to adjudicate the justice of a situation ex post. It is backward looking. Its basic function is to decide whether one party has wronged another party . . . . [It is] not aimed at creating new reasons to perform, but aimed at resolving disputes, taking those reasons as already given. One can see this backward-looking, remedial character in the way that contract law waits for breach, waits for an aggrieved party to bring forward a complaint, and even then rarely orders conduct. We suggest that contract law is not about creating forward-looking reasons, because other mechanisms might serve that purpose equally or better.

*Id.* at 361 (footnotes omitted).

<sup>152</sup> *Id.* at 340.



Thus, applying the TTTK to smart contracts demands the view that they “will not . . . replace contract law.”<sup>153</sup>

Werbach and Cornell state that the automatic execution feature of smart contracts “admit[s for] no possibility of breach” of contract suits.<sup>154</sup> “[B]ecause blockchains run on a distributed network of independent nodes, with no control point, a litigant seeking to enjoin performance of a smart contract has no one to sue.”<sup>155</sup> Even if we accept that blockchain decentralization poses a practical problem to finding a litigant to sue, under the TTTK it has been established that one can sue only when another unjustly possesses their property, received in a manner at variance with the parties’ contractual conditions.<sup>156</sup> Therefore, under the TTTK, a suit for implicit theft, concerning any means of contracting, can occur only after transference of possession to property. This means that the novelty of smart contracts pointed out by Werbach and Cornell, whereby contract suits can commence only after the smart contract has actually executed, poses no problem for the TTTK, because all contract suits under the TTTK in itself can occur only after a wrongful transference of possession to property. Thus, although smart contracts will not lead to the death of contract law, applying them would require suits for restitution rather than breach of contract, while the TTTK replaces all suits for “breach of contract” with suits for “restitution,”<sup>157</sup> again revealing the natural congruence between the two.

Since this paper focuses on theory over practicality, an in-depth analysis of how to best find a litigant to sue for restitution after implicit theft through a smart contract is beyond this paper’s scope. However, it is worth noting that blockchain networks are not fully anonymous – they are pseudonymous.<sup>158</sup> There have been cases where Bitcoin users have been tracked down and even criminally prosecuted.<sup>159</sup> Thus, although the pseudonymous nature of blockchain may present a practical limitation to finding the correct litigant to sue for restitution after execution of a faulty smart contract, such is a technical issue native to the technology, and does not theoretically hamper the TTTK’s application. As smart contract technology advances and perhaps becomes more adopted, trial and error in the marketplace can lead to practical solutions for this problem, if such a solution is what users and those effected by blockchain networks desire. Indeed, applying the TTTK to smart contracts may be an important first step in facilitating this market process, because a market can properly function only when it has market price signals, and market price signals can accurately reflect the reality of resource scarcity and

---

<sup>153</sup> *Id.* at 318.

<sup>154</sup> *Id.* (Footnotes omitted.)

<sup>155</sup> *Id.* at 332 (footnotes omitted).

<sup>156</sup> *Supra* Part I(B)(i).

<sup>157</sup> *Supra* Part I(B)(iv), and Werbach and Cornell, *infra* note 186.

<sup>158</sup> De Filippi and Wright, *supra* note 33, at 83.

<sup>159</sup> See SILK ROAD CASE: THE REAL, UNTOLD STORY, (2019), [https://www.youtube.com/watch?time\\_continue=12&v=\\_NZxivue5Ng](https://www.youtube.com/watch?time_continue=12&v=_NZxivue5Ng) (last visited Dec. 18, 2019).

human value judgments only under a legal regime based upon private property rights,<sup>160</sup> as the TTTK is.

Under a TTTK regime, parties using smart contracts can hedge against risk of incorrect execution (caused by poorly constructed code, mistake, or misunderstanding) in light of their actual contractual conditions. Therefore, although smart contracts may indeed play a role in changing the nature of judicial institutions,<sup>161</sup> under the TTTK such institutions in some form nevertheless must exist.<sup>162</sup> We see, then, that applying the TTTK to smart contracts saves them from the perception that they will lead to the “imminent death of contract law,”<sup>163</sup> “eliminat[ing] the need for legal enforcement.”<sup>164</sup> “If the parties do not or cannot represent all possible outcomes of the smart contract arrangement *ex ante*, the results may diverge from their mutual intent.”<sup>165</sup> Under the TTTK, such is the situation in which the legal enforcement of contracts through restitution lawsuits must remain.<sup>166</sup>

---

<sup>160</sup> For more on the importance of the interplay between private property and price signals in a functioning free market, see Ludwig von Mises, *Economic Calculation in the Socialist Commonwealth* (Ludwig von Mises Inst. 1990) (1920).

