Subject: File No. SR-CboeBZX-2018-001
From: SAM AHN (2nd at this file number)

This is my seventh comment on bitcoin. The first one was put at SR-CboeBZX-2018-040 on 08/13/2018, the second at SR-NYSEArca-2017-139 on 08/16/2018, the third at SR-CboeBZX-2018-001(right here) on 08/17/2018, the fourth at SR-NYSEArca-2018-02 on 08/21/2018, the fifth at SR-CboeBZX-2018-040 again on 08/28/2018, and the sixth at SR-CboeBZX-2018-040 for the third time on 10/16/2018. All my writings including this revolve around intrinsic value.

A travel to the world of bitcoin

SR-CboeBZX-2018-001, as shown in SEC Release No. 34-84367, does not have an indication that bitcoin is a currency. But the most authoritative site of bitcoin world, www.bitcoin.org, does. Their FAQ starts with this:

> (Quote 1) Bitcoin is a consensus network that enables a new payment system and (1) a completely digital money. It is the first decentralized peer-to-peer payment network that is powered by its users with no central authority or middlemen. From a user perspective, Bitcoin is pretty much like cash for the Internet. Bitcoin can also be seen as the most prominent (2) triple entry bookkeeping system in existence. (Quote 1)

The underlined (1) is that bitcoin is a currency, but this idea has not been supported even by the Exchange who filed this proposal (SR-CboeBZX-2018-001). Support for such an idea may be in violation of US Constitution.

Coining is very different from issuing note money. A coin is a commodity money, which is an asset of the holder but liability of nobody. Note money is an asset of the holder and liability of the issuer. In the USA, the Congress (alone?) has the power to coin money under Section 8 of US Constitution, and the States are prohibited from coining under Section 10 thereof. As to note monies, many states allowed private banks to issue money from 1836. Bitcoin dared to coin money in the source literature of Quote 1, but I don't know exactly if it is a crime.

The underlined (2) is unknown to the world of accounting, but I could find a little more explanation about it at one (http://financialcryptography.com/mt/archives/001325.html) of their companion sites:

> (Quote 2) Triple entry is a simple idea, albeit revolutionary to accounting. A triple entry transaction is a 3 party one, in which Alice pays Bob and Ivan intermediates. Each holds the transaction, making for triple copies. (Quote 2)

Quote 2 is the address of their minds. They somehow came across the accounting term "double entry," which looked to them meaning an accounting system where one transaction is recorded by two parties. Then, they thought that a new system, where one transaction is recorded by three parties, could be a more advanced accounting system.

Citizens of accounting world (https://www.accountingcoach.com/blog/what-is-double-entry-bookkeeping), however, explains double entry very differently:

(Quote 3) Double-entry bookkeeping refers to the 500-year-old system in which each financial transaction of a company is recorded with an entry into at least two of its general ledger accounts.

For example, if a company borrows $10,000 from its bank, the company's asset account Cash is increased with a debit entry of $10,000 *and* the company's liability account Loans Payable is increased with a credit entry of $10,000. If the company repays $3,000 the company will decrease the amount in its Cash account with a credit entry of $3,000 *and* will reduce the balance in its Loan Payable account with a debit entry of $3,000. (Quote 3)

In real accounting, the word "double" is refers to two accounts within a single party. That's about the name "double." In practice, one transaction is recorded in more than two places in many occasions. For example, one cash sale is usually recorded in cash, sales, cost of sales, and inventory control account. Four accounts! If we count in the specific inventory item record, five entries! If it is a credit sale instead, accounts receivable control account and individual client account. Seven entries! If the company run cash control account and individual bank accounts in parallel, the same record will be entered in eight places.

Involving three parties is neither revolutionary nor new. For example, suppose you bought an apple with a credit card. This simple transaction involved four to five parties: you, the store, card processing service, card issuing bank, and perhaps another bank where the card processing service deposits its money. For another example, suppose you borrowed 200 thousand dollars from a bank. The bank takes out the money from their account with a Federal Reserve bank. Again, three parties are involved.

