

Should central banks be concerned about virtual currencies?

Monetary Dialogue July 2018



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Abstract

Virtual currencies have generated much discussion over the past few years with some believing they are an improvement on state-issued currencies and will end up replacing them. This paper argues this is extremely unlikely. Cryptocurrencies such as Bitcoin do not work well as money because of security weaknesses and the volatility of their price relative to traditional currencies. The theory that the private sector will choose to replace a state-backed currency with privately-issued currency also has little historical backing.

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EXECUTIVE SUMMARY

- Virtual currencies have generated a lot of excitement in financial markets over the past few years with some arguing they are an improvement on state-issued currencies and will end up replacing them.
- Advocates of virtual currencies argue they provide more privacy to users and allow people to avoid using untrustworthy financial institutions. They also believe that currencies such as Bitcoin are less likely to lose value over time because their total supply will be fixed.
- This paper argues it is extremely unlikely that virtual currencies will replace sovereign money issued by central banks.
- Claims that cryptocurrencies such as Bitcoin are likely to be attractive to many people do not bear up to close scrutiny. Bitcoin, for example, has a number of safety and security problems relative to existing currencies: Coins held in “hot wallets” are vulnerable to theft via hacking, malware or phishing while coins held in “cold storage” can be lost forever if the storage devices are misplaced or damaged.
- Claims that Bitcoin has superior privacy features to state-issued currencies are also over-stated. People can use dollars or euros to make anonymous cash purchases while every Bitcoin transaction is publicly recorded and the IP addresses associated with Bitcoin wallets can be detected.
- Prices for virtual currencies display bubble-like tendencies including periods of self-fulfilling optimism and pessimism. Higher prices are seen as growing evidence the currencies will be accepted widely for payment, which fuel further increases. Falling prices trigger pessimism and further declines.
- The extreme volatility of cryptocurrencies relative to traditional currencies means they have not been a useful medium of exchange and are rarely used to purchase goods and services.
- The theory that the private sector will choose to replace a state-backed currency with privately-issued currency also has little historical backing. The so-called “Chartalist” school of thought, which argues that the state is best positioned to encourage and enforce its own monetary system, has a better record of explaining how monetary systems came about.
- Even if virtual currencies were one day to replace state-issued money for transactions purposes, there would still be a need for financial intermediation. Banks would still exist and would still need to be regulated. The liquidity and solvency regulations currently enforced by central banks would still be required so central banks could still control the total amount of credit and the supply of broad money (including demand deposits). It is also possible that central banks would continue to have the resources to control short-term interest rates.
- A global crash in the prices of virtual currencies is not likely to cause any major financial stability problems unless the prices end up going far higher than their current value.
- The principal policy issues raised by virtual currencies relate to preventing money laundering and fraud. European policy-makers will need to consider whether these currencies should be subject to EU securities law.

1. INTRODUCTION

One of the most remarkable financial developments in recent years has been the growing interest in virtual currencies, in particular those that use cryptography to process transfers denominated in these currencies. The cryptocurrency Bitcoin has received enormous attention and the price of an individual Bitcoin has grown substantially in value over the past few years. This has been followed by many other “imitators”, many of whom have raised money through so-called Initial Coin Offerings (ICOs).

As of early June, the estimated total global market value of all these crypto-currencies was about \$350 billion, of which Bitcoin accounted for about \$130 billion.¹ While it is possible that these virtual currencies may end up playing an important role in the global economy, there is plenty of evidence to suggest we may be in the middle of a speculative bubble in which assets with little to no fundamental value are being priced highly.

Given these events, it is natural for central bankers to ask whether virtual currencies might have implications for their role as issuers of currency and regulators of the financial sector. Some advocates for virtual currencies believe they could ultimately replace the state-backed currencies issued by central banks. These advocates, who often come from a libertarian background, argue that cryptocurrencies such as Bitcoin provide a superior option for payments than euro or dollar-denominated transfers because they provide more privacy for users and their use of block-chain technology means those involved in payments are not required to place trust in financial institutions whose reputations have been damaged by the global financial crisis. Another commonly-stressed theme is that virtual currencies such as Bitcoin are designed to have a finite supply and thus will prove better stores of value than fiat currencies such as the euro, the supply of which can grow without bound.

