

Commodity, scarcity, and monetary value theory in light of bitcoin

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Abstract: The relationships between bitcoin and the core economic concepts of goods, scarcity, commodity, and monetary types are examined based on a strict division between abstract action theory and technically informed case interpretation. This analysis identifies bitcoin as a rival digital commodity with competitive monetary and novel non-monetary characteristics. The emergence of such an unlikely “immaterial commodity” calls for refining the historical thesis of the “dematerialization of money,” which narrates an advance from material commodity monies to immaterial fiat monies. In contrast to conventional financial services and common historical practices, users can control and use bitcoin units, including advanced transfer features, without having to rely on third-party services or counterparty-issued substitutes.

Keywords: Monetary value theory; bitcoin; scarcity; rivalry; commodity

Facts do not speak; they need to be spoken *about* by a theory.
—Ludwig von Mises¹

Introduction

Economists, regulators, and opinion makers the world over have made cases for classifying bitcoin as money, not money, a commodity, a miscellaneous form of property, an intangible asset, a private unit of account, and so forth for local positive law and taxation purposes in various jurisdictions. Meanwhile, bitcoin critics of many persuasions cite as a fatal defect its lack of “backing,” whether material or political.

This partly reflects the pre-existing landscape of monetary value theories. The hard-money oriented tend to be most unsettled by bitcoin’s lack of material backing. A simple “metalist” view clearly sees none of the commodity foundations supposedly necessary for a money to be sound. Even a commodity theory view that holds that money must *originate* as a commodity, though it can then lose backing over time, cannot approve of bitcoin as even a potential money—bitcoin never had any commodity backing that could have subsequently been lost.

Credit money theorists, who argue that the nature of money as such originates in, and is now, a credit/debt relationship, might wonder at the lack of any such relationship visible in bitcoin. Those with related understandings in the direction of state and sovereign theories of money might be curious upon finding that bitcoin seems to function in a monetary role in the absence of any political or legal privilege whatsoever.

In broad strokes, that to which these schools respectively attempt to ascribe the universal essence of the value of money as such is in all cases absent in bitcoin, which to that extent might reasonably be considered defective in their respective sets of eyes. Bitcoin can at best be viewed as “not money” and therefore not to

be taken too seriously. If the reality of bitcoin does not appear to conform to their various theories, it must be bitcoin that is a substandard thing, not their theories.

A combined assessment of the respective contributions and weaknesses of credit, state, sovereign, and commodity theories of money in light of bitcoin is a much larger project underway. The current treatment emphasizes the conceptual foundations of commodity approaches. Some of these foundations should also serve as groundwork for additional analysis.

Goods, scarcity, and commodity are concepts each associated more or less strongly with materiality. It is argued below that wholly informational bitcoins nevertheless meet key characteristics of a good, exhibit a novel endogenous form of scarcity, and trade as commodities do in terms of relative pricing characteristics. While the physical concept of materiality played a practical role in the formation of the economic concepts of goods, scarcity, and commodity, it was never a necessary logical requirement of them.

If this is so, it could reveal weaknesses in the “commodity versus pure information” dichotomy that helps divide the various schools of monetary thought as reflected in the overarching historical thesis of the gradual “dematerialization of money” (Huber 2013, 48; Simmel 1900). If something other than dematerialization *per se* can also characterize the long-term development of monetary history, it could open the way for subsequent re-examinations of what does account for the value of money, and of bitcoin, in light of the balance of positive contributions from these various schools of thought.

Method: Differentiating economic and technical layers

In the action-based approach to economics formalized by Mises,² interpreters combine

1 Mises 1953, 510.

2 Mises (1998, 2006, 2007). See also Hoppe (2006) and Hülsmann (2003, 2003b).

abstract principles with specific understandings of the technical natures of the objects that take roles as ends or means in specific acts. The approach seeks to carefully differentiate respective roles for 1) abstract economic theory, understood as among the logical implications of the concepts of choice and action as such; 2) the study of things (and unintentional non-action behaviors), as in the experimental natural sciences, technology, and engineering; and 3) the interpretation of human events in terms of the meetings of these subjective and objective components in acts and emergent social patterns. This facilitates the interpretation of specific acts and patterns situated in time and place (“history”), acts that took certain (technically understood) objects as ends or means and employed them within particular settings and contextualized understandings.

In the current case, the clear grounding of economic-theory concepts in action better distinguishes the economic from the technical layers of observed monetary phenomena. This better delineates which aspects are within the proper domains of which fields. Action-derived economic theory also provides a universal base framework separable from the particulars of local positive law classifications and normative monetary policy concerns, especially useful for examining a border-agnostic system.

The formal logic of choice and action as distinct from “rational choice”

This formal logic of choice and action should not be confused with the better-known artificial construct of a fictitious “rational choice” that no really existing human has ever made. While it has become fashionable to cite “modern research in experimental psychology” to refute the naive assumption of an alleged “economic rationality,” the Misesian approach to economics, apparently unbeknownst to such critics, does not make any such assumption, and has from the outset also sharply criticized rival

approaches that do. According to this critique, appending “rational” to “choice” was needed to create a representational proxy of real people that could be examined using mathematics. In contrast to this study of proxy humans has already long stood the logical-deductive lineage of Menger, Böhm-Bawerk, Mises, and beyond, which rejects this path as fundamentally misguided from the ground up.