<sup>161</sup> Adam Sulkowski, *Blockchain, Business Supply Chains, Sustainability and Law: The Future of Governance, Legal Frameworks, and Lawyers?*, 43 Del. J. of Corp. L. 303, 327 (2019) (citing Michèle Finck, *Blockchain Regulation*, 19(4) German L.J. 665 (2018); Carla L. Reyes, *Conceptualizing Cryptolaw*, 96(2) Neb. L. Rev. 384 (2017); and Kevin D. Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 33 Berkeley Tech. L.J. 489 (2018).

<sup>162</sup> Tannehill, *supra* note 41.

<sup>163</sup> Werbach and Cornell, *supra* note 40.

<sup>164</sup> Savelyev, *supra* note 40. See also Grimmelmann, *supra* note 34, at 2 (stating that smart contracts are mechanisms that “enforce agreements using software rather than with law” (citations omitted)). Indeed, this application of the TTTK to smart contracts comports with the view that written contracts:

are the most efficient way to ensure that the court correctly understands what parties were willing to exchange under their deal. That understanding can be essential when the court needs to supplement or correct the agreement. And, as we will see, these documents provide parties with important tools to manage uncertainties inherent in the agreement process and responses if the agreement goes wrong.

Sklaroff, *supra* note 32, at 275. Thus, the TTTK allows room for legal adjudication regarding smart contracts when disputes over terms arise, meaning that smart contracts do not find themselves left entirely outside of the ambit of contract law.

<sup>165</sup> Werbach and Cornell, *supra* note 151. “Nothing in a smart contract ensures a true meeting of the minds. . . . Computers, after all, do not have minds.” Werbach and Cornell, *supra* note 15, at 368.

<sup>166</sup> As Werbach and Cornell stated, “contract litigation plays a role [of *ex post* adjudication] that smart contracts do not even purport to replicate.” *Id.* at 352. Smart contracts and contract law have two “fundamentally different objectives. Smart contracting functions to ensure action. Contract law functions to recognize and remedy grievances. Smart contracts could not – even in theory – replace contract law. At best, smart contracts might reduce the need for contract litigation.” *Id.* at 363.

Werbach and Cornell fear that “[a] judicial decision holding a smart contract unenforceable cannot undo the results of its fully executed agreement.”<sup>167</sup> This may be the case, although efforts are being made to enable reversible smart contracts.<sup>168</sup> However, this problem is again purely practical, requiring trial and error to find the best way to address it.<sup>169</sup> There is nothing in theory stopping courts, when they do have a litigant before them for implicit theft through a smart contract, from ordering the litigants to create a new smart contract in order to return to the aggrieved party their rightful digital assets. After all, as Grimmelmann states, “[b]lockchains are made out of people.”<sup>170</sup> It is humans who write and deploy blockchain networks and smart contracts, and people are subject to whatever judicial system exists. Because blockchain networks’ consensus mechanisms sometimes fail,<sup>171</sup> causing a blockchain to not reflect transactions which are held to be valid by a judicial institution with jurisdiction over the network due to users’ inability or refusal to adopt the state of affairs ordered by the court, then the court could fall back on orders for payments in tort to return to the aggrieved party the value of the property which they lost through the erroneous smart contract, plus other damages deemed just under libertarian tort theory.<sup>172</sup> It could also perhaps hold the network’s users who are blocking the adoption of the court’s order in contempt. Surmising further about how a TTTK regime could practically handle smart contract adjudication is beyond this paper’s scope. It is enough to establish that under the TTTK, in principle, there remains a role for courts to play in adjudicating smart contract disputes.

