

REVISITING CONCEPTIONS OF COMMODITY AND SCARCITY IN LIGHT OF BITCOIN

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Japanese commodity money before the 8th century: arrow heads, grain, and gold powder. Source: PHGCOM, Wikimedia Commons.

This 17 March 2014 edition has been completely revised, updated, and reformatted from its initial version from one year earlier, “The sound of one Bitcoin” (19 March 2013), which appeared as an extended post on konradsgraf.com. This work is liberated under the Creative Commons 3.0 Attribution framework. Bold emphasis in quotations is the author’s throughout.

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The first purpose of a scientific terminology is to facilitate the analysis of the problems involved.

—Ludwig von Mises

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1. Introduction

Tradable bitcoin units viewed as discrete objects of human action are a new type of monetary phenomenon. They can even appear to elude trusted monetary typologies. This paper seeks to clarify their economic nature by reexamining core theoretical concepts with bitcoin held in mind next to more traditional examples.¹ It also distinguishes economic-theory and property-theory senses of scarcity, and seeks to better differentiate scarcity from tangibility or materiality. These steps help overcome interpretive challenges in considering bitcoin in relation to the monetary classification scheme pioneered in Ludwig von Mises's *The Theory of Money and Credit* (TMC).² They may also help inform emerging debates in progress as to whether and in what sense bitcoin units should or should not be considered legitimate objects of legal ownership under a rigorous approach to the foundations of property theory.

With these proposed pieces in place, the paper next examines bitcoin using a typical set of criteria for explaining the historical-evolutionary strengths of metallic coins as media of exchange. How does bitcoin fare on a representative list of criteria used to describe what gives certain types of market goods competitive advantages in a monetary role? It concludes by recalling the importance of applying realistic comparative methods and avoiding comparisons of real options against idealized imaginary versions of other options.

The focus is on the perspective of individual actors and discrete marginal objects of action (both tangible and intangible “objects”). I address technical-system, payment-network, and social-system perspectives in *On the origins of Bitcoin: Stages of monetary evolution* (October 2013) and my three-part *Bitcoin Decrypted* video lecture series (December 2013). These treatments build on the action-theory foundations developed here in keeping with the Misesian tradition of methodological individualism, in which systemic treatments of social phenomena are to remain rooted in action analysis.

¹ I attempt to follow general usage advice in using upper-case ‘B’ for protocol, network, or overall phenomenon, and lower-case ‘b’ for currency. Lower-case bitcoin is sometimes used in an uncountable sense, as in water or oil. The countable plural usage of “bitcoins” is a confusing and unresolved and evolving linguistic issue due to the increasingly large exchange value of a “whole bitcoin” (=100 million satoshis). For now, I sometimes resort to “bitcoin units” when it is important to unmistakably include any tradeable amount, regardless of exchange value.

² Ludwig von Mises. 1953 [original German, 1912]. *The Theory of Money and Credit*. New Haven: Yale University Press.

2. Epistemological dualism and the role of terminology

In taking a strictly subjectivist position on the nature of goods, the fact that bitcoin units might be described as “merely” the current status of accounting entries in the ubiquitously duplicated block chain record, and therefore not “really” goods at all, raises less difficulty than it might at first appear. Of interest for action-based economic theory is the interpretive observation that large numbers of market actors on a global scale are actually treating these units as a scarce economic good in general and as a medium of exchange in particular, as demonstrated through their actions and choices. Bitcoin units might be viewed as property titles, but if so, they are self-referential “titles” to nothing other than themselves as tradable goods.

By way of illustration, one might quip about the historical trading of a commodity money such as silver that, just behind the outward surface, the metal is “really” just one particular pattern by which sub-atomic particles are arranged in nature, resulting in certain observed physical properties. Such context-shifting commentary, however, would not seem to advance our understanding of the monetary phenomena observed. The Misesian method in economics takes no *direct* interest in such matters in the sense that it calls for a strict differentiation between those methods and fields concerned with the study of human action and those concerned with the study of things and (non-action) behaviors. Economics is part of the study of action itself and its extended implications for social analysis.³ The objective natures of the objects of such action are of interest to the sciences of human action only by secondary extension for use in the specific interpretation of definite actions and patterns observed in specified times and places.

³ In more technical terms, this is the dualist distinction between 1) the teleological concepts of action such as ends, means, and meanings and 2) the objective, causal relationships of the natural sciences concerning the realms of the dimensionally measurable including matter, space, and energy.

In 2011, I began using “action-based” as a synonym for “praxeological” in the sense defined by Mises, starting in “Action-Based Jurisprudence: Praxeological Legal Theory in Relation to Economic Theory, Ethics, and Legal Practice,” *Libertarian Papers* 3, 19. In short form, see also, “Misesian action theory is an approach to social theory, not just economics,” 20 February 2013, with “(Misesian) action theory” substituting for “praxeology.”

On the foundations and methods of action theory, see in particular: Mises. 2006 [1962]. *The Ultimate Foundation of Economic Science: An Essay on Method*. Indianapolis, IN: Liberty Fund; and Jörg Guido Hülsmann. 2003. “Facts and Counterfactuals in Economic Law.” *Journal of Libertarian Studies* 17 (1): 57–102.

If no existing category in a given monetary typology proved sufficient to contain bitcoin, a new category might have to be appended. In investigating a new case, terms and categories should facilitate understanding rather than hinder it. In developing his terminology in Chapter 3, “The Various Kinds of Money” in TMC (50–67), Mises sought to employ terms that would facilitate economic analysis more effectively than the conventional and positive-law terms of the time (59–60).

Our terminology should prove more useful than that which is generally employed. It should express more clearly the peculiarities of the processes by which the different types of money are valued. [It should also help to overcome] the naive and confused popular conception of value that sees in the precious metals something “intrinsically” valuable and in paper credit money something necessarily anomalous. Scientifically, this terminology is perfectly useless and a source of endless misunderstanding and misrepresentation. (61–62)

I do not believe that Mises’s typology from TMC necessarily requires any fundamental revision to account for bitcoin, though even if it did, this should not be considered problematic. The purpose of a typology is to helpfully set forth the monetary phenomena observed in a given time and place in a way that is relevant to the particular investigations being undertaken.