Unrealistic assumptions such as “economic rationality” do undermine much of conventional economics, and Kahneman (2011) and Taleb (2010, 2012), for example, have squarely taken aim at the resulting target. However, such critiques, while largely on the mark regarding the approaches to economics these authors are addressing, do not apply to all schools. Specifically, there is no contradiction between experimental insights into decision psychology and the abstract concept of choice and action as advanced as the ultimate foundation of the causal-realist approach. In this view, the proper role of choice in economics is as an abstract universal, without “assuming” any limiting qualitative descriptors such as “biased,” “social,” “economic,” or “rational.” Examining the entire fabric of such qualifiers is then within what this approach considers the proper respective domains of many fields other than economic theory, including but not limited to psychology, management, anthropology, and history.

The importance of a minimum technical understanding

The application of action theory to specific cases and events entails considering both the balance of empirical/historical evidence and the theoretical concepts applied to its interpretation. Cases must be sufficiently identified as belonging to relevant classes if a theoretical interpretation is to apply suitably. If the observed phenomenon itself has been poorly understood, an economic theory interpretation of it will be compromised.

Thus, even when approaching bitcoin mainly from an economic-theory viewpoint, it is still essential to overall understanding to become at least minimally familiar with its major technical components, architecture, and functionality, as well as its surrounding business, volunteer, development, and other associational infrastructures. A tendency of observers to feel that bitcoin must be a scam or Ponzi scheme appears correlated with low knowledge of such technical underpinnings and contexts. More positive impressions appear to correlate with knowledge and expertise in relevant fields such as cryptography, peer-to-peer networking, and open-source development.³

A scarce, digital, monetary good

Disentangling the association between commodity and materiality entails examining the related concepts of scarcity and goods framed against the emergence of the digital economy over the past several decades. Since a commodity is a type of scarce good, in considering whether bitcoin can be a commodity, it should logically be possible to establish first that bitcoin is a *good* and second that it is a *scarce* good.

Bitcoin meets key characteristics of a good as defined in relation to action and choice. A good serves as a means within a structure of action. Böhm-Bawerk advanced a subjectivist explanation of goods in an 1881 paper, concluding that:

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. (1962)

The scarcity of economic goods derives from their limited availability, not in general, but “with respect to the actual ends that they are capable of satisfying,” explains Campan (1999, 21-33), elaborating on Böhm-Bawerk’s reasoning. Objects become goods only in relation to persons and their actions. A good has properties that render it useful within structures of action, and this must be understood primarily in terms of the structure of action, and only secondarily in terms of objective properties of the good.

Users obtain and use bitcoins, conceiving of them as digital objects from which they anticipate some such “rendition of services.” Among such services are filling the role of a type of liquid financial balance that can be put to use to better address the uncertainties of the future, whether near or distant. That is, users derive that type of value that has been described under the concept of the yield from money held (Hoppe 2009).

Bitcoin also meets another quality of a good that Böhm-Bawerk identified—it can be exclusively and effectively controlled and put to use by specific users (Campan 1999, 24). Bitcoin employs cryptographic keypairs and digital signatures to provide exclusivity of control. Bitcoin wallets contain keys and addresses to which units of bitcoin are cryptographically assigned as recorded on the blockchain. Once a user transfers bitcoin from one wallet to another, it is no longer controllable with the keys in the originating wallet, but controllable exclusively with the keys in the destination wallet instead. A given unit’s state of address assignment is mutually exclusive to its being in some other such state.

More than one party could potentially gain access to a copy of *the key* simultaneously, but only one such party can ultimately succeed in *using the key* to spend any associated bitcoin. User-level security is thus dependent on maintaining suitable control of signing keys. In bitcoin’s security design, there is “no reliance on recourse. It’s all prevention (Nakamoto 2008b).”

3 See Graf (Sep 2014) for a technical-structural overview of Bitcoin for a general audience.

Natural and artificial scarcity in the digital age

Precious metals and other commodity-money goods linked—more or less—scarcity and materiality in a monetary context over centuries. Yet bitcoin is squarely within the realm of non-material digital goods. Modern digital goods, such as media or document files, lack materiality and can, in principle, be copied *ad infinitum*, a fatal flaw for any good to function in a monetary role.

Paradoxically, the essence of the digital-information revolution, without which bitcoin could not exist, was that unlimited numbers of people could make and use unlimited copies of a good simultaneously without direct mutual interference. *Copies* of digital goods could be made at effectively zero variable cost without “the original” disappearing or even degrading.

Such mass digital replication dealt a crushing blow in certain areas to an age-old adversary—natural scarcity. In response, however, a legal and technical scramble to create and expand *artificial* scarcity ensued. The chief methods have been expanding copyright and patent legislation, treaties, and enforcement; ever more draconian, elaborate, one-sided, and unread software license terms; and the application of digital rights management (DRM) methods.