#### IV. Objections

This paper now considers objections which may be raised against applying the TTTK to blockchain-based smart contracts. The objections addressed are as follows: A.) Blockchain-based digital assets are not ownable under Rothbardian property theory; B.) Smart contracts are not correctly viewable as property rules; and C.) Blockchain ledgers are not trustworthy enough to determine objective links between owners and property titles.

---

<sup>167</sup> *Id.* at 333.

<sup>168</sup> See, e.g., Bill Marino and Ari Juels, *Setting Standards for Altering and Undoing Smart Contracts*, 2016 Int’l Symposium on Rules and Rule Markup Languages for the Semantic Web 151 (2016).

<sup>169</sup> See *supra*, notes 41 and 160.

<sup>170</sup> Grimmelmann, *supra* note 34, at 23. See also Werbach and Cornell, *supra* note 15, at 367 (stating that “smart contracts bind real people, who have real relationships . . . . This makes it impossible to avoid some of the messiness that attends traditional contracts”).

<sup>171</sup> *Id.* at 16-17.

<sup>172</sup> See generally Rothbard, *supra* note 78.

## A. Are Blockchain-Based Digital Assets Unownable Under Rothbardian Property Theory?

Kinsella has argued that, under Rothbardian property theory, Bitcoin (a blockchain-based cryptocurrency) is not an ownable, scarce resource.<sup>173</sup> Kinsella argues against intellectual property by employing the same Rothbardian property theory as this paper.<sup>174</sup> He extends this argument to Bitcoin, holding that because information and “[i]deas are not naturally scarce”<sup>175</sup> there can be no conflict over them and their use, meaning they are not subject to Rothbardian property theory, and because Bitcoin is “a ledger, which is just information,”<sup>176</sup> it likewise is not subject to ownership.

The blockchain ledger itself – the medium upon which the blockchain’s information is stored – is not ownable, because it can be copied onto any computer at any time without taking away any part of others’ copies. However, this is not the same as using a Bitcoin which is linked on the network to a specific private key, because if such occurs then the original private key will be deprived of their ability to use that Bitcoin, even though it is just information. It would not be theft to copy the informational contents of a book, because doing so does not deprive the owner of access to the information, nor does it damage the book’s physical integrity.<sup>177</sup> Such may deprive the physical owner of the book’s value, because physical media containing the book’s

---

<sup>173</sup> See STEPHAN KINSELLA - NOBODY OWNS BITCOIN (PFS 2019), (2019), <https://www.youtube.com/watch?v=WfLt7pIyrLs> (last visited Dec. 13, 2019); Stephan Kinsella, KOL274 | NOBODY OWNS BITCOIN (PFS 2019) (2019), <http://www.stephankinsella.com/paf-podcast/kol274-nobody-owns-bitcoin-pfs-2019/#more-12653> (last visited Dec. 13, 2019).

For more on this issue, see Konrad S. Graf, Are Bitcoins Ownable? Property Rights, IP Wrongs, and Legal-Theory Implications, (2015), <https://static1.squarespace.com/static/5720adbdc6fc0891cbccce17c/t/580e138c2994ca6771b9c135/1477317533610/Are%2BBitcoin%2BOwnable%2BBook%2BFree%2BPDF%2B5Nov2015.pdf> (last visited Dec. 13, 2019).

<sup>174</sup> See Kinsella, Against Intellectual Property, *supra* note 62, at 28-45.

<sup>175</sup> *Id.* at 33.

<sup>176</sup> Kinsella, *supra* note 173, at 8:47 – 8:50 (transcribed from video lecture).

<sup>177</sup> Kinsella, *supra* note 174, at 32-33 (stating that:

if you copy a book I have written, I still have the original (tangible) book, and I also still “have” the pattern of words that constitute the book. Thus, authored works are not scarce in the same sense that a piece of land or a car are scarce. If you take my car, I no longer have it. But if you “take” a book-pattern and use it to make your own physical book, I still have my own copy. The same holds true . . . for any “pattern” or information one generates or has. . . . Since use of another’s idea does not deprive him of its use, no conflict over its use is possible; ideas [and information], therefore, are not candidates for property rights).

information is now in greater supply,<sup>178</sup> but property rights do not extend to one's subjective value judgments, but rather only to property's physical integrity.<sup>179</sup>