Despite the enthusiasm of virtual currency advocates, I argue in this paper that central banks do not need to be concerned about being put out of business by virtual currencies. Nor is their role in making monetary policy or regulating the financial sector likely to change much. Indeed, I argue that even if a virtual currency replaced the euro or dollar for payments purpose, something like monetary policy would still exist, with a central bank controlling the supply of credit and playing a role in setting interest rates.

The contents of the rest of the paper are as follows.

Section 2 compares cryptocurrencies such as Bitcoin with existing currencies such as the euro or dollar which can be exchanged either via cash or banking transactions. Some economic theories suggest fiat currencies emerge as a decentralised solution to an efficiency maximising problem, in which case a more efficient currency could potentially emerge to replace a less efficient currency. I argue that the current era’s cryptocurrencies are far away from being efficient means of payment or store of value and thus are not a threat to replace central-bank-issued currencies via any efficiency-related consideration. Other aspects of cryptocurrencies that are celebrated by libertarians (such as the greater privacy associated with Bitcoin and the advantage of its fixed supply) are argued to be misplaced.

Section 3 argues that efficiency-based theories of money have little historical support and that the introduction and acceptance of money is best understood via the approach of the so-called Chartalist school, who emphasised the crucial link between the acceptance of money and the actions of the state. These theories (and many historical examples) suggest there is very little chance of privately-issued money replacing state-issued currencies.

¹ Source: <https://coinmarketcap.com/charts/>.

Section 4 moves more on a more speculative question. It asks what would happen to central banks if a virtual currency did end up replacing the euro or the dollar. I argue that financial intermediates such as banks would still be required and that public policy needs would still require a central regulator to control the total supply of credit in the economy. This regulator may well also be able to control market interest rates as part of its policy tool box.

Finally, Section 5 addresses some of the other concerns that virtual currencies are raising for central banks and financial regulators: These includes risks to financial stability and the need to combat fraud and money laundering. Virtual currencies may end up giving central banks plenty to worry about but they are certainly not going to put them out of business.

2. WEAKNESSES IN VIRTUAL CURRENCIES AS MONEY

Will virtual currencies replace fiat currencies issued by governments such as the euro or the dollar? I believe this is unlikely and will focus in the next two sections on two different sets of reasons. First, the current range of virtual currencies do not work efficiently enough to be a threat to normal currency. Second, the history of how currencies have been used points to a central role for government and the legal and economic reasons for this are unlikely to be over-turned by currencies issued by private bodies.

There are various schools of thought on how economies transitioned to using tokens to facilitate exchanges of good and services. An excellent summary of these schools of thought was provided by Charles Goodhart's (1998) "Two Concepts of Money" paper and I recommend strongly that anyone interested in how money became used as a medium of exchange read this paper.

Goodhart's paper describes how "*debate exists between those who have argued that money evolved as a private-sector, market-oriented, response to overcome the transaction costs inherent in barter ... and those who ... argue that the state has generally played a central role in the evolution and use of money (call them Cartalists).*" Goodhart noted that the first approach to understand money can be traced back to early discussions of the role of money such as that of William Stanley Jevons (1875) but that there are also more formal modern examples of how the private sector may settle on using a particular type of token as the basis for a monetary economy with Kiyotaki and Wright (1993) providing one model that illustrates how a "monetary equilibrium" can arise.

While the modern theoretical literature has tended to assume that money can be used without cost to trade goods, in practice all types of money have some potential costs and efficiencies associated with them. For example, bank notes can be forged and holding large amounts of cash can be risky and can require spending on security such as safes. Payments via credit cards and bank accounts can deal with the weaknesses associated with cash payments but come with their own costs, including bank charges, delays in processing, the potential for banks to become insolvent leading to creditor losses and the possibility of depositor online accounts being hacked.

In theory, if the private sector's decisions on which type of money to use are ultimately based on convenience, it is possible that a new type of currency that has lower transaction costs (or superior properties in relation to other features such as security or transaction speeds) could emerge as a consensus replacement for the existing currency. In practice, however, there is no evidence to suggest the current generation of virtual currencies have the features that could lead to a dramatic switch of this type.

In the rest of this section, I will discuss various weaknesses of virtual currencies for transaction purposes which, taken together, mean they are unlikely to be considered more efficient than the currencies we use today.