In monetary affairs, a similar blend of legalistic and technical artificial-scarcity measures are employed to combat the unauthorized replication of official paper slips (counterfeiting) and restrict to authorized members of national and supranational banking cartels the special legal privilege of issuing bank money, the private “fountain pen money” that flows from the pens of loan officers into upwardly revised digital account balances (Huber 2013, McLeay 2014).

How can bitcoin be interpreted in terms of such natural and artificial scarcity? The intuitive answer, that bitcoin is likewise “artificially” scarce, may not end up being entirely correct,

but to argue this requires turning to a different concept—rivalry.

Distinguishing rival and nonrival goods

A rival good is one that different parties *could not use* simultaneously for different incompatible purposes without coming into physical conflict. These are mainly physical goods as we most ordinarily think of them; they cannot be literally “copied,” each one must be *produced*. A nonrival good, in contrast, is one—such as an idea, method, or digital file—that *can* be copied or emulated freely. Moreover, each copy or instance can be put to simultaneous parallel uses without direct mutual interference. The concept rival thus specifies a descriptive relationship between the nature of certain types of goods and their objective employability when used in a social context.⁴

Defined, a **nonrival good** is a good that is copiable with perfect remainder of the original and useable by multiple actors simultaneously without mutual interference. 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 between physically incompatible uses.

The broad economic sense of the word scarcity can encompass both rival and non-rival goods; the concept of a “good” itself already implies this broad sense of scarcity (Mises 1998, 92-92). Yet the word scarcity can also be used to specify the narrower sense of a rival good. This rival sense is more useful in interpreting bitcoin and the word rival should also be clearer in this use.⁵

4 This narrower sense is used in property theory, such as in Hoppe 2010 Chap 2 and Kinsella 2001. Tucker and Kinsella 2010 used the terms “scarce and nonscarce goods.”

5 Scarce has yet a third meaning of “in short supply” or “not enough” relative to an assumed ideal baseline norm of comparison. This colloquial normative sense differs

On a descriptive basis, to prevent conflict between multiple incompatible uses in the case of a rival good, either exclusive control of the given single instance of such a good must be transferred (through abandonment, sale, gift, or theft), or an entirely new instance of the good must be produced.⁶

Are bitcoins rival goods?

Even though bitcoins are part of the normally copiable and therefore nonrival digital realm, they *cannot* be copied. Instead, as noted above, their current state of address assignment can be altered only with the required digital signatures on a transaction that becomes included in the blockchain. Such “spending” of bitcoin is a transfer of control assignment.

Although bitcoin is informational, the protocol and network nevertheless operate to deliver rival scarcity of units. This enables bitcoin to function in the social role of facilitating indirect exchange. It could not do so if it were a nonrival digital good, and almost all digital goods prior to bitcoin were nonrival.

Note also that this rival scarcity does not result from appending special legal status or technical protections to otherwise pre-existing nonrival digital objects. It is instead among the *inseparable defining characteristics* of bitcoins as they exist, and they exist in no sense other than as integral attributes of the cryptographic data structures of the Bitcoin blockchain, protocol, and network.

Also, unlike past cases, such as the immaterial recorded data content of credit ledgers and other debt recording substrates, no creditor/debtor relationship is recorded. No one is designated as owing or being owed anything. The

yet again from the two distinct and more formal descriptive senses distinguished.

6 Coordinate ranges in three-dimensional space (the economic-theory concept of “land”), have both rival and nonrival characteristics; some uses of defined spaces can overlap, others not. Space thus has both rival and nonrival aspects relative to possible uses.

Bitcoin blockchain is not a record of outstanding debt obligations, but a ledger of exclusive control assignments to specified rival goods.

Newcomers to cryptocurrency are often concerned as to the issue of copiability when observing that forked and altered new blockchains, known as altchains, can be created *ad infinitum*. Indeed, altchains and their respective altcoin units have already proliferated. Bitcoin typically constitutes from 90%-95% of cryptocurrency market cap, with the next 500+ listed altcoins *combined* accounting for the remainder.⁷ Some of these, such as Namecoin, purport to fill quite different roles from Bitcoin, but others are relatively minor variations on the Bitcoin theme. Such variants each offer somewhat different issuance models that can be viewed as partly analogous to central bank monetary policies (Rochard 2013). Arguably, a version of “Bitcoin” with different unit production characteristics would no longer *be* “Bitcoin” in substance, but another new altcoin instead.

Even though *whole blockchains* can thus be copied and varied in this way and are therefore nonrival goods, cryptocurrency *units themselves* nevertheless still function as rival goods. In no case do units of altcoins factually constitute new units of *bitcoin*. Moreover, no such individual units are actually valued on the market as interchangeable direct substitutes from one chain to another. Instead, each is valued and priced as a distinct good, and each can in fact be observed to carry dramatically divergent valuations.

A bitcoin is thus a rival good. It is *not* copiable with perfect remainder of the original and is *not* useable by multiple actors simultaneously without mutual interference between physically incompatible uses. “Physically,” in this case, refers to the actions, devices, and network resources required to sign and send a specific transaction to the network. Only one such attempt to spend a given unit at a time *can succeed* in reaching the end sought. The protocol

7 See Coinmarketcap.com for current figures.

renders any such “double spending” acts mutually incompatible.