It may be possible to account for bitcoin within the TMC typology by taking a further step in the direction of a strictly dualistic action theory. This is the same direction of refinement that gave rise to those classifications to begin with as Mises pursued his career-long process of moving economic theory away from objectivized constructs and toward an ever more careful grounding in action analysis.⁴ Mises warned sternly in 1912 that:

The greatest mistake that can be made in economic investigation is to fix attention on mere appearances, and so to fail to perceive the fundamental difference between things whose externals alone are similar, or to discriminate between fundamentally similar things whose externals alone are different. (62)

In what follows below, I retain the TMC categories and seek to refine the popular understanding of what “commodity” means toward a more strictly economic-theory sense rather than a more intuitively accessible materialistic or historical one. I have outlined an alternative monetary typology that is based on legal-status differentiations elsewhere, near the end of *Bitcoin Decrypted*. I consider that approach and the one below compatible, highlighting different aspects of the same phenomena.

⁴ Hülsmann. 2003b. “From Value Theory to Praxeology,” Introduction to the third edition of *Epistemological Problems of Economics* by Ludwig von Mises. Auburn, Alabama: Mises Institute.

3. Commodity money viewed as an economic-theory concept

Among its many other contributions, Peter Šurda's 2012 thesis, *Economics of Bitcoin: Is Bitcoin an alternative to fiat currencies and gold?*⁵ examined bitcoin in terms of Mises's typology from TMC. Having already given some initial thought to the matter, upon first reading Šurda's account, I discovered that up to a certain point, he and I had interpreted bitcoin in largely the same way.

He rejected one candidate after another as a place for bitcoin within the TMC scheme (23–28). It is not any kind of money substitute, as it is not “redeemable” for any more fundamental unit. Even *within* Mises's “money in the narrower sense,” that is, senses other than money substitutes, bitcoin is not credit money, as no creditor/debtor relationship exists. Finally, it is not fiat money, as it lacks any legal-tender status or other state-sponsored privileges, stamps, or certifications. Šurda and I had each arrived independently at just one possible candidate: commodity money.

Yet for many observers, as visible in online debates, this initially seemed like it could not be quite correct either. Some found it more intuitive to *start* by rejecting commodity money as a possibility, and then trying to make analogies to other categories, including fiat money and token money.

This is understandable. If one has in mind a conception of commodity that includes materiality as an essential characteristic, it would be impossible to imagine purely informational bitcoin as being one. True, in certain other contexts, “commodities” can have a quite broad meaning. In the broadest usage in purchasing-power theory, commodities are the euphemistic label for everything that is *not* money—all that against which money prices are paid. Nevertheless, in a “commodity money” context, a commodity is usually thought of in its narrower and more common meaning: a fungible, divisible material or product, such as metal, oil, grain, or these days, even interchangeable “commodity” memory chips or other general-purpose electronic components as contrasted with customized components.⁶

In the face of this apparent impasse, Šurda next proposed several considerations. First, since he had argued that bitcoin is not a money (yet), but a secondary medium of exchange (22), it need not necessarily fit on a chart of money. Yet he also recognized that this was not a long-term solution. What if bitcoin *did* grow to qualify as “money” in the future?

⁵ Peter Šurda. 2012. Vienna University of Economics and Business.

⁶ In *On the origins of Bitcoin* (October 2013, 2–3), I argue that Carl Menger used the concept of commodity in an analysis of *pricing conditions* for various classes of goods (specialty versus general purpose), and that the materiality of the goods considered was more as an historical association than a characteristic essential to his topic. See Menger. *On the origins of money*. 2009 [1892]. Auburn, Alabama: Ludwig von Mises Institute. Translation by C. A. Foley.

In a later post, he stated perhaps the most important point of all:

The issue...is not some abstract classification for its own sake. The purpose of the classification system provided by Mises is to assist in the economic analysis of trade, money supply, price building, liquidity and so on. From this perspective, if we insist that we must keep the number of categories the same that Mises used, the economically closest category of Bitcoin would be commodity money.⁷

After considering bitcoin in light of traditional definitions of money and medium of exchange, particularly the imprecise definition of money as a “commonly used” medium of exchange, I have come to identify money as the unit of pricing, accounting, and economic calculation in a given societal context. I define medium of exchange as a good used for payment of money-denominated prices in indirect exchange transactions. Bitcoin currently qualifies under the second category and not under the first. However, I see no reason that it could not begin eventually to qualify under the first in certain times and places if and as adoption continues to expand.⁸

In search of still further clarification about bitcoin and the concept of commodity money, we turn to the use of language and its context. In language, meaning comes first; words follow along as best they can. Concepts are one thing; the words used to signify them another.⁹

TMC is a translation of Mises’s 1912 *Theorie des Geldes und der Umlaufsmittel*.¹⁰ “Commodity money” was the term used to translate the German *Sachgeld*. Although some issues have been found with the TMC translation, including a rather serious problem with the title,¹¹ “commodity money” seems a perfectly reasonable translation in this case. I am aware of no reason to think that Mises

⁷ Šurda. 12 March 2013. “The classification and the future of Bitcoin.” *economicsofbitcoin.com*.

⁸ Graf. 14 September 2013. “Bitcoin as medium of exchange now and unit of account later: The inverse of Koning’s medieval coins.” *konradsgraf.com*.

Another definition of money would be “the most liquid good in a given societal context.” In most, and perhaps all cases, such a good is also used as the unit of account. Units of this good, more than any other, can be observed to trade in varying numerical relationships directly against all other market goods and services, giving rise naturally to a pricing role. The most liquid good is in this way also most likely to be used as a unit of pricing and accounting. Next to the abstract “most liquid,” the latter descriptors have the practical advantage of being readily identifiable in each empirical situation based on their prominent role in price labeling.

⁹ A good translator works at the level of the concepts and meanings that the various words are employed to convey—at times somewhat imperfectly—in specific communicative contexts.

¹⁰ Munchen und Leipzig: Verlag von Duncker & Humblot.