2.1. Safety and security

Virtual currencies have a wide range of practical drawbacks for use as money relative to traditional currencies. Consider, for example, Bitcoin, which is by far the highest value and most-hyped of the current virtual currencies. Bitcoin's now-famous blockchain technology does not solve the issues

relating to security that are associated with traditional money.² In fact, in many ways, Bitcoin is substantially less safe than normal money.

To conduct transactions using Bitcoin, users need to have bitcoins (each of which is basically a long sequence of numbers) “stored” in a so-called wallet, which can be used to accept coins or transfer them to another wallet. These can be either “hot” wallets, which record information about your bitcoins in an application on a computer or a phone that is connected to the internet or an online web wallet provided by third-party firms. These wallets can be used for transactions once someone has access to the wallet via the use of a unique private encryption “key” associated with this wallet. In practice, Bitcoin wallets have proven to be highly insecure. Hackers have moved bitcoins from many of the largest exchanges and those who have hot wallets can be subject to hacking via malware or lose the bitcoins via phishing exercises that fool them into giving away private keys.

Once Bitcoins have been stolen, there are none of the protections that are available to those who deposit their euros or dollars in bank accounts. All Bitcoin transactions are permanent, so the transactions removing the bitcoins cannot be reversed. Tracing the stolen bitcoins has also proven difficult because those who steal them often use “mixing” services which allow Bitcoins to be swapped so the stolen bitcoins end up being owned by people who had nothing to do with the original crime.

Of course, it is possible for commercial banks accounts to also be hacked but if a customer loses their deposits via hacking, it will generally be the bank’s responsibility to provide full compensation. Even if a bank ends up becoming insolvent because of a hacking crime or some other event, the vast majority of bank deposits are covered by government deposit insurance schemes.

Because these wallets are so insecure, the “official” advice from Bitcoin.org is to not keep many bitcoins in a wallet. They recommend³

“A Bitcoin wallet is like a wallet with cash. If you wouldn't keep a thousand dollars in your pocket, you might want to have the same consideration for your Bitcoin wallet. In general, it is a good practice to keep only small amounts of bitcoins on your computer, mobile, or server for everyday uses and to keep the remaining part of your funds in a safer environment.”

The safer environment they recommend is usually described as offline “cold-storage”. Bitcoin.org advises as follows

“An offline wallet, also known as cold storage, provides the highest level of security for savings. It involves storing a wallet in a secured place that is not connected to the network.”

Common cold storage options include USB keys or other storage media such as hard drives. Of course, if these cold storage devices are stolen or damaged, then the coins are effectively lost because without the necessary information, they cannot be spent.

I have placed an emphasis on safety and security because it is often claimed that cryptocurrencies will replace regular currencies such as the euro. However, if you gave most people the choice between (i) their current option of holding some cash and then having the rest of their money in a bank account

² I am assuming here that readers are familiar with the basic concepts underlying Bitcoin, including how individuals hold bitcoins and how transactions are conducted and verified via blockchain technology. There are many excellent introductions to Bitcoin technology that can do a better job of explaining these issues than I can do in the space provided here and written by people with greater expertise. One generally accessible summary that I can recommend is Böhme et al (2015).

³ <https://bitcoin.org/en/secure-your-wallet>.

and (ii) the option of holding some bitcoins in a hot wallet that can be hacked and holding the rest on a USB key that could be lost, I suspect very few would pick the Bitcoin option.

Of course, cryptocurrency enthusiasts emphasise that Bitcoin holdings can be made safe if people use security precautions such as two-factor authorisation and regular use of computer backups. But is a currency that requires people to understand two-factor authorisation ever likely to take off and become a mass currency that replaces the dollar or euro? I think this is unlikely.

2.2. Payment-related issues

One area where Bitcoin can claim to be more efficient than normal currencies is the efficiency of its payments system. As Bitcoin.org puts it⁴

"Sending bitcoins across borders is as easy as sending them across the street. There are no banks to make you wait three business days, no extra fees for making an international transfer, and no special limitations on the minimum or maximum amount you can send. The Bitcoin network is always running and never sleeps, even on weekends and holidays."

Despite its complex verification process, Bitcoin transactions are currently being verified at an average time length of about ten minutes (provided the sender pays a transaction fee). While the transactions delays often associated with commercial banking may not be a big concern for many people, this is certainly an area where cryptocurrency seems to have an advantage.