Bitcoin and the competitive characteristics of monetary goods

Several characteristics objectively differentiate some rival goods as relatively competitive candidates for potential roles in facilitating indirect exchange in society. As a practical matter, units of silver have appeared most widely in monetary roles historically, with shell beads most widespread over both time and place among so-called social currencies.⁸ Typical lists of commodity-money characteristics include durability, divisibility, homogeneity and fungibility, value per weight unit (portability), and scarcity (as the opposite of abundance or cheap reproducibility).⁹

Bitcoin evaluates well on each characteristic. As a configuration of digital information, it is perfectly durable through time. This contrasts with any particular blockchain or private key recording *substrate*, each of which is at risk of loss, destruction, or “bit rot.” Bitcoin is infinitely divisible for any practical purpose—under the current settings, to 2.1 quadrillion satoshis¹⁰—but this too could be extended. “Signed outputs” of virtually any size can be generated and combined. Each unit is perfectly interchangeable and mathematically uniform, though this is

8 See Graeber’s description of social currency, its uses, and its differentiation from money used in straight trade (2011, esp. Chap 6). Social currency correlates with what Szabo (2002, 2006) called proto-money or collectibles. Ridley (2010, Chap 2) interprets early forms of trade facilitation as enabling the extension of specialization and thus knowledge and technology.

9 One concise discussion of these characteristics in terms of silver is in Hülsmann 2009.

10 A satoshi is the current name for the actual base unit in the protocol. A “bitcoin” was arbitrarily labeled early on as a 100-million-satoshi unit for initial human purposes. Currently, bits (100 satoshis) and millibits (100,000 satoshis) are among contenders for use in human communication, pricing, and client interfaces.

an ongoing area of tension and technical arms races between advocates of financial privacy and proposals and practices such as identity tracking and black- or white-listing of coins.¹¹ Bitcoin lacks the characteristic of weight altogether and therefore competes against material monetary commodities on value per weight with a score of “infinite.” On portability, it features always-on, costless global direct access and near-instant transfers.

Finally, its objective limitations on new production are defined directly within the protocol. They form part of the nature of what kind of units bitcoins *are*, which is unprecedented. By contrast, even declaring a “limited edition” of some coin or printed paper is ultimately a mere promise. Such promises are subject to later revocation, or simply the successful counterfeiting of additional units by other parties.

Examining such technical characteristics is not a direct task for economic theory. It is primarily a matter for specialized technical investigation and evaluation based on the standards and criteria of the relevant fields. Such facts, as they are understood, can then be subjected to economic interpretations.

Viewing “commodity money” with theory rather than history

In *The Theory of Money and Credit*, the first German edition of which appeared in 1912,¹² Mises used Chapter 3 to define and assign terms to the classes of monetary objects that he set out to analyze. He selected these terms to facilitate analysis better than the conventional, positive-law, and financial press terms of his time, which he found too superficial for this purpose (59-60). This emphasis on economic function as contrasted with outer appearances in elucidating “the processes by which the different

11 See Dawkins (1986) on the characteristics, features, and outcomes of evolutionary arms races.

12 English version cited: Mises 1953 (TMC).

types of money are valued” (61-62) remains a useful reminder of the importance of differentiating technical and economic factors.

Still, the typology does not immediately present an intuitive place for bitcoin.¹³ Bitcoin is not fiat money. It lacks any legal-tender status or other official privilege, stamp, or certification. Nor is it a token, note, or other type of issued money substitute. It is not “redeemable” at fixed rates in exchange for any more fundamental unit.

It is not credit money either. It entails no creditor/debtor or other promissory relationship. As Rothbard wrote of the nature of claims: “when the claim finally falls due, the creditor redeems the claim and acquires *the good itself*, thus ending the existence of the claim (2004, 167).” Bitcoin is, in precisely this sense, “the good itself.” The holder of a bitcoin balance owes nothing and is owed nothing on that basis.

This leaves one final candidate: commodity money. Yet for many observers, this initially seems as though it could not be correct either. First, they argue, bitcoin is not a “commodity,” and second, it is not “money.” If one’s conception of commodity necessarily entails materiality, it is impossible to consider purely informational bitcoin as one.

Some critics likewise attempt to dismiss bitcoin for allegedly having the fatal defect of not being “money.” Šurda labels this the “money or nothing fallacy (if bitcoin is not money, it’s nothing).” The distinction between money and other media of exchange *can* be useful, but use of terms should be grounded in analytical purposes. The adjective “monetary,” derived from money, encompasses a range of objects and phenomena of interest to “monetary theory,” which includes media of exchange that may not be technically classifiable as money according to specific definitions. Mises also noted that

13 Šurda (2012, 23-28) also similarly examined bitcoin in terms of the TMC typology.

this “money” distinction, at least when based on an imprecise descriptor such as “commonly used,” is not necessarily that important in principle. Of primary importance is that the theory of indirect exchange refers “to all instances of indirect exchange and to all things which are employed as media of exchange... The theory of money was and is always the theory of indirect exchange and of the media of exchange (1998, 395).”