¹¹ Hülsmann. 2012. “The Early Evolution of Mises’s Monetary Thought,” *Theory of Money and Fiduciary Media: Essays in Celebration of the Centennial*. Auburn, Alabama: Mises Institute.

would have objected, or did object, to this choice. In *Nationalökonomie*,¹² the 1940 German precursor to *Human Action*, many instances of *Sachgeld* are accompanied by the usual examples of gold and silver, which also serve as the stock examples of commodity money in *Human Action*.

In brainstorming about the classification of bitcoin, however, the two-part compound construction of *Sachgeld* suggested to me connotations that “commodity money” did not. *Die Sache* is a “thing,” in either a concrete or abstract sense, which contrasts with *das Ding*, “thing” only in an objective physical sense. Alternative senses of *die Sache* and associated compounds readily include such abstract senses as “the matter at hand,” “the facts of the situation,” and “the main or most important point or issue.” *Sachgeld* in modern dictionaries comes across as any object (or even animal or slave)¹³ that was historically used as a medium of exchange, or simply the earliest forms that money took¹⁴ (which happen also to have preceded the sequential evolution of money substitutes).

Sachgeld, in this most literal construction, looks like “thing-money.” But recall that *die Sache* taken alone carries the abstract sense of thing or fact. A “thing” is usually considered tangible, but unlike commodity in its usually assumed meaning of a fungible physical material, “thing” can also easily cover abstract senses such as “matters at hand,” “conditions,” etc., as in, “the thing is...” or “How are things going?” or “It is a curious thing.”

This suggested to me a way to proceed with the classification of bitcoin: by clarifying the conception of *Sachgeld* in a more strictly economic (action-based) rather than objectivistic (falsely placed material) sense. “Commodity money,” in this view, is the monetary “good itself,” without any intermediation such as a fixed-rate substitution promise or other credit relationship.

Such a clarification of the term commodity money would also be in keeping with the overall direction of progress in economic theory in distinguishing ever more carefully between action-based teleological concepts and the objective characteristics of the particular means that actors employ. If we take the central *economic* (as opposed to historical-descriptive) meaning of *Sachgeld* to be “money in itself,” this would still contrast with all of the other categories in the TMC scheme in the same way that a materialistic understanding of commodity would, except that the more abstract sense can also account for bitcoin. Money in itself contrasts with money by extension—extension through such intermediaries as fixed-rate substitution promises, credit relationships, and any variation of the trust, reputation, or “full faith and credit” of some specified institution.

¹² Mises. 1940. *Nationalökonomie: Theorie des Handelns und Wirtschaftens*. Genf: Editions Union.

¹³ wirtschaftslexikon24.com/d/sachgeld/sachgeld.htm

¹⁴ zahlenbilder.de.

Much as a circulating silver coin once functioned directly as “money in itself,” and was not “backed” by anything, a bitcoin unit is likewise not backed by anything. It is not a perfect or imperfect substitute for anything else. From the point of view of economic actors using it, bitcoin *is the tradable good itself*. From a strictly action-theory point of view, no intermediating substitutes stand between the good itself and its end user/controller. Fiat money is also in one sense treated as a good in itself, but it relies heavily on being “backed” by the force of law and monopolistic status. This is part of what led me to develop the legal-status based categorization introduced in *Bitcoin Decrypted*. “*Sachgeld*” can—and bitcoin famously does—trade on the open market in a monetary role with no special contractual, legal, or legislative status whatsoever.

Moreover, the characteristics of bitcoin itself do not suggest a similar scope of demand for such money substitutes as have historically grown up around metallic currencies. Notably, the widespread historical use of such paper-note and account-entry substitutes was an essential element in setting up the long-term conditions for the emergence of fiat money as the links between commodity monies and their substitutes gradually degraded with progressive institutionalized corruption.

With bitcoin, such substitutes are possible; they just do not appear to necessarily add value. By adding superfluous derivative- and counterparty-risk layers, they can even subtract it. The bankruptcy of a centralized bitcoin exchange, such as the Mt. Gox collapse of February 2014, is a prime example of the kind of counterparty risk that the Bitcoin protocol itself was designed to eliminate.¹⁵ One way that this counterparty risk functions in this case is that customers of a centralized exchange business do not maintain direct control of their bitcoin, but instead trade it for credits on an internal corporate accounting system. They then rely on the particular quality of this third-party managed internal system to the extent that they leave balances in it.

When this exchange collapsed, it became clearer to more observers that customers had been holding, not bitcoin, but bitcoin substitutes, Goxcoins, that is, Mt. Gox-brand bitcoin account credits. It is important to note that the Mt. Gox collapse is a company-specific failure and has no systemic implications of the kind associated with highly regulated and cartelized conventional financial systems.

4. Intellectual context for the TMC typology

For an initial check on how well this specification of the definition of commodity money toward a more strictly economic-theory sense might mesh with the context in which TMC appeared and its major contributions, we turn to Professor

¹⁵ See the more detailed discussion of these points in Graf. 27 February 2014. “MtGox fiasco highlights advantages of Bitcoin and damage from regulation.” *konradsgraf.com*.

Hülsmann's definitive intellectual biography, *Mises: The Last Knight of Liberalism*.¹⁶

In dealing with the nature of money, Mises relied heavily on the work of Carl Menger. The founder of the Austrian School had shown that money is **not to be defined by the physical characteristics** of whatever good is used as money; rather, money is characterized by the fact that the good under consideration is (1) a commodity that is (2) **used in indirect exchanges**, and (3) **bought and sold primarily for the purpose of such indirect exchanges**. (215)

Many readers might ordinarily assume the words “good” and “commodity” point to physical characteristics. However, note that this paragraph emphasizes the functional *economic* characteristics of money for actors. Look for the action verbs: *used*, *bought* and *sold*. Moreover, “physical characteristics” are specifically singled out as factors on which money is “not to be defined.”

In quickly reviewing Mises’s typology of monetary objects, Hülsmann notes that:

[Mises] distinguished several types of “money in the narrower sense” from several types of “money surrogates” or substitutes. **Money in the narrower sense is a good in its own right**. In contrast, money substitutes were legal titles to money in the narrower sense. They were typically **issued by banks** and were **redeemable in real money** at the counters of the issuing bank. (216–17)

“A good in its own right” is reminiscent of our proposed “money itself” concept. Although bitcoin substitutes, such as exchange account credits, exist, bitcoin itself is traded and held directly. It trades at freely floating rates against all other goods, services, and monies. Use of bitcoin substitutes is wholly optional on a user-by-user basis and entails a mix of pros and cons at the margin. Bitcoin itself is not the substitute in such cases, but the good itself, that which account credits substitute *for*.