Further, three-party itself is not compatible with the bitcoin whitepaper of 2009. Quote 4 is a part of Abstract of the whitepaper.

(Quote 4) A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. (Quote 4)

Satoshi Nakamoto was proud that a third party is unnecessary in the world of bitcoin. The one who wrote Quote 2 ignored not only accounting practice but also Satoshi's pride. The world of bitcoin is messed up with erroneous views to the real world. Therefore, a careful examination of their thought process is inevitable.

The math that is considered backing bitcoin:

The "Economy" section of their FAQ (https://bitcoin.org/en/faq#economy) has this:

(Quote 5) Bitcoins have value because they are useful as a form of money. Bitcoin has (1) the characteristics of money (durability, portability, fungibility, scarcity, divisibility, and recognizability) based on (2) the properties of mathematics rather than relying on physical properties (like gold and silver) or trust in central authorities (like fiat currencies). In short, Bitcoin is backed by mathematics. With these attributes, all that is required for a form of money to hold value is trust and adoption. In the case of Bitcoin, this can be measured by its growing base of users, merchants, and startups. (3) As with

all currency, bitcoin's value comes only and directly from people willing to accept them as payment. (Quote 5)

The brave new world is revealing, in Quote 5 above, three pillars that support their fundamental idea that bitcoin is a currency.

List of Three Pillars
Pillar 1: Bitcoin has six characteristics of money.
Pillar 2: Bitcoin is backed by math.
Pillar 3: People will accept bitcoin as payment.

Among these, the most important concept is math. There are in bitcoin world just three things that can be called math: blockchain, hashing, and the math used to limit the number of minable bitcoins.

Blockchain is a skill involved in payment, having nothing to do with the value of a bitcoin. Hashing can be done by anybody. A successful mining requires certain characteristics in a hashed 64-digit code. But the code can mean something only if it is made within bitcoin system. The code itself does not mean anything.

Table 1 hereunder shows how the number of minable bitcoins is limited. According to the current protocol, there will be about 21 million bitcoins in the world by the year 2040.

Table 1. How total number of minable bitcoins is limited

block = the block with a successful mining						Unit = 1,000 coins		Indices	
Periods	coins/ block	blocks/ hour	hours/ day	days/ year	Years	coins/ 4 years	total coins	Coin quantity	Global GDP
2009-2012	50.00	6	24	365	4	10,512	10,512		Annual
2013-2016	25.00	6	24	365	4	5,256	15,768		3.00%
2017-2020	12.50	6	24	365	4	2,628	18,396	100.00	100.00
2021-2024	6.25	6	24	365	4	1,314	19,710	107.14	112.55
2025-2028	3.13	6	24	365	4	657	20,367	110.71	126.68
2029-2032	1.56	6	24	365	4	329	20,696	112.50	142.57
2033-2036	0.78	6	24	365	4	164	20,860	113.39	160.47
2029-2034	0.39	6	24	365	4	82	20,942	113.84	180.60
2035-2038	0.20	6	24	365	4	41	20,983	114.06	203.27
2038-2042	0.10	6	24	365	4	21	21,003	114.17	228.78
2043-2046	0.05	6	24	365	4	10	21,014	114.23	257.49
2047-2050	0.02	6	24	365	4	5	21,019	114.26	289.81
Sum	99.98					21.019			

Bitcoin system controls just two Columns in the table. The column titled “coins/block” shows that the number of bitcoins per one successful mining halves every four years. When the four-year periods lapse

numerous times, the sum of this column becomes almost twice the number in the first cell, which is 50. The formula behind this design is S = a/(1-r), where a=50 and r=(1-r)=50%.

The other column under bitcoin protocol's control is the one headed "blocks/hour." The "6" in this column means that the current protocol has been set up so that one success of mining can happen every ten minutes. This control has been achieved through automatic adjustment of the required number of zeros at the beginning of the hashed 64-digit code.