Beyond this generality, however, there is still some additional value to be gained from distinguishing which among several media of exchange is used as the dominant unit of pricing and accounting in a given area, and this could then be designated as the exclusive “money,” to the extent this linguistic distinction proved analytically useful.¹⁴ It is worth noting in this context that in common usage, most people would make no such distinction: a Singapore dollar left in someone’s pocket upon returning to euro-denominated France would still be a specimen of “money,” even though it would be unusable in a shop (let alone being the local unit of economic calculation). All of this is therefore of concern only in the technical use of terms as defined and justified for specific analytical purposes.

Some hard-money oriented critics of bitcoin cite sources such as Menger’s *On the origins of money* (2009 [1892]) and other works as support for claims that bitcoin’s lack of materiality is a serious defect, as, according to such venerable classics, money “must originate as a commodity,” by which such writers appear to have some *material* commodity firmly in mind. Meanwhile, some credit money theory commentators reject Menger’s discussion as merely another reflection of the historically naive “myth of barter.”

14 See Graf Sep 2013, referencing Koning 2013, for an initial treatment of the separability, under technical definitions, of “money” and media of exchange in a bitcoin context.

A note on debt recording and the “myth of barter” critique of economics

The critique of economics as such for its alleged reliance on a made-up primitive social phase of barter as its “founding myth” was recently elaborated in Graeber 2011, which carried forward the thesis from Mitchel-Innes (1913, 1914). The balance of issues raised warrant separate treatments. However, at least one preliminary response is that the “barter story” is *supposed to be* a theoretical reasoning tool that should not be misapplied as a quasi-historical claim as to the actual purported existence of a Barter Eden. If the statements of the theory of direct exchange have at times, especially understandable in their earliest developments, been mixed with conjectural historical speculations, it is only necessary to point out that it is a misapplication of pure theory to employ it as a weak proxy for historical research.

One role of economic theory, including insights derivable specifically from the theory of direct exchange, is to aid in and clarify the interpretation of history, including the balance of any and all historical, archeological, and anthropological material available. Mises 2007 [1957] addressed the relationship between theory and history in general, and Mises 1998 [1949] (202-203) in particular includes an unequivocal statement of the strictly theoretical role that “the barter fiction” should play in economic theory.

The case of credit money, in which debt instruments circulate in trade, does differ from commodity money in that the credit money instruments (the tablets, tallies, or circulating notes) do not themselves have a significant independent prior value as goods (Hülsmann 2008, 28). They are *records* of outstanding credit relationships, and as such *do* represent the “pure information” of credit-money school thought. Such items *do* carry information about outstanding credit/debt relationships. If the records themselves circulate as tradable

instruments, they can initially begin to become valued as substitutes for the goods to which the creditor was entitled under the claim recorded. The relative market valuations of substitutes and original goods can then also diverge in various ways under various conditions.

However, the credit money school approach seems to have taken this special case and extended it in an attempt to define the general nature of money as such as being a credit instrument. One historical challenge to this as a general, rather than a special, theory of money, is that it does not seem to explain the frequency with which such historical credit/debt records were *denominated in* units of precisely such goods as have been traditionally described as commodity money, such as amounts of silver or grain in ancient Mesopotamia or numbers of cattle in Ireland or camels in Somalia.¹⁵ Theoretical economists have focused on the natural competitive factors differentiating commodity money goods from all other goods, which has a bearing on *why* credits/debts in debt ledger systems would have strongly tended to be initially denominated in *those* units, as opposed to others.

The theoretical relevance of commodity in relative liquidity

Returning to Menger, his central theoretical use of commodity in his considerations on the origins of money was in the comparative analysis of the pricing of various classes of goods, a general theoretical issue. He contrasted markets for specialty goods such as technical instruments with those for general-purpose goods, especially those types of fungible goods that are literally traded on commodities markets. Relative to other types of goods, it is nearly as easy to either buy or sell commodity units at a given going market price. This contrasts with other items for which the relative positions of buyers and sellers differ more widely.

15 Patterson 1994; Van Notten 2006.

For most—non-commodity—goods, it is easy to go to a store and buy something, but much harder to turn around and sell it. One may not be able to resell the item at all, or if so, only at a steep discount from the price just paid. On a commodity market, however, the relative positions of buyers and sellers are much more similar. Regardless of whether one is currently in the role of buyer or of seller, one faces similar price spreads and a similar relative ability to have transactions executed in a timely way, not the case with non-commodity goods.

Money is that good which, for whatever specific sets of reasons in each time and place, is at the apex of this hierarchy of what Menger called “saleability” (liquidity). Other media of exchange, such as bitcoin today, are not at the very top—the dominant local money itself is, but are still ahead of most all other goods on the market (cars, shoes, tomatoes) in terms of the nearness of the relative bargaining positions of buyers and sellers.

The primary relevance of commodity to Menger’s discussion was to contrast the relative liquidity of goods rather than their materiality. His primary topic was not things or events, but the relative liquidity of different types of goods and what this might tell us about the economic nature of money.