Mises, in developing his monetary theory in TMC, was also arguing against the assignment theory of money, which holds that money has no real value of its own, but merely functions as a receipt that facilitates deposits and withdrawals on the “social warehouse” of goods. Money, in this view, is a veil, functioning as a claim ticket exchangeable for other goods, but not a good itself.

Hülsmann explains:

Mises’s great achievement in his *Theory of Money and Credit* was in **liberating us from the veil-of-money myth**...Mises could even rely on Menger’s theory of cash holdings, which already contained, in nuce, the insight that money **is itself an economic good and not just representative of other goods**. (2007, 237)

Eugen von Böhm-Bawerk had framed it this way in an early-1880s lecture:

¹⁶ Hülsmann. 2007. *Mises: The Last Knight of Liberalism*. Auburn, Alabama: Mises Institute.

Money is by its nature a good like any other good; it is merely in greater demand and can circulate more widely than all other commodities. Money is no symbol or pledge; it is not the sign of a good, but bears its value in itself. It is itself really a good.¹⁷

Hülsmann explains the role of Mises's strict terminology in TMC in countering the prevailing assignment theory of money:

To combine these elements into one coherent theory required a radical break with time-honored pillars of monetary economics, in particular, with the classical tradition of presenting money as a mere veil. Mises was fully conscious that this was the key to his theory, which is why, in an introductory chapter of his book [TMC, Chapter 3], he engaged in the somewhat tedious exercise of distinguishing various types of money proper (money in the narrower sense) from money substitutes. **It was these substitutes in fact that were the sort of tokens or place holders that Wieser and the other champions of the assignment theory tacitly had in mind when they spoke of money...**While it is true that the value of a money substitute corresponds exactly to the value of the underlying real good (for example, one ounce of gold), **the value of the gold money itself does not correspond to anything**; rather it is determined by the same general law of diminishing marginal value that determines the values of all goods. (237)

The rise of bitcoin a century after TMC has provided a fresh opportunity for revivals of the veil-of-money approach, and along with them, fresh opportunities to follow Mises in refuting it.

In sum, Mises had argued that money was not just a placeholder for other goods; it was one good trading for other goods on the market. Moreover, he differentiated *Sachgeld* within "money in the narrower sense," contrasting it with circulating debt instruments (credit money) and monies that depend on some official certification or special legislative status (fiat money). *Sachgeld*, while discussed in terms of its material, historical instantiations, thus served more abstractly as a sub-category of "money in the narrower sense" that did not rely on any contractual (credit) or other institutional (fiat) legal status.

One of the reasons a monetary good gains value is that its relatively higher liquidity¹⁸ gives rise to an increased value as a hedge against uncertainty. If no uncertainty existed, there would be no need to hold cash balances. In the real and uncertain world, however, one does not know in advance exactly *what* one will want to buy, when, or from whom, but one typically does expect strongly *that* one will want to buy something sometime from someone. The holding of

¹⁷ As cited in Hülsmann 2007, 235.

¹⁸ As Šurda often points out, this was Menger's "saleability at economic prices." In, *On the origins of Bitcoin*, I emphasized Menger's distinction between the degree of difference between the relative positions of buyers and sellers. With highly "saleable" goods such as commodities, their positions are very similar; with specialty goods, more divergent.

cash balances can be understood as a forward-looking measure one takes in relation to this degree of perceived uncertainty.¹⁹

The more liquid the good, the better market participants expect it to enable them to purchase not-yet-specified goods and services at not-yet-specified future times. As more and more market participants around the world accept bitcoin—and new ones begin to do so daily—its utility in this uncertainty-hedge role grows. This is particularly so if it is paired with a user expectation that the exchange value of each unit is likely to rise over the medium- to long-term due to the combination of expanding global demand and the Bitcoin protocol’s strict, asymptotic unit-growth trajectory.

Many critics of bitcoin cite its high current short-term exchange rate volatility, as if this early-stage state of affairs should permanently doom the project. Such critics do not typically also explain why holders of monetary-unit balances should not also take into account other salient medium-term empirical data next to short-term volatility. For example, the exchange value of bitcoin against US dollars at the end of 2013 was 56 times higher than it was at the beginning of 2013—the greatest annual appreciation recorded for any asset ever.²⁰

Holders of various monetary-unit balances should reasonably be expected to contrast such developments with the relatively steady *decline* in the purchasing power of all fiat monies at varying rates, however steady or unsteady. Depending on a given decision-maker’s expected timeframes for future purchases, short-, medium-, and long-term value expectations will be weighed in various configurations in deciding what balances of which tradable monetary units to hold over which durations. It is a relatively simple matter to understand that some market actors might perceive a potential medium- to long-term advantage in holding certain balances of a unit that the user expects to *rise* in value at a less consistent pace next to balances of other units that the user expects to *decline* in value at a more consistent pace.

Whatever the future brings, for today, bitcoin is traded directly as itself in a monetary role. It is digital *and* it is impossible for any given party, such as a central bank board or corporate issuer, to manipulate its total supply. This is critical, because one of the most important monetary issues of the foregoing centuries has been the expanding ability of money producers to manipulate the money supply to the advantage of their favored constituencies at the expense of other, less favored ones.²¹

¹⁹ Hans-Hermann Hoppe. 14 May 2009. “‘The yield from money held’ reconsidered.” *Mises Daily*.

²⁰ Coindesk. 26 February 2014. “State of Bitcoin 2014.” (4).

²¹ Hülsmann. 2008. *The Ethics of Money Production*. Auburn, Alabama: Mises Institute. mises.org/document/3747/The-Ethics-of-Money-Production.