For example, suppose the following code got recognized as a success and the miner of it got 12.5 bitcoins in just 7 minutes after the previous success.

0000000000000000012494ddcfb91d3968b2ea4d2dd55e0d94b23c6eb1f11cf8

The above code has 16 zeros at the beginning, and it was a success because the system had set the required number of zeros at 16 right after the previous success. As this success happened too fast, the system sets the next requirement at 17 zeros, so the next success should be something like this:

00000000000000000f84021d63f8e21e9bcb5ac28b78b9e7ae292b726891896

If this mining completed in 8 minutes, the next requirement goes up to 18 zeros. If this mining completed in 12 minutes, the next requirement would go back down to 16.

So far, we have seen all the math the bitcoin people are proud of. The only thing of math drawing our attention was the high school formula of S=a/(1-r). This formula is used in various corners of financial world, including business valuation and money multiplier calculation.

The true value of bitcoin

Satoshi Nakamoto believed that this limitation has achieved freedom from inflation. Such a belief is written in the whitepaper as follows:

(Quote 6) Once a predetermined number of coins have entered circulation, the incentive can transition entirely to transaction fees and be completely inflation free. (Quote 6)

Freedom from inflation, in the world where bitcoin is the dominant currency, means freedom from deterioration of bitcoin's value. But there is a mathematical problem in the assertion of Quote 5 above.

In economics, value depends on utility and scarcity. With this premise, let us examine the structure of bitcoin worlds' argument:

The argument of bitcoin world Prop 1: The math in Table 1 achieves scarcity of bitcoin. Prop 2: Usefulness as a currency (as said Quote 5 above) achieves utility of bitcoin. Prop 3: The value of bitcoin will not deteriorate because of Props 1 and 2. Prop 4: Prop 2 depends upon Prop 3, for bitcoin.

Prop 4 indicates a circulatory argument. Prop 3 stands on Props 1 and 2. Prop 2 stands on Prop 3. This is like saying that somebody is his biological father's biological father. What William Wordsworth said about the man and the child is not about biological parenthood.

Therefore, the math behind bitcoin has achieve only one factor of the value: scarcity. The rest factor, which is utility, was attempted, but in vain because of a circulatory argument. If we state the relationship of value (V), scarcity (S) and utility (U) with the following equation, bitcoin's value is zero.

$$V = S \times U = 0, \text{ because } U = \text{zero}.$$

Besides zeroing out bitcoin's value, I would like to shake off the dirt of bitcoin idea by presenting something more about money. Contrarily to the bitcoin thoughts, the quantity of money shall not freeze.

Normal growth of money growth and bitcoin

When the economy grows, more money is necessary. Table 2 shows an example of money growth according to economic expansion.

Table 2. Sale of a new house involving changes in the quantity of money

(Words in parentheses express negative action.)

	Description of event	Lender or money holder	Borrower or money issuer	quantity of money	
	Account or instrument			Base	M-2
1	Consumer pays down (escrow agent ignored).				
	1a Builder's bank account	Builder	Bank 1		Increase
	1b Deposits at the Fed - Bank 1	Bank 1	the Fed	Increase	
	1c Consumer's bank account	(Consumer)	(Bank 2)		Decrease
	1d Deposits at the Fed - Bank 2	(Bank 2)	(the Fed)	Decrease	
2	Consumer borrows and pays up (escrow agent ignored).				
	2a Builder's bank account	Builder	Bank 1		Increase
	2b Deposits at the Fed - Bank 1	Bank 1	the Fed	Increase	
	2c Deposits at the Fed - Bank 3	(Bank 3)	(the Fed)	Decrease	
	2d Promissory note	Bank 3	Consumer		
	2e Lien on the house	Bank 3	Consumer		

Event 1 shows increases and decreases of money for each economic entity, resulting in no change to the total quantity of money, either in terms of monetary base or in terms of M-2. Event 2 increases M-2, while making no change to monetary base. This increase is powered by the consumer's borrowing from Bank 3. The borrowing is the exchange of Row 2a (money) with the bundle of 2d (payment plan) and 2e (collateral).