In contrast, taking a private key's Bitcoin deprives the private key not of the information about that Bitcoin, which is still on the ledger, but of the key's ability to manipulate that information, an ability which is scarce – taking the Bitcoin destroys the objective link which tied that Bitcoin to a specific private key. It is as if the only way to copy the information stored in a book were to destroy the physical book through the copying process, depriving the owner of access to their book; or, alternately, depriving one's mind of the book's information through the copying process, thus foreclosing their use of that information. In such a case, the copying of the information as such would not be theft, but the physical destruction of the book would be tortious destruction of another's property. In the same way, even though Kinsella is correct in stating that a Bitcoin is just information on a decentralized ledger, and that information qua information is not ownable, Bitcoin and other blockchain-based digital assets are a unique type of information which can only be used conflictably – meaning, that there can be no simultaneous control of the information by separate private keys. This is due to the use-scarcity embedded in the Bitcoin blockchain's code.<sup>180</sup> When one copies the information from a book, the owner of the original physical book is not deprived of their ability to use the book itself. But when one transfers a Bitcoin which is not linked to their own private key, the original private key is deprived of the ability to manipulate the Bitcoin-information.

---

<sup>178</sup> See Murray N. Rothbard, *Man, Economy, and State: A Treatise on Economic Principles, with Power and Market: Government and the Economy* 119-20 (Ludwig von Mises Inst., 2d Scholar's ed. 2009) (1970) (stating that:

market prices will tend to change only when changing supply and demand conditions alter the equilibrium price and establish a condition of excess supply or excess demand where before the market had been cleared.

...

It is evident that, as the price increases, new suppliers with higher minimum selling prices are brought into the market, while demanders with low maximum buying prices will begin to drop out. Therefore, as the price decreases, the quantity demanded must always either remain the same or increase, never decrease. Similarly, as the price decreases, the amount offered in supply must always decrease or remain the same, never increase. Therefore, the demand curve must always be vertical or rightward-sloping as the price decreases, while the supply curve must always be vertical or leftward-sloping as the price decreases. The curves will intersect at the equilibrium price, where supply and demand are equal.

Clearly, once the zone of intersection of the supply and demand curves has been determined, it is the buyers and sellers at the margin—in the area of the equilibrium point—that determine what the equilibrium price and the quantity exchanged will be).

<sup>179</sup> Hoppe, *supra* note 49.

<sup>180</sup> Indeed, one of the major stated goals of the Bitcoin network was to create a digital currency which “prevent[s] double-spending” of digital assets. Nakamoto, *supra* note 10, at 8.

Thus, Bitcoin is ownable under Rothbardian property theory, because taking Bitcoin-information from another's private key without the private key's authorization is analogous to an admittedly fanciful situation where the act of taking information from another's mind would necessarily imply that the originally-knowledgeable party no longer knows the information, and therefore can no longer act on it.<sup>181</sup> Such would be an impermissible invasion of self-ownership in one's mind. Although it can be said that Bitcoin is "artificially" scarce, because its scarcity is set by human-made computer code,<sup>182</sup> it is, in a more important sense, "naturally" scarce, because the computer code is the fount of Bitcoin's nature, and this code precludes the simultaneous manipulation of particular pieces of Bitcoin-information.<sup>183</sup>

Moreover, not all blockchain networks are constrained in their applications to merely the denotation of information on a decentralized ledger for use as cryptocurrency. Since the release of Bitcoin, blockchain technology has advanced to the point where blockchain-based assets can

---

<sup>181</sup> Indeed, Kinsella endorsingly cites Thomas Jefferson, Kinsella, *supra* note 174, at 32, when he states that:

He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation.

Thomas Jefferson, *The Writings of Thomas Jefferson*, vol. 13, 334 (A.A. Lipscomb and A.E. Bergh eds., Thomas Jefferson Memorial Ass'n 1903). This statement implies that, if it were the case that one person's taking of an idea from another would diminish the idea within the latter's mind, then property rules would apply as it does for all other scarce physical resources. The same logic applies to Bitcoin. In the hypothetical scenario, there is only one mind which may contain an idea at any point in time; in the Bitcoin network, there is only one private key which may be linked to a specific amount of Bitcoin, provable by an existing and consented-to series of transactions on the network.