As Mises wrote, “It is not just an accident that in our age inflation has become the accepted method of monetary management. Inflation is the fiscal complement of statism and arbitrary government (TMC, 428).” He also explained the related social-protective advantages of having precious-metal coins circulate physically:

Gold must be in the cash holdings of everybody. Everybody must see gold coins changing hands, must be used to having gold coins in his pockets, to receiving gold coins when he cashes his pay check, and to spending gold coins when he buys in a store. (450)

This might seem to be the definitive Misesian endorsement of circulating metallic coins. Yet as Hülsmann notes, “Mises had not become a gold bug. He had no fetish about the yellow metal or any other metal” (2007, 922). Hülsmann then points to the *reasons* behind Mises’s proposal—to help counteract inflationary policies. Mises had explained that:

What is needed is to alarm the masses in time. The working man in cashing his pay check should learn that some foul trick has been played upon him. The President, Congress, and the Supreme Court have clearly proved their inability or unwillingness to protect the common man, the voter, from being victimized by inflationary machinations.

The function of securing a sound currency must pass into new hands...Perpetual vigilance on the part of the citizens can achieve what a thousand laws and dozens of alphabetical bureaus with hordes of employees never have and never will achieve: the preservation of a sound currency. (TMC, 451–52)

In Bitcoin, the function of securing users against unit inflation rests with cryptography and protocol definitions. Engaging in perpetual vigilance is the primary role of both the distributed global mining network and open-source development communities. The function of Mises’s having of “gold coins in everybody’s pockets” is fulfilled in that users maintain direct control of signing keys, such that there is no question as to how much bitcoin each person and entity controls out of a strictly regulated and publically verifiable total quantity in existence at any given time.

5. Meanings of scarcity; its differentiation from materiality

Precious metals bound together the qualities of scarcity and tangibility in a monetary context over many centuries. In further considering bitcoin and monetary theory, the concepts of goods, scarcity, and tangibility must be carefully differentiated.

What if factors other than tangibility, such as relative stability of total supply, durability, and divisibility, were always the *essential* factors regarding commodity money? What if tangibility was a sort of monetary “inactive ingredient,” a “material carrier” for *other* qualities that had always been the essential monetary characteristics? If so, perhaps these qualities could also be

delivered in previously unexpected ways other than through grounding in tangible materials.

Digital goods have brought the separability of goods from materiality front and center in the modern world. To apply these concepts to bitcoin, we revisit their various senses and definitions. Not only can bitcoin be viewed in light of theory, but theory revisited in light of bitcoin.

Most digital goods, such as song or text files, can in principle be copied *ad infinitum*. This was the essence of the digital-information revolution. Unlimited numbers of people could use copies at the same time without direct mutual interference or degradation of other copies. Unlike with the transfer of a physical object, such as by theft, a *copy* could be made without the original disappearing. Moreover, any copy could itself become a new “original” from which more copies could be made in a cascading process. Much the same applies to the emulation of practices seen or ideas heard in person, but it was the advent of mass digital replication that made this distinction increasingly significant.

Mass digital replication dealt a crushing blow in certain areas to an age-old adversary—inherent or natural scarcity. In response, however, a legal and technical scramble to create and expand *artificial* scarcity ensued. The chief methods have been expanding legislation and enforcement, ever more draconian and elaborate software license terms, and the application of digital rights management (DRM) technologies. These developments brought the dusty old issue of “intellectual property” out of the obscure corners of law libraries.

To make sense of this odd scene in a principled way called for a fresh look at basic social-theory concepts. As one step in this effort, Jeffrey Tucker and Stephan Kinsella in “Goods, scarce and nonscarce,”²² focused on distinguishing perfectly copiable goods, such as ideas, methods, and most digital goods, labeling them “nonscarce goods.” They quoted from Kinsella’s “Against Intellectual Property” (2001), which addresses the relationship between tangibility, scarcity, and the core social function of property rights. Kinsella had asked:

What is it about tangible goods that makes them subjects for property rights? Why are tangible goods property?...it is these goods’ scarcity—the fact that there can be conflict over these goods by multiple human actors. The very possibility of conflict over a resource renders it scarce...the fundamental social and ethical function of property rights is to prevent interpersonal conflict over scarce resources. (19)

This sense of the word scarcity is a social-relational one. The term “rival good” also describes this. A rival good is one that different parties *could not use* simultaneously for different incompatible purposes without coming into conflict with one another over these purposes. For example, one person *cannot* drive from Rome to Vienna while another drives from Sydney to Brisbane *in the same*

²² 25 August 2010. *Mises Daily*.

car. Notice that this is not a normative concept, but a descriptive one pertaining to the relationship between the nature of certain types of goods and their objective employability. This sense of the word scarcity is grounded in the property-theory reasoning of Hans-Hermann Hoppe, who wrote:

insofar as goods are superabundant ('free' goods), no conflict over the use of goods is possible and no action-coordination is needed...To develop the concept of property, it is necessary for goods to be scarce, so that conflicts over the use of these goods can possibly arise.²³

Yet the word scarcity carries other meanings. It is used in economic theory as a necessary attribute of *any* economic good, part of the definition of what a good *is*. It was in this broadest sense that Mises emphasized how the concept of a means only arises in relation to the concept of action:

Means are not in the given universe; in this universe there exist only things...Parts of the external world become means only through the operation of the human mind and its offshoot, human action...**It is human meaning and action which transform them into means.**

Means are necessarily always limited, i.e., scarce with regard to the services for which man wants to use them. **If this were not the case, there would not be any action with regard to them.** Where man is not restrained by the insufficient quantity of things available, there is no need for any action. (1998, 92-93)

Compounding the potential for confusion, in everyday usage, “scarce” has yet a third meaning of “in short supply” or “not enough to go around” relative to an assumed normal or ideal baseline supply. This evaluative sense differs from the two distinct descriptive senses above.

Tucker and Kinsella mentioned that tangibility is not necessary for scarcity, citing airspace and radio waves as examples—one transmitter can interfere with the signal from another. While the practical conclusion seemed to be that tangibility and scarcity do coincide in almost all cases, the authors left no doubt about the key point: “The term scarcity here...means that a condition of contestable control exists for anything that cannot be simultaneously owned: **my ownership and control excludes your control.**”

In strictly economic-theory terms, one must still act to obtain even a “nonscarce” copy of an *economic good*, by definition. For example, one must still click on one free file icon rather than another, displaying choice and preference through this action, and making the clicked-on file a means and the runner-up file an opportunity cost. In the property-theory sense, however, even a non-good can be scarce, which is impossible in the economic-theory sense. Yet once again, Tucker and Kinsella had made their intended sense for scarcity clear:

²³ Hoppe. 2010 [1989]. *A Theory of Socialism and Capitalism*. Auburn, Alabama: Mises Institute. 235.