That said, conventional bank payment systems are already moving towards much faster processing. For example, the ECB is introducing its TARGET instant payment settlement (TIPS) in November. This system will allow money transfers within the euro area to be settled in matter of seconds. There is also evidence that some of the technological ideas underlying virtual currencies are going to be used in commercial banking in the future. For example, many banks are now using payments services provided by Ripple, which uses some of the elements present in Bitcoin's technology (hashtrees to summarise transactions and a distributed network of different nodes each verifying transactions) to improve their international payments. Worth noting, however, is that Ripple also offers payments services using its own virtual currency (XRP) and as of yet there seems to be little commercial interest in this service.

So while payment efficiency may be an area where the current "blockchain mania" ends up having an impact on the financial sector, it does not provide reasons to think one of these virtual currencies will become a dominant vehicle, replacing or working alongside the dollar or euro in every-day transactions.

2.3. Uncertain value and volatility relative to traditional currencies

Modern currency has no innate value other than as a medium of exchange. This is just as true for the dollar or euro as it is for virtual currencies: People only accept these currencies for payment because they know they can use them to acquire goods and services from other people. Virtual currencies such as Bitcoin are not yet at the point where they are widely accepted as payment and it appears that only a small fraction of Bitcoin transactions actually involve swapping bitcoins for goods or services, with the rest of the transactions being people buying and sell bitcoins for speculative purposes.

The perceived value for any virtual currency is thus based on possibility that, at some point in the future, the currency may be widely accepted as a replacement for state-issued currencies or at least be

⁴ <https://bitcoin.org/en/bitcoin-for-individuals>.

accepted alongside these traditional currencies. If this was to happen for Bitcoin, for example, then we could estimate a future value of by assuming the currency would finance a large fraction of all day-to-day transactions in the global economy. Then one could think about what each unit of the currency would be valued at by dividing an estimated total transaction values over a period by the total number of units of the virtual currency that would be used over this period .

Because Bitcoin has been designed to have a maximum supply 21 million total coins, then each bitcoin unit would have to have an extremely high value to finance a large amount of daily transactions. To give one concrete calculation, the Federal Reserve's payments system Fedwire processes about \$3 trillion per day in transactions. If this was all financed by Bitcoins and each day one in ten Bitcoins was spent, then one could calculate the necessary value of 1 Bitcoin by dividing \$3 trillion by 2.1 million, which would equal about \$1.4 million. These calculations give a sense of why Bitcoin enthusiasts believe the currency's value could end up soaring.

On the other side of the argument, it is probably more likely that Bitcoin does not end up being used by many people for transactions and that its value ends up heading towards zero. Even if a particular virtual currency ends up emerging as a replacement for the euro or dollar, there is no reason to think that it would have to be Bitcoin or any of the existing range of cryptocurrencies. So while, theoretically, the value of these currencies could end up being extremely high, it is more likely they will end up being worthless.

Making judgements about the likeliness of low probability events (and what exactly would happen if these events took place) is extremely difficult so it is not surprising that prices of virtual currencies are extremely sensitive to news or speculation. Because the prices of these currencies depend on the possibility they may achieve mass acceptance in the future, they are also subject to speculative self-sustaining booms and busts. An increase in the price of Bitcoin, for example, is seen as a sign that more people believe this will be a successful currency and since widespread acceptance is exactly what is needed for the currency to end up having a positive value, this can fuel further price increases. The opposite can also happen and most likely will happen when the prices of these virtual currencies head towards zero.

For these reasons, the prices of virtual currencies when quoted in dollars tend to be extremely volatile. This volatility undermines their ability to perform one of the most basic features required for something to function as "money" i.e. that it be considered a store of value. Currency can be spent on goods and services but it is just as important to know that it can be saved rather than spent and the holder of this currency will have a good idea how much they can purchase later with the money they have saved. Virtual currencies such as Bitcoin do not have this feature. If you hold on to bitcoins, you have no idea how much you will be able to acquire later in the form of goods and services. Instead, most who invest in Bitcoin are engaged in speculation, hoping the price will rise in the future, at which point they can cash out and turn their investment back into dollars or other conventional currencies.