Bank 3 paid cash to the builder in exchange for the consumer's possession of the house. Therefore, Bank 3's payment the builder was in fact lending to the consumer. In exchange for that, the consumer provided the promissory note and a lien on the house. The promissory note of 2d is a promise to repay principal and interest by designated dates. As 2d is less liquid than 2a, interest charge makes up the gap. Collateral of 2e is reinforces the promise of 2d.

The preceding paragraph shows that M-2 does not grow like proliferation of rats. The money growth shown in 2a was possible because the consumer had the will to borrow and the power to provide security (2e). When the whole society is considered, the consumer's such a power came from the builder's production. Where there is more production, more money follows into the economy. That is why M-2 is often compared with GDP in normal economies.

Let's compare said normalcy with a focal point in Table 1 above. Table 3 is an abridgement of Table 1, and what to compare is the two cells at the far right of the bottom row.

Table 3. Abridgement of Table 1

block = the block with a successful mining						Unit = 1,000 coins		Indices	
Periods	coins/ block	blocks/ hour	hours/ day	days/ year	Years	coins/ 4 years	total coins	Coin quantity	Global GDP
2009-2012	50.00	6	24	365	4	10,512	10,512		Annual
2013-2016	25.00	6	24	365	4	5,256	15,768		3.00%
2017-2020	12.50	6	24	365	4	2,628	18,396	100.00	100.00
2043-2046	0.05	6	24	365	4	10	21,014	114.23	257.49
2047-2050	0.02	6	24	365	4	5	21,019	114.26	289.81

Said two cells (114.26 and 289.81) tells that the growth of bitcoin quantity from 2020 to 2050 will fall short of global GDP growth. Now, it is generally viewed that global GDP grows by about 3% per annum.

Table 3 shows that GDP was not considered in the process of limiting the number of minable bitcoins. This, in turn, means that the "unit of account" function of money is not well understood in the world of bitcoin. For a currency to work as a unit of account very well, its value should be stable. That means that not only inflation but also deflation should be considered during the design of a new currency. The designers of bitcoin completely ignored the deflation side.

About deflationary spiral

Quote 7 at the following link is bitcoin people's apology for absence of any consideration of deflation in the design of bitcoin.

https://bitcoin.org/en/faq#wont-bitcoin-fall-in-a-deflationary-spiral

(Quote 7) The deflationary spiral theory says that if prices are expected to fall (1), people will move purchases into the future in order to benefit from the lower prices. That fall in demand will in turn cause

merchants to lower their prices to try and stimulate demand, making the problem worse and leading to an economic depression.

Although this theory is a popular way to justify inflation amongst central bankers, it does not appear to always hold true and is considered controversial amongst economists. Consumer electronics (2) is one example of a market where prices constantly fall but which is not in depression. Similarly, the value of bitcoins (3) has risen over time and yet the size of the Bitcoin economy has also grown dramatically along with it. Because both the value of the currency and the size of its economy started at zero in 2009, Bitcoin is a counterexample to the theory showing that it must sometimes be wrong.

Notwithstanding this, Bitcoin is not designed to be a deflationary currency. It is more accurate to say Bitcoin is intended to inflate in its early years, and become stable in its later years (4). The only time the quantity of bitcoins in circulation will drop is if people carelessly lose their wallets by failing to make backups. With a stable monetary base and a stable economy, the value of the currency should remain the same. (Quote 7)

Points (1) and (2): Deflationary spiral happens during a recession or depression. Constant price decline of consumer electronics was due to technological advancements, which is a different situation. Therefore, point (1) and point (2) are not related to each other.