Something can have zero price and still be scarce: a mud pie, soup with a fly in it, a computer that won't boot. So long as no one wants these things, they are not economic goods. And yet, in their physical nature, they are scarce because **if someone did want them, and they thus became goods, there could be contests over their possession and use.** They would have to be allocated by either violence or market exchange based on property rights.

Applying the dualist dividing line clarifies why airspace and radio waves qualify as scarce in this sense even though they are not material. The dividing line is whether the concept being addressed belongs to the realm of human meaning—including valuations, ends, and means—or to the realm of that which is physically measurable in dimensional space.

The subtle difference in the meaning of scarcity in these uses within economic theory and property theory reflects the respective clarification tasks at hand. Economic theory is concerned with action as such, which only individual actors can take (Crusoe). Property theory is concerned with individual action *in its capacity as occurring* in a social context of other actors (Crusoe plus Friday on up). The economic-theory sense of scarcity is used in considering Crusoe alone, while the property-theory sense can begin to also be used in considering the possible classes of interactions between Crusoe and Friday. And here is where the use of the term “rival” could help head off confusion, as rivalry is an inherently social-interactive concept.

Property rights are a purely social phenomenon. With Crusoe and Friday situations onward, social action theory posits binary action possibilities of either cooperation or violent conflict. These are differentiated by consent, and can most simply and intuitively be described as theft versus non-theft relationships. These encompass a descriptive categorical binary of all possible human interactions. Some investigators have selected this binary as being especially valuable for social analysis.²⁴

Confusion in discussions of scarcity could also arise from the use of the term “free goods.” In the economic-theory sense, free goods are not really goods at all, but the background conditions of action. They are not means in themselves within an intentional structure of action. Murray Rothbard put it this way:

The *means* to satisfy man's wants are called *goods*. These goods are all the objects of economizing action...The common distinction between “economic goods” and “free goods” (such as air) is erroneous...air is not a means, but a general condition of human welfare, and is not the object of action. (2004, 8)

²⁴ For examples, see: Frédéric Bastiat. 2007 [1850]. *The Law*. Auburn, AL: Mises Institute; Hoppe 2010 [1989]; Hülsmann. 2004. “The A Priori Foundations of Property Economics.” *The Quarterly Journal of Austrian Economics* 7 (4): 41–68; and Murray N. Rothbard, [1962, 1970] 2004. *Man, Economy, and State, with Power and Market*. The Scholar's Edition. Auburn, Alabama: Mises Institute. 79–94.

Air would not usually count as a means for a jogger unless that jogger was an obsessive economist who had in mind “using” air to go jogging. The air outside under normal circumstances is a background condition, but not itself an object of action, and therefore not a good, unless its supply or quality is threatened.

6. Goods and “renditions of services;” rival scarcity defined

To further clarify underlying concepts before applying them to bitcoin, we consider the concept of “good” itself more directly. A good is something that serves as a means within the structure of human action. This was already explained in Eugen Böhm-Bawerk’s 1881 paper, “Whether Legal Rights and Relationships Are Economic Goods.”²⁵ Gael J. Campan elaborates the subjectivist conception of a good that Böhm-Bawerk advanced:

While scarcity is commonly referred to as an essential feature of an economic good, this must not be understood purely in a physical sense, i.e., a fewer number of items compared to the quantity of others. Indeed, if all means are scarce by definition, it is specifically because they are limited **with respect to the actual ends that they are capable of satisfying**...The characteristics of a good are **not inherent in things** and not a property of things, but merely a **relationship between certain things and men**.

The thing named a *good* must have useful properties, which is not to be understood in a strictly physical sense.²⁶

As quoted by Campan, Böhm-Bawerk wrote:

Whatever importance we accord to the corporeal objects of the world of economic goods derives from the importance we attach to the satisfaction of our wants and the attainment of our purposes...It is the renditions of service rather than the goods themselves which, as a matter of principle, constitute the primary basic units of our economic transactions. And **it is only from the renditions of service that the goods, secondarily, derive their own significance.** (24)

We have seen that scarcity in the rival, property-theory sense pertains not to whether something is a good or not in the broader economic-theory sense, but rather to the native potential for rivalry and the presence or absence of the attributes of copiability and simultaneous shareability. Since the broader economic concept of scarcity is already contained within the definition of a good, the narrower property-theory sense appears more useful for the current tasks.

²⁵ Böhm-Bawerk, Eugen von. 1962 [1881]. “Whether Legal Rights and Relationships are Economic Goods.” *Shorter Classics of Eugen von Böhm-Bawerk*. South Holland, Illinois: Libertarian Press; originally, “Rechte und Verhältnisse vom Standpunkte der volkwirtschaftlichen Güterlehre.” Innsbruck, Austria: Verlag der Wagner’schen Universitäts-Buchhandlung.

²⁶ Gael J. Campan. 1999. “Does Justice Qualify as an Economic Good?” *The Quarterly Journal of Austrian Economics*. 2, 1 (Spring): 21–33.

Building on this property-theory sense of scarcity, a nonscarce good, or nonrival good, is **a good that is copiable with perfect remainder of the original and useable by multiple actors simultaneously without mutual interference.**

If the two travellers from our earlier example each had a separate car, each could drive from Rome to Vienna and from Sydney to Brisbane simultaneously. However, a car *cannot* just be “copied,” whereas a song file that they could each listen to on these simultaneous trips *can* be. A car *design* could be copied just like a song file, but not an actual new instance of a car.

The point here is not to enter into the pros and cons of copyright legislation and entertainment business models,²⁷ but only to show relevant descriptive distinctions. A copy of a nonscarce good *can* be freely produced while a “copy” of a rival good such as a car *cannot* be made in this way. Either control of a given single instance of a car must be transferred (through sale, gift, or theft), or an entirely new instance of a car must be constructed from additional and different scarce instances of the requisite materials and energy.