<sup>182</sup> Kinsella, *supra* note 174, at 34 (citing Boudewijn Bouckaert, *What is Property?*, 13(3) *Harv. J. of L. and Pub. Pol'y* 775, 793 (1990)). Bouckaert states that:

Natural scarcity is that which follows from the relationship between man and nature. Scarcity is natural when it is possible to conceive of it before any human, institutional, contractual arrangement. Artificial scarcity, on the other hand, is the outcome of such arrangements. Artificial scarcity can hardly serve as a justification for the legal framework that causes that scarcity. Such an argument would be completely circular. On the contrary, artificial scarcity itself needs a justification.

This classical dichotomy between "natural" and "artificial" scarcity does not neatly translate over into the Bitcoin context. The question, in applying property theory to Bitcoin, is not whether it is "naturally" scarce as Bouckaert defines, meaning scarce before any human arrangements have occurred. Indeed, Bitcoin would not exist at all without such pre-existing human arrangements. Rather, it is whether Bitcoin is "naturally" scarce on its own terms – i.e., scarce in virtue of its computer code. This paper holds that, in principle, it is, since one's taking of a Bitcoin from another's public key, at least in theory, precludes this key's use of that amount of Bitcoin.

<sup>183</sup> Nakamoto, *supra* note 180.

denote title to scarce resources in the physical world,<sup>184</sup> which are themselves subject to Rothbardian property theory.<sup>185</sup> Therefore, even if we assume that Kinsella’s argument regarding the unownability of Bitcoin is correct qua Bitcoin, the argument does not necessarily translate to other types of blockchain-based digital assets which denote title to physically-scarce resources.

## B. Are Smart Contracts Not Property Rules?

Werbach and Cornell, in their treatment of how smart contracts will move contract litigation from claims for breach of contract to restitution,<sup>186</sup> state that “[o]ne might think that this effectively shifts contracts from liability rules to property rules.<sup>187</sup> That’s not quite right, because one could have a smart contract that awards liability damages in a self-executing way. Rather, the difference is between ex ante enforcement and ex post adjudication.”<sup>188</sup> The problem with this formulation is that the difference between ex ante enforcement and ex post adjudication can be fairly characterized as a more specific conceptualization of liability rules vs. property rules. The proper remedy for implicit theft under the TTTK is ex post suit for restitution after possession of property has been transferred without the corresponding title transfer.<sup>189</sup> Therefore, because the TTTK is property-based,<sup>190</sup> and because the proper remedy for implicit theft under the TTTK is ex post restitution,<sup>191</sup> to say that the primary difference between smart contract litigation vs. traditional contract litigation is only ex ante enforcement vs. ex post adjudication, rather than the underlying property rights which require ex post adjudication for their vindication, is to miss the forest for the trees.

## C. Is Blockchain-based Data Reliable Enough to Adequately Meet the TTTK’s Objective Link Element?

One limitation of blockchain technology’s ability to reliably record information is the “garbage-in, garbage-out” problem.<sup>192</sup> I.e., although a blockchain may, once launched, act and

---

<sup>184</sup> See *supra*, note 33.

<sup>185</sup> See *supra* Part I(A).

<sup>186</sup> Werbach and Cornell, *supra* note 15, at 376-77.

<sup>187</sup> *Id.* at 376 (citing Guido Calabresi and A. Douglas Melamed, *Property Rules, Liability Rules, an Inalienability: One View of the Cathedral*, 85 Harv. L. Rev. 1089, 2206-10 (1972) (distinguishing between property and liability rules. This distinction, formulated by Calabresi and Melamed, is flawed because, properly understood, rules of tort liability, like contract theory, are derived and not entirely distinct from property theory. Rothbard, *Law, Property, and Air Pollution*, *supra* note 62, at 57 (stating that “tort or criminal law is a set of prohibitions against the invasion of, or aggression against, private property rights”); see also Rothbard, *Law, Property, and Air Pollution*, *supra* note 62, at 57-60 (outlining fallacies in the “law and economics” approach)).

<sup>188</sup> *Id.*

<sup>189</sup> *Supra* Part I(B)(iv).

<sup>190</sup> *Supra* Part I(A)-(B).