2.4. Libertarian arguments for Bitcoin

Two other elements of virtual currencies, particularly Bitcoin, have been emphasised by libertarian advocates in recent years: Privacy and the benefits of a fixed supply of currency in terms of maintaining value.

2.4.1. Privacy

In relation to privacy, Bitcoin enthusiasts highlight how transactions can be undertaken independent of financial institutions which require that they know the name and address of the individuals they are

dealing with. Bitcoin wallet addresses are just strings of numbers so, in theory, there is complete anonymity about who owns them.

In practice, claims that Bitcoin allows for complete privacy are over-stated. Unlike traditional currencies which allow cash transactions that can be carried out in complete privacy, every single Bitcoin transaction is recorded on a publicly-available distributed ledger. And while Bitcoin wallets are theoretically private, using them to receive goods or services will generally require giving over a name or address. All transactions from these wallets and the balances in the accounts are also publicly available.

For these reasons, Bitcoin's official advice is that users should take a number of steps to protect their privacy⁵:

"To protect your privacy, you should use a new Bitcoin address each time you receive a new payment. Additionally, you can use multiple wallets for different purposes. Doing so allows you to isolate each of your transactions in such a way that it is not possible to associate them all together. People who send you money cannot see what other Bitcoin addresses you own and what you do with them."

It turns out, however, that even these complicated steps are insufficient to guarantee complete privacy. Researchers have shown that hackers can link Bitcoin transactions to IP addresses, so even the use of multiple wallets does not guarantee complete privacy.⁶

One could argue that a new virtual currency could emerge that has superior privacy features to Bitcoin. But these extreme privacy features don't matter much to most people and this feature is unlikely to turn any virtual currency into a widely-accepted medium of exchange, particularly if users are required to take lots of additional steps to protect their privacy. By contrast, should a completely private virtual currency become successful, it is likely that law enforcement agencies would take steps to prevent its abuse by criminals. There are good reasons why banks are asked to record personal information on their customers (relating to preventing money laundering and tax evasion) and these reasons would apply to any virtual currency that became a popular medium of exchange. Indeed, legal authorities are already beginning to pay closer attention to the use of the Bitcoin network for money laundering and sale of illegal drugs. Overall, it is highly unlikely that any virtual currency will gain a mass acceptance on the basis of having superior privacy features to existing currencies. And if cash were to be eliminated, it is likely that people will have less privacy around their financial transactions than they do today.

2.4.2. Fixed Supply

One of the most commonly cited advantages of Bitcoin is the idea that it will have a limited total supply of 21 million bitcoins.⁷ Some argue this will allow Bitcoin to sustain its value and this is commonly contrasted with the US dollar, which is claimed to "have lost almost all its value over the past 100 years". This is then cited as a reason why people will abandon fiat currency in favour of Bitcoin.

These arguments are seriously flawed. In relation to the dollar losing value, it is indeed the case that the US consumer price index increased by a factor of 25 between 1913 and 2017.⁸ This means that a dollar kept in a shoebox over these 104 years would only be able to purchase an equivalent of 4 per

⁵ <https://bitcoin.org/en/protect-your-privacy>.

⁶ Biryukov, Khovratovich and Pustogarov (2014).

⁷ It is possible, however, that a majority of Bitcoin miners (who verify transactions) could get together at some point in the future to change the protocol that limits the supply.

⁸ Source: St Louis Fed, FRED database, <https://fred.stlouisfed.org/series/CPIAUCNS>.

cent of what it could get you in 1913. So, technically one can indeed say “the dollar has lost 96 percent of its value” since 1913.

However, despite the shock value of this figure, it turns out this level of price increase has corresponded to an average inflation rate of only 3.1 percent over these 104 years, which is not an inflation rate that causes much disruption to economic activity. And there is no evidence that this inflation has had a negative effect on people’s wealth. While Bitcoin and gold enthusiasts often compare the value of the dollar with the price of gold, it can easily be shown that essentially any investment strategy other than keeping your money in a shoe box (e.g. keeping money in a savings account, investing in short term government bonds or purchasing property) will have produced returns ahead of inflation.

It is also ironic also that this movement against fiat currency comes during a long period in which inflation has been subdued and indeed over the past decade leading central banks such as the ECB have struggled even to meet low inflation targets of 2 percent.