Progress on understanding the various actual historical origins of monies in specific times and places should follow from combining the best of historical research with the application of the best of causal-realist economic theory. In this process, the proper respective roles and methods of the distinct disciplines involved should be identified and maintained.

The alleged absence of non-monetary uses of bitcoin

Bitcoin critics often cite current non-monetary uses as an allegedly necessary characteristic of a monetary commodity, one that bitcoin obviously lacks. One helpful

observation in considering this view is that the global payment system functionality of Bitcoin is inseparable from the use of bitcoin units. The bitcoin unit and the Bitcoin network are an integrated totality best understood in a unit/system duality framework. Attempting to value the one in the absence of the other is purely analytical in that their actual practical separation is impossible. There is a single unit/system phenomenon, aspects of which *can be viewed* either with system or unit perspectives. In contrast, more familiar types of monetary units are comparatively (though not entirely) payment-method agnostic. Units and transfer methods can be selected and used more independently of one another. Multiple currencies can transfer through the same interbank network or the same currency might be sent using two different remittance services.

It is fashionable to claim that the Bitcoin “blockchain technology” is the “real” innovation, independently of bitcoin “the currency,” which, it is usually added, does have its problems. However, an alternative way to look at this is that it may be the *inseparability* of system and unit that is itself the “real” innovation, at least from a mainly monetary point of view. A fully integral (inseparable) payment-system/payment-unit is novel, and theoretical treatments of bitcoin valuation must account for it.¹⁶

While it is often *assumed* that bitcoin has no former or current non-monetary applications, examination reveals candidates.¹⁷ Many of these are easier to grasp in the context of

16 See Graf Nov 2013, Section 10 on unit/system duality applied to monetary theory. See more recently also Tucker Aug 2014 on payment-system/unit inseparability and unit valuation.

17 For example, Šurda Dec 2013, quoting Molyneux, lists at least eight. The specific issue of non-monetary value components *prior* to the first emergence of a medium-of-exchange value component is taken up in Graf Nov 2013 in the context of the regression theorem in purchasing power theory.

the above integral unit/system perspective. Such functions include, but are not limited to: 1) integrated, permanent, and free secure storage independent of value amount stored, with units always accessible by holders from anywhere with network access; 2) multi-signature corporate fiduciary controls; 3) time-stamped proof of existence for any document or data; 4) multi-signature transaction escrow (itself a lynchpin in the construction of true peer-to-peer online marketplaces¹⁸); 5) ownership registry and secure low-cost title transfer technically independent of geography; 6) the secure, permanent, and low-cost recording of a signed hash of any sort of contract or document whatsoever;¹⁹ and 7) the infrastructure required for publically proving current control of bitcoin reserves. These are all functions supported on the Bitcoin network, but none of them are counted directly under traditional monetary functions.

For the “blockchain technology” to function and self-finance as it does, individual units must be able to gain and sustain some non-zero valuation as discrete units. What users can in turn do with these units is dependent on the characteristics of the network of which they are inseparable components.

A drawback of the “synthetic commodity” concept

Another proposed conception of monetary commodities suggests that they can be distinguished as naturally occurring goods as contrasted with artificially produced or synthesized goods.²⁰ This distinction may have some valuable uses, but it also has a conceptual drawback. Part of the general meaning of an economic good already includes an aspect of being

distinguished from mere objects, substances, or locations in an unused “state of nature.”

Classical proto-monetary and monetary commodity goods such as shell beads and metal bars and coins begin to take form only with the raw materials for these items and their associated production tools being removed from a state of nature. Seashells by the seashore are not yet objects suitable for a peace offering to the clan across the valley. Carved shell beads arranged on strings are skill- and labor-intensive craft items. Both production tools and raw materials for the final products must pass through multiple processes before a suitable product emerges. And so it is with locating and transforming metallic ores.

However, before it comes into existence, a rival digital commodity, with bitcoin as the prototypical example, must likewise be produced through specific technical processes, although these processes differ dramatically from those of material commodities. If one is unfamiliar with the nature of these production processes, however, they can easily seem fraudulent or at best unreliable or mysterious.

The key distinction, then, is not the presence or absence of “artificial” production, which must take place in either case, but the *types* of discoveries, materials, and production processes required to bring the respective types of goods into existence. Successful production requires, respectively: 1) the rearrangement of scarce physical matter into a suitable material good or 2) the arrangement of information in such a way that a rival digital good is made available.

A unique characteristic of commodity money vis-à-vis special contractual or administrative status

Commodity money is also distinct from fiat and other categories of money in that it can be valued on the market without special distinctions of legal status. Monetary commodities

18 See the open-source, peer-to-peer OpenBazaar project (openbazaar.org).

19 See Tucker Sep 2014 on some extended potential implications of this.

20 As in Selgin’s working paper on synthetic commodity money (2013).

can be traded, can facilitate indirect exchange, without reliance on any legal, legislative, or even contractual status that would distinguish them from any other ordinary good on the market.

This contrasts most starkly with the bases of modern fiat and bank-credit monies in a long-evolved mesh of legal privileges and exemptions without the ongoing support of which such units could be expected to lose most or all of their trading value. Other historical monetary objects such as banknotes also relied on some legal status such as legal tender designation, preferred official acceptance, or the contractual promise to redeem.