<sup>191</sup> *Supra* note 185.

<sup>192</sup> Sulkowski, *supra* note 161, at 322.

record information reliably, there are no rigorous, on-chain methods to ensure the reliability of information in the first place, before and at the time of the network’s launch.<sup>193</sup> Because of this, off-chain institutions are still needed “to provide [] means for detecting, deterring, and punishing fraud.”<sup>194</sup> Rothbard addresses a similar issue, albeit it at a more general level of analysis.<sup>195</sup>

After establishing his property theory, Rothbard considers important issues which arise at the outset of applying it.<sup>196</sup> In particular, he considers the issue of how a libertarian legal system would determine, in cases of conflict over scarce resources, who are the peaceful, just property title owners, versus the criminal, unjust resource possessors.<sup>197</sup> How are we to know which property claims are just and should be protected through force of law, in contrast to those that are unjust and subject to legal sanction?<sup>198</sup> “Wouldn’t this involve a chaotic inquiry into everyone’s property title, and furthermore, what criterion [] establish[es] the justice of these titles?”<sup>199</sup> Rothbard answers: “where we are not sure about a title but it cannot be clearly identified as criminally derived, then the title properly and legitimately reverts to its current possessor[;]”<sup>200</sup> “if a current [possession of] property is criminal in origin, and the victim or his heir can be found, then the title should immediately revert to the latter[;]”<sup>201</sup> if “we know that [the possessor’s] title is criminal, but [] we cannot now find the victim or his current heir”<sup>202</sup> then there are two possible outcomes: a) if the possessor is the thief, “then it is quite clear that he cannot be allowed to keep it . . . [and] the [property] is now . . . in a state of no-ownership, and it must therefore become the legitimate property of the first person to ‘homestead’ it[;]”<sup>203</sup> or b.) if the possessor

is not the criminal . . . but [] had inherited or [] innocently purchased it from the thief . . . [then] the disappearance of the victim means that the stolen property comes properly into a state of no-ownership[,] . . . revert[ing] as legitimate property to the first

---

<sup>193</sup> Victoria Louise Lemieux, *Trusting Records: Is Blockchain Technology the Answer?*, 26 Records Mgmt. J. 110 (2016).

<sup>194</sup> Sulkowski, *supra* note 161, at 323.

<sup>195</sup> Rothbard, *supra* note 24, at 51-61.

<sup>196</sup> *Id.*

<sup>197</sup> *Id.* at 51-52.

<sup>198</sup> *Id.*

<sup>199</sup> *Id.* at 56.

<sup>200</sup> *Id.* at 57.

<sup>201</sup> *Id.*

<sup>202</sup> *Id.*

<sup>203</sup> *Id.* at 58.



person to come along and use it, . . . [and] this “first” person is clearly [the possessor], who has been using it all along.<sup>204</sup>

We can see, then, that the TTTK has already considered a variant of the “garbage-in, garbage-out” problem, as it applies to property titles. Therefore, when the TTTK is applied to blockchain-based property titles, it provides a formulation, in principle, for how to handle the problem of establishing the reliability of blockchain-based data regarding such titles at a blockchain network’s outset. An explication of how this principle would be best applied in practice is beyond this paper’s scope.

## Conclusion

This paper has set out to establish that the Title-Transfer Theory of Contract is more congruous, theoretically, with smart contract technology’s nature in its simplest applications than traditional contract theories. This conclusion rests primarily on the fact that neither the TTTK nor smart contracts look to promissory obligations as the basis of contract. However, the question remains as to how the TTTK applies to more complex implementations of smart contracts. After all, smart contracts can be used to create more complex contractual arrangements than mere bilateral transfers of property title. Just as smart contracts are built atop blockchains to create more complex methods of owning and transferring the blockchain’s digital assets, multiple smart contracts can be layered together to create a web of self-executing title-transfers which can in effect become a corporate-style entity called a “Decentralized Autonomous Organization” (DAO).<sup>205</sup> The fact that “DAOs operate without the need for human management[, being] governed exclusively by code[.]”<sup>206</sup> has led to interest, and sometimes concern, among legal scholars as to what the effects of DAOs may be, and whether and how DAOs should be classified as legal entities.<sup>207</sup>

---

<sup>204</sup> *Id.*

<sup>205</sup> Werbach and Cornell, *supra* note 15, at 337 (stating that:

Some blockchain advocates . . . envision smart contract as the foundation of a new kind of economic entity, the distributed autonomous organization (DAO). If a corporation is simply a nexus of contracts, why not encode those agreements into digital self-enforcing agreements? A DAO could have stock ownership, corporate governance rules, payroll arrangements, and virtually all of the economic trapping of a modern corporation, all running automatically in a completely distributed manner.