Points (1) and (2) and (3): Point (3) is the other side of (1), and there is no discrepancy between the two. When people expect downward price action, they will postpone purchases, other things being the same. When people expect upward price action (like bitcoin), then they will purchase even on credit. Point (2) is the opposite to Point (3). The word “similarly” is wrong.

Point (4): Bitcoin is not yet a currency. If it is a currency, prices of general goods and services would be quoted in bitcoin. Now, in the market, the price of bitcoin is being expressed in dollars. In a hypothetical situation where bitcoin is made a currency, what happened so far with the quantity of bitcoins would not mean anything.

If bitcoin is the only currency in the world, shortage of bitcoin will lead to deflation, and many property holders and businesses would go bankrupt just because of inability to obtain bitcoins somewhere. Bankruptcies kill jobs, kill income, kill demand, kill prices, kill businesses, and in turn kill jobs. This is deflationary spiral. Deflationary spiral won’t happen at every deflation. But one will certainly happen when money is short everywhere.

The importance of banking

So far, Pillar 2 of the list of pillars on Page 3 has been reviewed. Now it is the time to review more of it.

List of Pillars
Pillar 1: Bitcoin has six characteristics of money.
Pillar 2: Bitcoin is backed by math.
Pillar 3: People will accept bitcoin as payment.

On Pillar 1: What is important with money is not the "characteristics" but functions. A good currency means one that functions well as a medium of exchange, as a unit of account, and as a store of value. We have found that bitcoin cannot function as a unit of account because of the math in Table 1 above.

On Pillar 3: The bitcoin people believe that something of value is a currency if people take it as payment. Suppose bitcoin has obtained a certain stable value. For example, its value would be stabilized if a certain entity promises to take bitcoins in exchange for $6,000 per coin any time. In that case, can bitcoin be a currency?

It is not likely because the bitcoin whitepaper precluded banks from the world of bitcoin. Bitcoin changes hands through P2P system, which is fundamentally incompatible with banking. A P2P remittance system may save remittance cost, which is only one function done by banks. The most important function of banks is lending, as shown in Table 2 above.

Issuance of new money and cancellation of old money are natural phases of lending and repayment system. Without lending function of the banks, we cannot buy a house until we have stacked up the cost of a house in cash. Housing industry will be decimated because very few people can afford a house. Apartment rent will go up because not many people can get into apartment rental business. If bitcoin happens to be the only currency in the world, human civilization will fall.

Weimar versus Bitcoin

We have heard that bitcoin people are worried about Federal Reserve notes. But they reveal their mind mentioning Weimar Republic instead, at one corner of their website (https://bitcoin.org/en/faq#can-bitcoins-become-worthless).

> (Quote 8) History is littered with currencies that failed and are no longer used, such as the German Mark during the Weimar Republic and, more recently, the Zimbabwean dollar. Although previous currency failures were typically due to hyperinflation of a kind that Bitcoin makes impossible, there is always potential for technical failures, competing currencies, political issues and so on. (Quote 8)

The underline part contains these people's strong belief that there would be no inflation if the quantity of money is restricted. From November 2023, Weimar monetary system was stabilized very fast, and we all it Rentenmark Miracle. During the next one year, until the Mark was perfectly stabilized, Weimar Republic took the following measures:

Issued was a new money called Rentenmark, indexed to gold and exchangeable with mortgage bonds.
Said mortgage bonds were secured by German real estates, such as agricultural land.
The value of Rentenmark was set in terms of gold, so that 4.2 Marks equals 1 USD.
The old notorious paper money was exchanged with Rentenmark at the ratio of one trillion to one.
External mortgage bonds were issued in New York, with the help of JP Morgan.
Said bonds were stated in Mark that was indexed to gold and secured by German infrastructure.
Reparation payment plan for WWI was re-arranged under Dawes Plan.