A final point on inflation with a fixed supply of money is worth making. A world in which Bitcoin had been adopted as the primary currency with a fixed supply of 21 million bitcoins would be a world in which the monetary base was fixed. But, as I will discuss further below, it won’t necessarily have a fixed supply of money in the broader since providing some form of fractional reserve banking continues. So there may still be fluctuations in the broader supply of money. Moreover, in modern economies, there appears to be almost no relationship between the monetary base and inflation. For example, the QE episodes in the US, UK and the euro area have all lead to large increases in the monetary base without any corresponding surge in inflation. A fixed monetary base is not necessarily a guarantee of low inflation.

My assessment is that an inflation-induced abandonment of fiat currency in favour of Bitcoin or any other virtual currency is an incredibly unlikely event in the coming decades.

3. PRIVATE VERSUS STATE-ISSUED MONEY

Up to now, I have considered the merits of current virtual currencies from an efficiency standpoint and argued they are unlikely to replace existing currencies on these grounds. However, as Goodhart's (1998) paper outlined, the idea that monetary systems have ever emerged via an efficiency-driven private sector process is disputed by many familiar with the economic history of monetary systems. In his review of the use of money as a medium of exchange, Goodhart notes that "*the relationship of the state, the governing body, to currency in all its roles has almost always been close and direct*" a position associated with the so-called "Chartalist" school of monetary thought.

There are a number of reasons why states have taken control of the issuance and supply of money and why the public accepts state-issued money for transactions purposes.

A first is that money is clearly a "public good" in that its existence benefits everyone by facilitating trade in a more efficient way than would be the case in non-monetary economics. However, the issuance of money by a private entity bestows a benefit on the issuer and thus a private issuer may have an incentive to issue an above-optimal amount of money because they will be considering their own private benefit more than the social costs associated with too much money being issued. The creators of Bitcoin have suggested a clever way to get around the problem of limiting the supply of their currency but it remains to be seen whether private institutions are capable of keeping commitments to limit the supply of virtual currencies. In contrast, there are a number of legal and institutional mechanisms for keeping public organisation such as the Federal Reserve or ECB to honour their commitments to maintain low inflation and these have worked well over the past 30 years.

A second reason is that state-issued money facilitates tax collection and creates an important source of demand for this type of money. The fact that states insist that taxes be paid in the currency issued by the government is a crucial reason why these currencies are unlikely to be replaced. There are clearly many different possible types of "tokens" that could work as money but only state-issued money will have the feature that it can be used for tax payments. This will always be a key factor preventing any privately-issued money from replacing state-issued money as a common medium of exchange.

A third reason is that to work well monetary and financial systems need to have a substantial legal infrastructure supporting them. For a monetary system to work well, there needs to be a system of prosecuting and punishing those that forge currencies or steal them and the legal infrastructure to do this can only reliably come from governments. These governments are not likely to extend this kind of support to virtual currencies such as Bitcoin.

A final key reason why state-issued money has been dominant is that the ability to print money is a source of revenue for states that they will always be reluctant to give up. While pure monetary financing of government expenditure is not practiced much in modern advanced economies with well-developed tax systems, it is still the case that the issuance of notes and coins by central banks is a highly profitable activity and the profits of central banks get passed back to national treasuries. This is one reason why governments would use legal restrictions to prevent any competitor currencies from becoming used widely as a medium of exchange.

For these reasons, it is unlikely that even an efficient well-designed privately created virtual currency will replace state-issued currencies such as the euro.

4. MONETARY POLICY WITH VIRTUAL CURRENCIES?

Of course, I could be wrong. It may be that at some point in the near future, people have no interest in acquiring dollars or euros and everyone in the world is using a virtual currency for transactions. Would this mean the end of central banks? Not necessarily.

Even if a virtual currency such as Bitcoin replaced the existing monetary base, there is no reason to believe the rise of virtual currencies would eliminate the need for financial intermediation. Some people will have large Bitcoin savings and others will need Bitcoin-denominated loans to buy houses, cars or business equipment. So while much of the fuel for the virtual currency movement has come from a distrust of bankers, something like banks will still be required in the future to act as financial intermediaries.