<sup>206</sup> De Filippi and Wright, *supra* note 33, at 154.

<sup>207</sup> *Id.* (stating that “[e]ven if a government has jurisdiction over a DAO, there are questions as to whether the government would have the authority to impose rules on such an organization[, because] the legal system cannot provide legal rights or impose duties on something devoid of legal personhood.” (Endnotes omitted). *See also* Shawn Bayern, *Are Autonomous Entities Possible?*, 114 Nw. U. L. Rev. 23 (2019) (arguing that, under prevailing LLC statutes, positive law, DAOs can be legally cognizable entities); *but see* Lynn M. LoPucki, *Algorithmic Entities*, 95 Wash. U. L. Rev. 887 (2018) (arguing against Bayern’s view). *See also* Carla L. Reyes, *If Rockefeller Were a Coder*, 87 Geo. Wash. L. Rev. 373 (2019) (arguing that the best legal entity designation for DAOs is the business trust).

There has been debate over whether libertarian property theory, with its basis in methodological individualism<sup>208</sup> and focus on individuals' self-ownership and private property rights,<sup>209</sup> can sustain the validity of corporate-style entities under a libertarian legal system.<sup>210</sup> One issue raised in this debate is based on Rothbard's statement that "[p]roperty rights must only be accorded to and can only be enjoyed by the living,"<sup>211</sup> which may seem to place DAOs beyond the scope of entities which can validly own property. Because this debate persists, future scholarship is needed in order to a.) take a position in this debate, and b.) if the position taken is that corporate entities are valid, build off of this paper's work to apply the TTTK and libertarian corporate theory to smart contract-based corporate entities, DAOs.

Moreover, more research may be warranted in order to detail how a TTTK regime which leverages the power of blockchain and smart contracts to transfer and record property titles could operate in practice. One can imagine possible stumbling points, such as the possibility that different blockchains, used for the same purpose, may register conflicting titles to ownership to the same property. Although this paper's author is confident that the market for legal services<sup>212</sup> and the discovery procedure of adjudication services<sup>213</sup> would work to solve these problems in practice over time, scholarship may be warranted to offer a theoretical primer before the adoption of such a legal regime.

A modest suggestion for such future work is to formulate new doctrine(s)<sup>214</sup> to supplement or replace the "parol evidence rule" when litigating disputes regarding ambiguity in contractual terms of parties' smart contract dealings. This rule holds that when parties commit contractual terms to writing, the writing is considered the final agreement for purposes of contractual interpretation, with evidence regarding the parties' intent before the final writing being inadmissible,<sup>215</sup> except in cases involving mistake, fraud, duress, or genuine ambiguity in

---

<sup>208</sup> See Mises, *Human Action*, *supra* note 38.

<sup>209</sup> See *supra* Part I(A).

<sup>210</sup> For examples of libertarian arguments in favor of the legal validity of corporate entities under a libertarian legal system, see STEPHAN KINSELLA | THE ROLE OF THE CORPORATION AND LIMITED LIABILITY IN A FREE SOCIETY (PFS 2013) (2018), <https://www.youtube.com/watch?v=Op8hBM1TLQM> (last visited Nov. 16, 2019); Walter Block and J.H. Huebert, *Defending Corporations*, 39(2) *Cumb. L. Rev.* 363 (2009); and Robert Hessen, *In Defense of the Corporation* (Hoover Inst. Press, 1st ed. 1979). *But see*, for opposing views, Piet-Hein Van Eeghen, *The Corporation at Issue, Part I: The Clash with Classical Liberal Values and the Negative Consequences for Capitalist Practice*, 19(3) *J. of Libertarian Stud.* 49 (2005), and *The Corporation at Issue, Part II: A Critique of Robert Hessen's In Defense of the Corporation and Proposed Conditions for Private Incorporation*, 19(4) *J. of Libertarian Stud.* 37 (2005).