With those measures, the German importers could obtain dollar in exchange for the new money. The import figure of food, garment and other consumer goods increased dramatically. For example, 1924 shoes import was 25 times of 1923 that import. Eggs import, 300 times. (Source of the figures in this paragraph: The Economics of Inflation by Constantino Bresciani-Turroni, SBN 04 332005 8, printed by John Dickens & Co Ltd, Northampton, Great Britain, 1968. pp316-318. Said to be from German official statistic.) Enough import secured enough supply. Prices did not increase. Extraordinary demand for money did not happen again.

This success is called Rentenmark Miracle, but the real miracle is that this historical success story is not widely known. It happened to be known to me, and I cannot help analyzing this success by extending Table 2 above. Table 4 is an analysis of what may happen in the USA today, but may well explain Rentenmark Miracle, too.

Table 4. Government spending involving new debt and new money

(Words in parentheses express negative action.)

	Description of event Account or instrument	Lender or money holder	Borrower or money issuer	quantity of money Internal	 M-2
3	Treasury sells new Treasury bonds to Bank 4.				
3a	Treasury bond	Bank 4	Treasury		
3b	Treasury's account at the Fed	Treasury	the Fed	increase	
4	Treasury spends with the proceeds of bond issuance.				
4a	Treasury's account at the Fed	(Treasury)	(the Fed)	decrease	
4b	Providers' bank accounts	Providers	Banks		increase
4c	Deposits at the Fed - Banks	Banks	the Fed	increase	

Table 4 has the same pattern as Table 2, except one column title: “Internal” under quantity of money. In economics of today, money is counted basically in two classes: the money traceable from the balance sheets of FRB and the money traceable from the money owned by outsiders of US banking system and US government. M-2 is the most used of various measure of the latter. The former is usually called “monetary base,” but the Treasury’s account with the Fed is missed out of either class. As I need to analyze what is happening in that account, I had to create a new term “Internal Money” to comprise Treasury account with Fed and what is ordinarily called monetary base.

Table 4 shows that the amount of M-2 increase in Row 4b depends upon the price quoted by providers of government procurements. If the prices are high, the government must spend more and increase more M-2. When M-2 increase is expected more, the government must sell more bonds in Row 3a. If prices are stable and the government can afford everything with tax collected, the government does not have to issue more bonds and does not have to make more money.

What Weimar Republic did with Rentenmark Miracle can be summarize into two actions: rendering intrinsic value to their new money and importing supply enough to stabilize prices. Quantity of money

was controlled as the result of these efforts of German leaders and cooperation of outside people such as Dawes and Morgan. Bitcoin's design idea includes none of the processes but just the result.

Worries about Federal Reserve notes

The List of Pillars in Page 3 above was used again in Page 7. It is being used here once more.

List of Pillars
Pillar 1: Bitcoin has six characteristics of money.
Pillar 2: Bitcoin is backed by math.
Pillar 3: People will accept bitcoin as payment.

Pillar 3 connotes that people accept Federal Reserve note and the Euro as payment not because of intrinsic value but because the governments mandate it. In this thought, the bitcoin people believe that a certain consensus can take the same effect. The essence is that Federal Reserve notes, the EURO and bitcoin are equal in that none of them have intrinsic value. Unfortunately, the people of FRB and ECB wrote like that, too -- erroneously.

Rentenmark was a debt instrument money, and Rentenmark Miracle is all about solvency. Rentenmark was indexed to dollar and ultimately to gold, but it was not exchangeable with gold. Germany did not have much gold then. Rentenmark holders could buy German bonds with Rentenmark, and the bonds were collateralized with real estates of Germany. JP Morgan and other lenders viewed the German bonds solvent. Solvency comprises the assets and the people who manage the assets. The lenders trusted German people for their capability but did not know what would happen later with Hitler.