Tucker and Kinsella’s article set up a relevant binary along these lines:

One helpful way to understand this is to classify all goods as either finite and therefore normally scarce or nonfinite and therefore naturally nonscarce...It is scarce goods that serve as means for action, while nonscarce goods **that can be copied without displacing the original** are not *means* but *guides* for action.

...[A] recipe can be shared unto infinity. Once the information in the recipe and the techniques of making it are released, they are free goods, nonscarce goods, or nonfinite goods.

Accordingly, a scarce good (in the property theory sense), or a rival good, is **a good that is not copiable with perfect remainder of the original and is not useable by multiple actors simultaneously without mutual interference.**

In the age of digital goods, nonscarce goods have proliferated and become much more significant to modern life. The category includes abstract goods such as ideas, text and music files, patterns, plans, recipes, methods, and so on. Specifically, it includes the *meaning and content* of all types of media, text, and other abstract and informational objects.

7. Bitcoin as a rival digital good

With bitcoin, matters are different. Although bitcoin units are part of the digital realm, they *cannot* be “copied,” only transferred. Forked and altered new block chains (altcoins) can be created *ad infinitum*, but in no case are the resulting newly created units *bitcoin* units; they are units of the various altcoins instead.

²⁷ On which I recommend work done at *The Center for the Study of Innovative Freedom* (C4SIS.org) and *Techdirt* (techdirt.com).

Although bitcoin is information, the Bitcoin protocol and network simulate the properties of natural scarcity in the rival, property-theory sense, such that bitcoin can function in the social role of facilitating indirect-exchange transactions. It could not fill this role if it were an ordinary digital good, because such goods are in their descriptive natures nonscarce (nonrival) and could easily be copied and inflated into compounding superabundance and therefore uselessness in a trading role.

Each bitcoin unit can be associated with only one wallet at one time due to the protocol's methods of ubiquitously recording transactions and preventing double spending.²⁸ It is critical to understand that these qualities of bitcoin scarcity are not merely due to add-on security measures. They are not appended legal or technical protections. These qualities are *inseparable attributes* of bitcoin as it exists, and it exists in no sense other than as an integral attribute of the Bitcoin protocol and network.²⁹

As should be clear by now, it is not necessary to fuss over objectivistic and context-shifting considerations such as whether an abstract collection of digits in certain configurations can “really” be a good or not. Böhm-Bawerk's insertion of the word “corporeal” into his 1881 sentence is not a separate criterion for something to serve as a means, a point much more easily seen today than over 130 years ago. Böhm-Bawerk nevertheless clearly explained that one must observe what people are *doing* to understand what goods *are*, an insight that Mises would later run with in his systematic action-based reconstruction of economic theory.

Bitcoin has brought *authentic* rival scarcity into the realm of digital goods. This is not the artificially imposed, legally constructed scarcity of intellectual property legislation. It is not a type of DRM system that attempts to use technical add-on measures to create artificial scarcity out of informational objects that are in their nature not otherwise scarce. The Bitcoin protocol has set up a type of scarcity that is inherent to and inseparable from the nature of the digital good itself.

A bitcoin unit viewed as an object of action also meets another essential criterion from Böhm-Bawerk—it can be exclusively controlled. As Campan explained:

²⁸ This is true for most ordinary transactions and sufficient for general understanding. However, as-yet rarely used transaction forms enable the release of funds only under certain more complex conditions. For example, spending a specified input can be set up to require not just one signature, but, say, two out of three signatures, or other specified conditions that can be built into more complex transactions. It is in reference to such possibilities that the term “programmable money” is sometimes used to describe bitcoin.

²⁹ For a technical description of how Bitcoin functions, see my video lecture *Bitcoin Decrypted Part II: Technical aspects* (December 2013). Part I also outlines an integral unit/system duality approach applied in a monetary context.

It is necessary that the thing in question be disposable or available to us. We must possess the full power of disposal over it if we are really to command its power to satisfy our wants...the possession of a good cannot simply be decreed: either you possess effective control over it or not. (24)

The Bitcoin protocol achieves this through public key encryption, which allows effective control of bitcoin in a user's wallet, provided said user maintains control of signing keys and/or related passwords. Once a bitcoin unit is transferred from one wallet to another, it is no longer "in" the originating wallet, but exclusively "in" the destination wallet instead. A unit's state of address assignment is mutually exclusive to its being in some other state of address assignment at any given time, and this mutual exclusivity of assignment is a central element in the ontology of what a bitcoin unit *is*, as contrasted with something else that is *not* one.

Thus, in the rival, property-theory sense of scarcity, bitcoin qualifies, not as nonscarce like most other abstract or digital objects, but as scarce in the rival sense used in the foundations of property-theory reasoning. A given bitcoin unit is **"a good that is *not* copiable with perfect remainder of the original and is *not* useable by multiple actors simultaneously without mutual interference."**

Once a signing key to a Bitcoin address is copied, more than one party can have the key at the same time, as with any other nonscarce good. However, even so, only one party can succeed in using this key to make use of any given bitcoin unit associated with that address in any specific instance.³⁰

Clarifying the concept of scarcity in both its economic-theory (object of action) and property-theory (rivalry) senses is useful to understanding bitcoin and better separating the concepts of scarcity and tangibility. For some observers, it was tangibility that had seemingly held together all the traditional money-commodity characteristics in the form of a solid coin of silver, gold, or copper. Upon seeing that bitcoin lacks tangibility, it seemed intuitively obvious that it must also lack, or at least be weak on, associated monetary characteristics such as durability and supply stability. We therefore turn to such characteristics to examine bitcoin directly in terms of each one.

8. Applying a commodity-money checklist

Hülsmann's essay "How to Use Methodological Individualism"³¹ was on a different theme, but the following paragraph from it nevertheless contains a great deal of interest for our topic, all in one convenient location:

³⁰ Again assuming standard as opposed to multi-signature transactions for simplicity of presentation.

³¹ Hülsmann. 27 July 2009. *Mises Daily*.