<sup>211</sup> Rothbard, *supra* note 88.

<sup>212</sup> Tannehill, *supra* note 41.

<sup>213</sup> See Christainsen, *supra* note 87.

<sup>214</sup> Werbach and Cornell, *supra* note 17.

<sup>215</sup> Restatement (Second) of Contracts § 213.

the written document.<sup>216</sup> Because smart contracts create a new “document,” (the smart contract’s code itself), which embodies the contract’s terms, in addition to other written or oral agreements between the parties, new issues are raised as to how and why the terms of the encoded, written, and oral agreements should be weighed against each other in different circumstances.<sup>217</sup> Should the code be presumably controlling, or the written agreement? Should one or the other be favored in different circumstances? What if one or both are ambiguous, or what if the code did not effectuate the clear intent of the parties when such was unambiguously written beforehand? Although smart contracts do offer new opportunities for efficiency<sup>218</sup> and other benefits<sup>219</sup> in making and enforcing contracts, ambiguities in contractual conditions are necessary to the human condition.<sup>220</sup> Nobody can predict the future,<sup>221</sup> and mistakes between parties’ understandings of their contracts will inevitably occur due to incomplete information, inherent linguistic ambiguities,<sup>222</sup> differing cultural behavioral norms,<sup>223</sup> etc. Because even smart contracts necessarily bear ambiguities, by virtue of their being created and interpreted by humans,<sup>224</sup> an updated conception of how to weigh different documents when interpreting contracts in a smart contract setting may be warranted in order to address the peculiarities presented by smart contracts’ unique presentment of two written documents, rather than one, which attempt to embody a contract’s terms. For similar reasons, the Statute of Frauds doctrine, which holds that certain types of contracts must have their terms written in order to be valid,<sup>225</sup> and Randy Barnett’s work on default rules in contract theory<sup>226</sup> should be extended or modified in order to best fit smart contracts’ peculiarities.

Smart contract technology presents exciting, novel questions to legal scholars regarding contract theory’s bases; this paper argues that the Title Transfer Theory of Contract, in addition to being the proper basis for all contracts, addresses or obviates many of the theoretical issues

---

<sup>216</sup> *Id.* § 214(d).

<sup>217</sup> *See* Werbach and Cornell, *supra* note 129.

<sup>218</sup> Surden, *supra* notes 35 and 37.

<sup>219</sup> Werbach and Cornell, *supra* note 15, at 317.

<sup>220</sup> Lipshaw, *supra* note 35.

<sup>221</sup> Mises, *Theory and History*, *supra* note 38.

<sup>222</sup> Grimmelmann, *supra* note 34, at 9-10.

<sup>223</sup> *See, e.g.*, Peter Minuit’s “purchase” of Manhattan Island from Native Americans for the Dutch in 1626. George Bancroft, *History of the United States of America, from the discovery of the continent*, Vol. I 495 (D. Appleton and Co. 1883); Tim McNeese, *New Amsterdam 65-68* (Chelsea House Publishers 2007) (citing Dirk J. Barraveld, *From Amsterdam to New York: The Founding of New York by the Dutch in July 1625* 116 (Writers Club Press 2001); L.J. Krizner and Lisa Sita, *Peter Stuyvesant: New Amsterdam and the Origins of New York* 40 (Rosen 2001); and Edwin G. Burrows and Mike Wallace, *Gotham: A History of New York City to 1898* 24 (Oxford U. Press 1999)).

<sup>224</sup> Grimmelmann, *supra* note 170; Werbach and Cornell, *supra* note 170.

<sup>225</sup> Restatement (Second) of Contracts § 110.

<sup>226</sup> *See* Barnett, *supra* note 82.

raised when viewing smart contracts through the lens of traditional, promise-based contract theories. Because questions regarding the practicalities of smart contracts remain, this paper concludes by suggesting that adoption of the Title Transfer Theory would be a radical step in the correct direction if smart contract technology is to be able to harness its potential and find its niche within the marketplace, whatever that may be.