Federal Reserve notes and their electronic equivalents are all debt instrument monies, and the stability of their value depends upon solvency, too. All the internal money or "base" money shown in Tables 2 and 4 are backed by securities held by the Fed. Most of the securities are Treasury debts, and the Treasury debts are backed by US government. Therefore, the question of solvency of Federal Reserve notes is the question of solvency of US government.

The numbers in the US government balance sheet look like US government is empty, but explanation part tells something very different. Quote 9 is taken from FY 2017 Financial Report of the United States Government:

(Quote 9) For financial reporting purposes, other than multi-use heritage assets, stewardship assets are not recorded as part of PP&E. Stewardship assets consist of public domain land (stewardship land) and heritage assets. Examples of stewardship land include national parks, wildlife refuges, national forests, and other lands of national and historical significance. Heritage assets include national monuments, and historical sites that among other characteristics are of historical, natural, cultural, educational, or artistic significance. Stewardship land and most heritage assets are considered priceless and irreplaceable, and as such they are measured in physical units with no financial value assigned to them. Some heritage assets have been designated as multi-use heritage assets, for example the White House, the

predominant use of which is in government operations. For more details on stewardship assets, see Note 24—Stewardship Land and Heritage Assets. (Quote 9)

US national land is huge, and the value increases along with population and GDP growth. Many parts of the land have huge natural resources underneath. Though the land and natural resources are not collateralized for US debts, it is a backup. The Greek did not provide collaterals to national debts, but they had to sell national land pieces at emergency. If the Greek had learned what happened at the end of 1923 in Weimar Republic, they could provide national land pieces as collateral at the time of borrowing, thus reducing the interest.

What is important with the preceding paragraph is that US government is still solvent. Even if the US bond value deteriorates because of something like the new tax law passed on December 22, 2017, the Fed can keep its own solvency by changing its portfolio. For example, the Fed can replace Treasury debts with stocks of member banks. And wait for recovery of the Treasury, e.g. through counter-enactment of said tax law.

If the US government goes indebted for too long a time, the gap between market exchange rates and PPP would narrow down, sending the value of dollar much lower than today. Intrinsic value depends on solvency, but market exchange rate depends on the government's reputation. As JP Morgan and other lenders' trust in German government was required for stabilization of Weimer Republic's money, people, world lenders' trust in US government is necessary for stabilization of US money.

Quantitative Easing vs Reckless Budgeting

Excessive worries about US monetary system owes partially to clumsy explanations, not only by the employees of the Fed, but also by prominent economists. For example, Ben Bernanke equivocated about QE. At 8:00 of the following video, he said that the Fed ways doing something akin to printing money. It is a clip from 60-Minute of March 2009:
https://www.youtube.com/watch?v=uRM9qV4lkEg

The host was sweating at the critical moment when Ben Bernanke uttered about printing money.
At 6:30 of the following video, however, he strongly denied the "myth" that in fact he himself had spread 21 months before at the same show with the same host:
https://www.youtube.com/watch?v=LxSv2rnBGA8

Ben Bernanke sweated at the moment he was saying "myth" at the newer video. We remember Ben Bernanke's helicopter comment before the first video above. He remembers it, too. We can read his mind, bewildered between what was happening in 2010 (against his expectation of money multiplying like the rats' proliferation) and what he learned from Milton Friedman.

At last, a doubt (https://www.federalreserve.gov/faqs/money_12845.htm) appeared in the Fed site, with a button calling for questions.

In a sense, this writing is a response to that article linked just now. Its title contains "Is money supply important?" My answer is this:

"Internal money supply must be ample. External money supply (to which M-2 belongs) must be made in exchange for some value. There are two outlets for external money supply. The first outlet is commercial banks' lending. As the lending is powered by demand, the concept of external money supply is empty. Demand is supply. What is being supplied is internal money, which is almost effortless as we saw with QE. The second outlet is government spending. Our all efforts about monetary system must be concentrated here. Every single penny should be controlled with comparison of the spending to what the spending is expected to bring to us. (That is, not quantity of money.) TCJA of 2017 should have been blocked."