“Can be” is chosen to acknowledge that particular metallic coins in given historical contexts were often also legally designated in some way. However, such privileges arguably served functions such as monopolizing profits to particular mints or restricting coin designs to those that advertised a particular ruler. According to economic analysis of the competitive characteristics of monetary commodity goods themselves, such laws may have been to this degree extraneous to the native economic and technical suitability of the items to fulfill monetary functions such as facilitating indirect exchange.

This suitability was present, even if in most cases commodity monies *also* carried some official designation that also influenced their valuations, for better or worse. Advocates of the state theory of money, tracing back to Knapp (1905), claim that it was the designations rather than the goods that were always the essential factors in money. However, even if the sweeping claim that intervention was always involved in commodity money in every historical setting were granted, this would still not necessarily establish that, in the absence of such intervention, commodity money and other forms could not have otherwise come into being. It could suggest instead, for example, the existence of some compelling and concentrated advantages to be gained by rulers becoming involved in and attempting to dominate such a field at

their earliest opportunity. As Mises wrote in a 1917-1918 critique of Knapp’s work, “Facts do not speak; they need to be spoken *about* by a theory (1953, 510).”

Monetary commodity goods contrast with monetary objects that *must* rely on *some* contractual or administrative status to function in a monetary role. This includes, each in its own distinct way, money certificates, fiduciary media, token monies, fiat monies, and credit monies—that is, everything in the TMC scheme other than commodity monies.

“Sachgeld” as a category of unintermediated monetary good

Linguistic connotation differences may provide additional clues to differentiating economic from historical concepts of commodity. “Commodity money” is a standard translation for the German *Sachgeld*, and was also used in TMC. *Gelt* is money. *Die Sache* is a “thing” in either a concrete or abstract sense, which contrasts with *das Ding*, a “thing” exclusively in a material sense. Alternative senses of *die Sache* and associated compounds include abstract senses such as in “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 goods that were used in an exchange or social-currency role historically, or simply the earliest forms that monetary objects took.²¹

By clarifying *Sachgeld* in a more strictly economic sense, a commodity money could be viewed as a money traded without the need for intermediations such as fixed-rate substitution promises, legal tender status, or other counterparty dependencies. *Sachgeld* can—and bitcoin famously does—trade on the open market in a monetary role without any such privileges. If the central *economic* meaning of *Sachgeld* is

21 zahlenbilder.de; wirtschaftslexikon24.com/d/sachgeld/sachgeld.htm.

“a good that itself functions directly in a monetary role,” this would still contrast with the other categories, except that the more abstract sense is also able to account for bitcoin with no additional qualification. Money in itself contrasts with money by extension—through fixed-rate substitution promises, credit relationships, and any variation of the trust, reputation, or “full faith and credit” of any counterparty.

Bitcoin is not “backed” by anything. It is not a perfect or imperfect substitute for anything else. For users, bitcoin *is the tradable good itself*. This is not the “in itself” thinking of the old-time populist “metalism” based on an intrinsic concept of value, but rather specifies within a subjective-value context that *this*—in this case, a bitcoin, rather than something else by extension—is actually the economic good that is being valued.

Materiality hijacked a ride on an otherwise purely economic concept, commodity, at least until further differentiation and precision were called for. The arrival of bitcoin calls for the removal of materiality as an essential part of the separate economic concepts of goods, scarcity, and commodity.

The foregoing suggests retaining a single category of commodity money, as it is contrasted with all other monetary types in the original TMC fashion.²² To address new innovations, subtypes of such commodity money may be specified as “material” and “digital.” Analyzing other distinct issues, such as the aggregate production elasticity of specific items,²³ can then proceed as a discussion of those characteristics.

Substitutes, third-party services, and end-user opt-out costs

A central task of TMC was to separately analyze the nature, valuation, and general

economic effects of the various types of money and their substitutes. However, the technical characteristics of bitcoin do not suggest a similar scope of demand for such substitutes as have been associated with metallic commodity monies historically. The widespread use of paper-note and account-entry substitutes for precious-metal-linked money units, as well as the use of debt ledgers, which often also recorded debts in commodity-linked units, were among the conditions setting the stage for the eventual emergence of modern money. Today, the old material “fettors” no longer place any limits on the expansion of unit production, that is, inflation. Yet fiat and bank-credit monies only arrived fully in their positions as “modern money” after very long historical processes in which substitution rates between commodity and representation generally degraded, and finally reached zero only in 1971 (Hülsmann 2008, Huerta de Soto 2009).

The use of precious metals in the definition of monetary units places certain cost limitations on unit inflation by money producers. However, the use of metallic monetary units in extended trade must rely on measures such as ledger entries, money substitutes, and clearinghouses to enhance divisibility and transferability and lower transaction costs. Yet these are precisely the conditions that expose users to the degrading relationships between good and circulating substitute that appear repeatedly in historical records. This extends from recurring debt cancellations in the case of debt ledgers (ancient creditors left with broken pieces of ledger tablets) to runs on fractional reserve banks in the case of banknotes and deposit accounts (customers left with mere memories of account balances). In contrast, bitcoin requires no substitutes to deliver advanced monetary features and conveniences directly to users.

