

WHAT IS A *DIGITAL CURRENCY*?

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INTRODUCTION

Though no one has officially taken credit for inventing the Bitcoin ecosystem,¹ Satoshi Nakamoto—the person who published the initial conceptual and technical description of Bitcoin in 2008—is credited as the digital currency’s intellectual father.² His influential paper described Bitcoin as a “peer-to-peer version of electronic cash” that used cryptography to secure transactions.³ Protected by algorithms, Bitcoin users could safely transact without relying on—or paying for—the guarantee of third

¹ Bitcoins are the most widely used digital currency to date. Mining is the process by which Bitcoins are entered into the Bitcoin ecosystem. Many online sources provide succinct descriptions of Bitcoin. See *What is Bitcoin?*, COINDESK (Jan. 17, 2016, 8:20 AM), <http://www.coindesk.com/information/what-is-bitcoin/> [<https://perma.cc/TZ9S-EPDF>]; Tal Yellin, Dominic Aratan & Jose Pagliery, *What is Bitcoin?*, CNNMONEY (Jan. 17, 2016, 8:20 AM), <http://money.cnn.com/infographic/technology/what-is-bitcoin/> [<https://perma.cc/T9C5-FV47>]; Christina Rexrode, *Bitcoin basics: What you need to know*, MARKETWATCH (Jan. 27, 2016, 8:20 AM), <http://www.marketwatch.com/story/bitcoin-basics-what-you-need-to-know-2014-04-09> [<https://perma.cc/8YV3-6T33>].

² *Who is Satoshi Nakamoto?*, COINDESK (Jan. 17, 2016, 8:20 AM), <http://www.coindesk.com/information/who-is-satoshi-nakamoto/> [<https://perma.cc/BTX3-T8C4>] (stating that Nakamoto has denied his fatherhood); Aron Ranen and Brandon Lowrey, *Man called Bitcoin’s father denies ties, leads LA car chase*, REUTERS (Jan. 17, 2016, 8:30 AM), <http://www.reuters.com/article/us-bitcoin-inventor-idUSBREA252D820140307> [<https://perma.cc/JE38-JERB>]. It is estimated that Nakamoto owned one hundred million U.S. dollars’ worth of Bitcoins in May 2013. CHRIS CLARK, BITCOIN INTERNALS: A TECHNICAL GUIDE TO BITCOIN loc. 54–58 (Kindle Edition 2013) (ebook).

³ SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2016), <https://bitcoin.org/bitcoin.pdf> [<https://perma.cc/H96W-5LJ6>].

party financial institutions.⁴ The proposed cash system would rely on a decentralized system of invested individuals to record and confirm Bitcoin transactions.⁵ To protect the identities of Bitcoin users, the algorithms underlying the digital currency use addresses instead of names.⁶ Only a Bitcoin's owner has access to the key needed to access the wallet software allowing the user to transfer those Bitcoins, at least so long as no one else has illegitimately gained knowledge of the key.⁷ Nakamoto was convinced that the internet needed a currency that was, like it, decentralized, protected by cryptography, and conducive for peer-to-peer exchange.⁸

Three distinct groups of actors comprise the Bitcoin ecosystem: investors, speculators and users. Investors fall

⁴ *Id.*

⁵ *Id.* at 2; *see also*, CLARK, *supra* note 2, at loc. 350–53.

⁶ NAKAMOTO, *supra* note 3 at 6–7; *see also*, CLARK, *supra* note 2, at 350–53.

⁷ CLARK, *supra* note 2, at loc. 114–17 (“The keys in the wallet are cryptographic codes that enable transfer of bitcoins from your addresses to other addresses. The keys look like addresses, but they are longer, containing 51 characters. If someone else gets access to the keys in your wallet, they can steal your bitcoins by transferring it to one of their addresses. If a hacker can hack into your computer, then they can probably get your keys, so make sure your system is secure.”).