Money is not a mystery, if it is explained this way:

Table 5. Quantitative Easing

(Words in parentheses express negative action.)

Event		Lender or money holder	Borrower or money issuer	quantity of money	
	Account or instrument			Internal	M-2
3	Treasury sells bonds and spends with the proceeds. (Same as in Table 4)				
3a	Treasury bond in Bank 4	Bank 4	Treasury		
3b	Treasury's account at the Fed	Treasury	the Fed	increase	
5	FRB buys treasury bond from Bank 1 (Quantitative Easing).				
5a	Treasury bond in Bank 4	(Bank 4)	(Treasury)		
5b	Treasury bond in the Fed	the Fed	Treasury		
5c	Reserve account - Bank 4	Bank 4	the Fed	increase	

What was changed by QE was internal money, which is not counted in M-2. As it does not interface with transactions of goods and services, it has nothing to do with prices. Row 3b in Table 5 (and the same in Table 4) means "readiness for the government to spend like Row 4b of Table 4." Row 5c of Table 5 means "readiness for Bank 4 to lend like Row 2a of Table 2."

Before lending, the amount in Row 5c do not get into the counting of M-2. Row 5c is a reserve money, and it is like a reservoir that is ready to supply water. The part in the economy is analogous to the use of the water by the people around. If nobody scoops up, the water will remain unused. Likewise, if nobody borrows, no more money will flow into the economy. This is what happens with Row 5c of Table 5. Money does not proliferate like rats. People borrow money when they have good plans and ample collaterals.

Row 3b has a different destiny. Reckless use of the water by the government will flood the economy. That is what the new tax law of 2017 will turn out to be. The Fed did not print money by QE. The Congress printed money by TCJA of 2017. The Fed is printing money by increasing interest rate on national debt. Now, Trump administration and the Fed are competing to print more money. Money does not proliferate

like rats, but reckless spending and interest hike are like making new rats. The danger is starting now, but bitcoin is not a solution.

Clumsy application of quantity theory of money

The essence of bitcoin price control is limitation of total number of minable bitcoins. It is a clumsy application of quantity theory of money, which is also wrong. The tenet of quantity theory of money can be expressed like this:

> "Prices depend on quantity of money, other things being the same."

That other things to be the same includes the relationship of supply and demand. If supply goes up while demand stays, there is a deflationary pressure. In that case, the government must supply more money, according to quantity theory of money. When supply is running short of demand, money supply must be reduced, according to the same theory.

If money is created more, out of government control, according to supply shortage, things happen like in Weimar Republic of early 1923. In that case, quantity theory of money is of no use. Weimar Republic could solve the problem only securing ample supplies – through imports. When the prices were stabilized, the money supply came into control, too. This happened because money supply was dependent on general supply. The assumption "other things could not be the same" was unrealistic.

Contrastingly to the preceding paragraph, Spanish gold in the 16th century was produced independently of general goods and services production. Too much gold led to gold price collapse and general inflation. US silver in 1873 was produced independently of general production. The US government stopped reserving silver for money, and that meant prevention of excessive supply of money.

By comparing the two different situations in the preceding two paragraphs, we find one important assumption (Assumption 1 below.) underlying quantity theory of money to work. Two assumptions, including said one and another that we can intuitively found out, are put together below.

Assumption 1: Increase of money is independent of general production.
Assumption 2. Other currencies are not significant in the economy.

Bitcoin design is a clumsy application of quantity theory of money, because Assumption 2 was not considered at all. Quantity theory of money itself is inapplicable in this era of fiat currencies, because Assumption 1 is no more practical. See Row 2a of Table 2 in Page 5 above. M-2 increase was dependent upon production of a house.

I leave to the readers the opportunity to blow many more punches to quantity theory of money. While quantity theory of money survives, bitcoin-like disasters will continue. Bitcoin and its kin are all vermin nurtured by quantity theory of money.