With some third-party bitcoin companies such as payment processors and exchanges, user account credits are likewise at risk of degrading in their linkages to bitcoin. Bitcoin

22 Hülsmann 2012 clarified later patterns of misinterpretation as relating to translation errors.

23 A central concern, for example, in Selgin 2013.

substitutes do exist, but they do not appear likely to grow into generally circulating media, particularly compared with historical precious-metal-based unit substitutes. A silver-denominated account entry or other representation can be more versatile in different types of trade than a silver coin. With bitcoin, however, use of substitutes may not improve much, or at all, on bitcoin's own native transaction cost and versatility characteristics. Substitutes could even subtract net value due to superfluous counterparty risk.

The bankruptcy of a bitcoin exchange, such as the high-profile Mt. Gox collapse of February 2014, is a prime example of the kind of counterparty risk from which the Bitcoin protocol was designed to protect users. A key stated point of the design was to obsolete traditional intermediary parties in financial transactions, the "trusted third parties" in Nakamoto 2008. However, Mt. Gox exchange customers did not maintain direct control of bitcoin. They instead traded it for account credits within a third-party system. When Mt. Gox collapsed, it became clearer to more observers that customers had been holding, not bitcoin, but bitcoin substitutes, Mt. Gox-brand bitcoin account credits, which turned out to be largely irredeemable for bitcoin (Graf Feb 2014).

Centralized exchanges in general, some of which have long had considerably better reputations than Mt. Gox, remain reasonable options for trading bitcoin against local currencies. However, the direct earning of bitcoin for goods and services is growing with time and market penetration, while decentralized peer-to-peer exchanges that enable user retention of direct bitcoin control could also become more competitive over time. Meanwhile, several exchanges have developed and implemented blockchain-based public proof-of-reserve procedures that seek to periodically demonstrate that a total amount of bitcoin corresponding to the total of their issued internal account credits is currently within their direct control.

Bitcoin's greater optionality for users

Users can manage and spend bitcoin either directly or with the aid of third-party services.²⁴ Direct-use options include Bitcoin Core, MultiBit, and Armory, software with which users generate, manage, and back up their own signing keys. Mobile apps with direct key management are also available. In contrast, a prominent example of a third-party wallet, storage, and payment processing service, Coinbase, generates, secures, and controls signing keys and issues users with electronic account credits. A prominent hybrid service is Blockchain.info, which aids users in managing their own keys with client-side encrypted cloud-syncing. In addition to these solutions, multi-signature wallet software such as Copay, and also Armory, can be used to require signatures from two or more distinct keys rather than just the usual single key. This enables security designs such as third-party authentication services and multiparty corporate controls that rely for their effectiveness directly on the blockchain.

This primary availability of direct-use options sets up a critical contrast with conventional financial services—any bitcoin user can avoid or opt out of any third-party bitcoin service. Whoever has the signing keys is the controller of bitcoin stored with those keys, and users can choose to manage their own keys directly. A comparable opt-out from conventional financial services is much more costly, rendering one "unbanked" and reliant on less convenient and more expensive options (or no realistic options) for purposes such as remittance and online commerce participation.

Bitcoin's higher optionality for consumers means they can more easily sever ties with not only one bitcoin company in favor of another, but with any and all third-party bitcoin services. Even if all such third-party services were to be licensed and organized into bank-like cartels

24 Current details at: bitcoin.org/en/choose-your-wallet

on a national or even supranational basis, bitcoin users could still opt out of the services of the entire cartel, not just any particular member of it, by using direct key-management methods. Choosing the third-party service option “none of the above” is thus far more accessible to bitcoin users than to conventional financial services customers. This is a comparative factor likely to impact consumers positively and enhance competition and innovation, including in third-party services themselves, which must contend to offer some added value over direct key-management options.

Conclusion

The Misesian dualist grounding of economic theory in the formal concepts of choice and action, as distinct from the exterior, technological form of particular goods and services in specific times and places, proves useful in classifying the novel monetary innovation called bitcoin a century after the first appearance of *The Theory of Money and Credit*. Action-based definitions of goods, scarcity, and commodity help avoid distraction from the differential technical characteristics of monetary goods,

and return attention to characteristics defined strictly in terms of economic theory.

Historical commodity monies and bitcoin, despite their large and apparent *technical* distinctions of implementation and production, are from this standpoint much more akin to one another than they might at first appear. The simplest solution for theoretical classification may be to take the existing category of commodity money, divide it into material and digital subtypes, and proceed from there with additional differentiations depending on which variable characteristics are to be addressed.

Whatever the balance of historical investigation suggests was the case with monies at various times and places in the past, bitcoin is actually today a “pure” global commodity money, an unmediated monetary good. Bitcoin is a rival digital good, unexpectedly produced from within a world of otherwise nonrival goods, and then separately and freely taken up by end-users in a monetary role. Not enshrouded in any fog of history, bitcoin may be among the best-documented instances of a monetary commodity trading free of the rent-seeking certifications, imprints, legal privileges, and declared preferences of any ruler.

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