⁸ NAKAMOTO, *supra* note 3. However, Bitcoin is not the first attempt to create cash for the internet. Throughout the 1990s, a number of digital currencies with names such as Flooz and Beenz came and went without leaving much of a mark. DAVID S. EVANS & RICHARD SCHMALENSSEE, *PAYING WITH PLASTIC: THE DIGITAL REVOLUTION IN BUYING AND BORROWING* loc. 3648 (Kindle Edition 2005) (ebook). These electronic cash systems passed through the economy below the level of government regulation. Bitcoin has a broader user base, more interested parties, and greater popular exposure than its 1990s analogs, though the jury is still out as to whether this electronic cash system has staying power. MELANIE SWAN, *BLOCKCHAIN: BLUEPRINT FOR A NEW ECONOMY* loc. 33-9 (O'Reilly Media Kindle Edition 2015) (ebook).

into two camps: those who have invested in the hardware needed to produce Bitcoins and facilitate Bitcoin transactions and those who have invested in exchanges that trade Bitcoins for U.S. dollars and vice versa. Speculators in Bitcoin are those individuals and institutions that have purchased sizable quantities of Bitcoin for the purpose of reselling at a higher price in the future. Speculation has become popular in the Bitcoin world due to the digital currency's widely fluctuating price.⁹ Bitcoin users come in a multitude of varieties. Some are netizens looking to use the cash of the internet primarily for online transactions.¹⁰ Others are libertarian minded individuals who greatly enjoy partaking in a currency not controlled by any government or central bank (or, for that matter, any bank at all).¹¹ Many individuals simply heard about Bitcoin, found themselves with some quantity of the digital currency, and sought out physical stores willing to take Bitcoin as payment. And a variety of businesses have decided to accept Bitcoins as

⁹ In January 2013, the price of a Bitcoin in U.S. dollars was negligible. By July of that year the price had crept up to \$100 U.S. per Bitcoin, and the digital currency reached conversion rate highs in the \$1100s near the end of that year. BITCOIN.ORG, *Frequently Asked Questions*, <https://bitcoin.org/en/faq> [<https://perma.cc/L3AE-VNLN>]. Since then, the price has come down, with one Bitcoin being valued at roughly \$427 U.S. on December 31, 2015. *Bitcoin Price Index Chart*, COINDESK, <http://www.coindesk.com/price/> [<https://perma.cc/8J9V-FTS5>].

¹⁰ For a great example, see Kashmir Hill, *21 Things I Learned About Bitcoin From Living On It For A Week*, FORBES, <http://www.forbes.com/sites/kashmirhill/2013/05/09/25-things-i-learned-about-bitcoin-from-living-on-it-for-a-week/#2715e4857a0bea6e94727ca6> [<https://perma.cc/L7UD-QV77>].

¹¹ Indeed, the libertarian party recognizes that its membership has begun to use Bitcoin and is facilitating Bitcoin-based donations at <https://www.lp.org/donate/bitcoin-contribution/> [<https://perma.cc/UK6R-5CMJ>].

payment for goods and services.¹² Ultimately, each of these users is using Bitcoin for transactions that could be performed in some other currency.

There is another group of Bitcoin users whose purposes are significantly more nefarious. The decentralized, anonymous character of Bitcoin transactions is ideal for criminal organizations and terrorists, and the general lack of public information concerning the details of Bitcoin has paved the way for fraudsters of all stripes.¹³ Silk Road—an online marketplace of drugs and weapons, along with other items and services—is known to trade largely in Bitcoin,¹⁴ and the Department of Defense has expressed in interest in the link between Bitcoins and financing terrorism.¹⁵ Finally, hacker's prey on the distracted and unprepared, exposing everyone involved in the Bitcoin ecosystem to the risk of theft.¹⁶

Worried about both consumer protection and the link between Bitcoin and illegal activity, Congress and federal

¹² For a non-exhaustive list of companies accepting Bitcoin, see Jonus Chokun, *Who Accepts Bitcoin as Payment? List of Companies, Stores, Shops*, 99BITCOINS, <http://www.bitcoinvalues.net/who-accepts-bitcoins-payment-companies-stores-take-bitcoins.html> [https://perma.cc/Q4QK-ZSRE] (last visited Jan. 2, 2016).