Most likely, future financial intermediaries will continue to offer demand deposits to customers and this will mean operating a fractional reserve banking system. This would mean the supply of money, in the form of actual Bitcoins plus Bitcoin-denominated deposits people hold with banks, would be much larger than the monetary base of 21 million bitcoins.

Given the innate instability of fractional-reserve banking, a future Bitcoin-based banking sector would still presumably be subject to the same kinds of liquidity and solvency-related regulations as current banks. So this future system would still need a central bank that required banks to store a certain fraction of deposits with the central bank as “reserves” and also that these institutions would have a required amount of funding in the form of equity.

The ability to adjust reserve requirements and capital requirements would allow a central bank in this future Bitcoin-only economy to control the total size of bank balance sheets and thus the supply of credit and the broader supply of money. In this sense, monetary policy would still exist even if a central bank no longer had the power to create base money from nowhere.

One could also imagine that future central bank, without the ability to determine the monetary base, could be financed by a tax on the financial sector. These revenues could provide funds to the central bank which could then be used to pay interest on reserves to banks. This would allow the central bank to control the cost of credit in a similar fashion to the way the Fed and ECB are currently doing. So, while a future without the dollar or the euro may seem like science fiction, one could still imagine central banks playing a key role in macroeconomic policy and financial regulation even in these futuristic economies.

5. CURRENT CONCERNS: FINANCIAL STABILITY AND FRAUD

Central banks do not have to worry about virtual currencies replacing the money they issue any time soon. However, the virtual currency phenomenon is clearly presenting a number of challenges to central banks and financial regulators.

One concern is that the bubbles associated with cryptocurrencies could at some point destabilise the financial sector or the wider economy. There is little doubt that the valuation of the various cryptocurrencies and other companies promising to do great things with blockchain technologies have all the features of a bubble. However, unless the virtual currencies appreciate very substantially from their current valuations, a crash in this area is unlikely to have much wider effect on the economy.

As of June 14, the total global market capitalisation of various virtual currencies was \$272 billion. While this may seem like a large number, it is still very small compared to total global financial wealth. Indeed, this market capitalisation has already fallen from a peak of \$814 billion on January 7 and this decline has had little effect on the global economy. Unlike the housing bubble of the 2000s, the popping of this bubble is unlikely to cause solvency problems for banks. It is even less likely to have much impact on the real economy because there is so little real economic activity linked to these currencies. There may be reduced demand for computing equipment to mine bitcoins after the bubble has popped but conversely, the lower demand for electricity due to reduced mining activity would reduce energy prices (and be good for the environment.)

Virtual currencies also raise a host of concerns for financial market regulators that are essentially separate from monetary policy or financial stability concerns. Among these is use of virtual currencies for money laundering purposes. While it may have been easier to use virtual currencies to launder money related to illegal drug businesses when these currencies were in their infancy, financial market regulators will have to devote more time to tackling illegal money flowing through virtual currency exchanges in the future.

Cryptocurrencies appear to sit in a legal “grey area” in that they are generally not defined as securities and so they are not subject to the host of legal restrictions set by securities law. This has allowed the market for cryptocurrencies to become the “Wild West” of financial markets, with trading on unregulated exchanges apparently featuring a series of market manipulation issues such as insider trading, front running and exchanges using other digital currencies to manipulate the price of currencies such as Bitcoin.⁹ This leaves many unsuspecting investors open to being defrauded out of their money. In the US, the Securities and Exchange Commission has made clear it is looking closely at the cryptocurrencies and has signalled it may subject many Initial Coin Offerings to the kinds of regulations governing Initial Public Offerings of shares.¹⁰ With many European citizens also investing their money in virtual currencies, these markets also raise issue for European legislators.

So while virtual currencies will not replace sovereign-backed money, they are likely to raise policy issues for central banks and financial regulators for many years to come.

⁹ See Griffin and Shams (2018).

¹⁰ See the speech by William Hinman of the SEC <https://www.sec.gov/news/speech/speech-hinman-061418>.

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Virtual currencies have generated much discussion over the past few years with some believing they are an improvement on state-issued currencies and will end up replacing them. This paper argues this is extremely unlikely. Cryptocurrencies such as Bitcoin do not work well as money because of security weaknesses and the volatility of their price relative to traditional currencies. The theory that the private sector will choose to replace a state-backed currency with privately-issued currency also has little historical backing.

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