Media of exchange become ever more generally accepted to the extent that they are objectively more suitable than their competitors **in arranging indirect exchanges**. Silver is more suitable as a medium of exchange than cherry cakes because it is **durable, divisible, malleable, homogeneous, and carries a great purchasing power per weight unit**. Market participants are likely to recognize this relative superiority in a process of learning and imitation, and eventually most of them will use silver to carry out their transactions. Hence, one can explain why the technique of indirect exchange is adopted on an individual level; and one can explain **why specific media of exchange become generally accepted** and thus gradually turn into money.

There is much of relevance here, but for now I will consider how bitcoin fares against silver coins on the same characteristics (plus stock stability):

Is bitcoin...

1. **Durable?** Perfectly. Abstract digital objects do not change. However, this is subject to recording and replication, substrate non-destruction, signing keys and passwords not being lost, etc.
2. **Divisible?** Effectively infinite. Maximum of 2.1×10^{15} (21 quadrillion) units (“satoshis”) to be reached around 2140, with greater divisibility possible.
3. **Malleable?** Irrelevant; not material. However, units can be managed and traded in a variety of ways; block chain data can be saved on different types of media; and many possible implementations, mining software and hardware, and client wallets are possible, each within the same Bitcoin protocol.
4. **Homogeneous?** Perfectly. More homogeneous than possible with any conceivable physical material because the homogeneity is mathematical (by definition) rather than physical (by empirical measurement relative to a definition).³²
5. **Competitive on purchasing power per weight unit?** Its purchasing power per weight unit is infinite. Intangible code patterns lack the characteristic of weight, rendering the slightest purchasing power infinite in per-weight terms. This counter-intuitive property of having infinite value per unit of weight may help explain how the units were able to gradually gain a trading value seemingly from nothing, starting from small fractions of a cent.³³
6. Now add: **Competitive on total stock stability?** Quantitative growth and terminal maximum quantity and timing are determined

³² This is a critical property that systematic coin tracking or marking could threaten to undermine. Countervailing measures and strategies to defend fungibility and financial privacy exist and are in ongoing development. These include, but are not limited to, coin mixing, coinjoin, merge avoidance, and the use of hierarchical-deterministic wallets to help avoid address reuse.

³³ See *On the origins of Bitcoin* for a detailed account of this historical sequence.

computationally; macro supply of bitcoin units (theoretically) not subject to human manipulation.

On this initial reading, bitcoin appears competitively superior to metallic coins on factors 2–5, whereas factors 1 and 6 are open to contingencies and technical debate. These two criteria require further investigation, but bitcoin also appears potentially competitive and possibly superior on them as well. These are questions for empirical observation, specialized technical knowledge in the relevant fields of cryptography and computer science, and entrepreneurial prediction and speculation about the course of the future—not for abstract economic theory as such.

This analysis suggests other points with regard to several of these characteristics. First, purchasing power per weight was a major impetus in the evolution of paper and account entry substitutes for precious-metal coin monies. Another problem with metallic coins was gradual wear from circulation, which would eventually give rise to weight variations—a loss of homogeneity resulting from imperfect durability. Bitcoin does not share these weaknesses.

Second, it is intuitive to interpret the commodity-money characteristic of durability as a mainly material one. On reflection, however, a temporal aspect is central to the concept of durability in that it refers to rates of change. To ask about durability is to ask the extent to which an object tends to change over time in certain of its properties under certain conditions. In the case of an abstract relationship on a network, it need not change at all. Although particular instances of recording substrates might degrade, the cryptographic data relationships on the block chain can be perfectly copied and copied again to new media, and it is in this sense that the durability of these data is potentially infinite for any conceivably relevant purpose.

Third, regarding divisibility, whereas fiat money issuers stand ready to add integers to paper fiat notes and phase out the smallest denominations of change to accommodate the steady loss of fiat-unit value; the Bitcoin protocol is capable of supporting divisibility to as many decimal places as are demanded to adjust to value gains over time. This is a diametric contrast the further implications of which would be difficult to overstate.

9. Comparative-realist versus imaginary-perfection methods

The ultimate potential for manipulation of the total bitcoin stock (factor 6 above) is a key question that is certainly a technical one, possibly with philosophical aspects. Can it be established that future quantitative supply manipulation at the macro level *cannot* occur? Would that require “proving” a technical and empirical negative?

Whatever the factors and answers, it is important to apply the realistic-comparative method in preference to the tempting imaginary-perfection method.

If one of the criteria required of a candidate for becoming a sound money is proof of a technical and empirical negative, then meeting such an impossible standard ought to be required equally of all candidates.

Applying the comparative-realist method to fiat monies, we know that large-scale, distortive, quantitative manipulation of the money supply can occur—and in all known cases *actually does*. Moreover, it strains credulity to imagine any conceivable fiat money system in which this would not be the case, since enabling just such manipulation was among the main founding purposes of such monetary central-planning schemes.

Likewise, concerning any proposed relaunch of a precious-metal currency, comparisons on hypotheticals would also have to be even-handed. The stock of precious metals adjusts over time with mine output and other factors. Nevertheless, at the extreme, can it be shown that cheap synthetic gold could *not ever be produced* (as the alchemists had dreamed), thereby collapsing the price of gold by inflating its supply (as the alchemists may not have thought through far enough)? Gold can already be synthesized in particle accelerators and nuclear reactors, just not *cheaply*.³⁴ Asteroid mining plans are already out of the science fiction books and on the engineering table. Moreover, any use of metallic money beyond a primitive and local level must rely on money substitutes—and all their proven and persistent vulnerabilities to degrading substitution rates—to boost divisibility and transferability. Bitcoin itself requires no such money substitutes to deliver these same features and conveniences directly to users. These features are already part of the good itself.

Empirical perfection never comes to pass. The comparative method must be recalled and put to use in the assessment of real alternatives; *relative* pros and cons must be assessed. Attempts to reject real options by comparing them with non-existent idealized versions of other options must themselves be rejected. Human action means choosing among alternatives. The Misesian tradition of economics is positioned as one part of the study of such action. The study of society is the study of acting persons joined in a grand, interacting process of trial and error writ large, and it is not only to Bitcoin and the multifaceted communities involved with it to which this characterization applies, but to every endeavor.

³⁴ en.wikipedia.org/wiki/Synthesis_of_precious_metals

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