¹³ For an actively updated list of Bitcoin frauds, see *Bitcoin Scams*, <https://www.cryptocoinsnews.com/bitcoin-scams/> [https://perma.cc/N444-93WD] (last visited Jan. 2, 2016).

¹⁴ Joshua Bearman & Tomer Hanuka, *The Rise & Fall of Silk Road*, WIRED (May 2015), <HTTP://WWW.WIRED.COM/2015/04/SILK-ROAD-1/> [https://perma.cc/C9BX-BXNZ].

¹⁵ Tyler Durden, *Department of Defense to Study Bitcoin as a "Terrorist Threat"*, ZeroHedge (May 7, 2014, 6:33 PM), <http://www.zerohedge.com/news/2014-05-07/departement-defense-study-bitcoin-terrorist-threat> [https://perma.cc/G4ZT-99P3].

¹⁶ James Baldwin, *Can Bitcoin be Hacked?*, INVESTOPEDIA (Jan. 17, 2016, 8:45 AM), <http://www.investopedia.com/articles/investing/032615/can-bitcoin-be-hacked.asp> [https://perma.cc/CDX5-NEFJ].

regulators took a closer look at digital currency in 2013. Federal regulatory focus can be understood as having two prongs. The first centers on consumer protection. Regulators are worried that unsophisticated users and holders of Bitcoin will be swindled by Bitcoin intermediaries or hacked by computer science experts. Other executive branch officials want the public to know that using Bitcoin may inadvertently fund nefarious activity. The second prong views the Bitcoin ecosystem as a new economic space in need of regulation. This prong seeks to divide the world of Bitcoin into intermediaries, long-term and short-term speculators, and ordinary users in order to apply pre-existing financial regulatory and tax frameworks to the Bitcoin economy.

A pressing question in the literature is whether or not federal regulators have gotten Bitcoin “right.”¹⁷ This Note adds to that literature by delving to the more fundamental concern: What criteria—what test—should be used to decide whether or not a currency-like digital payment system is treated as non-currency property? This Note also investigates the potential mismatch between existing regulations and emerging, bank-backed digital currencies. Digital currencies need not have each of the features characteristic of Bitcoin. For example, Goldman Sachs recently went public with their own digital currency—

¹⁷ See Omri Marian, *Conceptual Framework for the Regulation of Cryptocurrencies*, 82 U. CHI. L. REV. DIALOGUE 53, 68 (2015); Nicole Mirjanich, *Digital Money: Bitcoin's Financial and Tax Future Despite Regulatory Uncertainty*, 64 DEPAUL L. REV. 213, 248 (2014); Sarah Gruber, Note, *Trust, Identity and Disclosure: Are Bitcoin Exchanges the Next Virtual Havens for Money Laundering and Tax Evasion*, 32 QUINNIPIAC L. REV. 135, 207 (2013). Generally, existing law articles have approached digital currency and its regulation from a pragmatic perspective. Unfortunately, different articles employ vastly divergent vocabularies and conceptual understandings, making comparison and analysis difficult.

SETLcoin—which lacks two of Bitcoin’s defining features: decentralization and anonymity.¹⁸

Because the regulation of digital currency is ultimately a money issue, it is logical to begin with money itself. Part I of this paper advocates for the credit theory of money against the traditional account by investigating the history of currency and its regulation in the United States. Part II delves deeper into the specifics of the existing federal regulatory scheme for digital currencies and identifies two concerns: a classification worry that non-digital currency technologies will be inappropriately channeled toward digital currency-specific guidance and a substantive worry based on the credit theory of money presented in Part I that emerging digital currencies could pose risks to the United States’ monetary system. Part III proposes methods by which regulators could alleviate the concerns identified in Part II. The classification concern is resolved by means of a test to determine whether or not a currency-like digital payment system should be treated as a digital currency or a contracting mechanism. A multi-factor investigation is advanced to determine whether or not a digital currency could pose risks to the United States monetary system. The goals of this paper are to provide an in-depth understanding of the current digital currency ecosystem, point out troubles on the horizon for regulators, and offer solutions.

¹⁸ Brian Cohen, *Goldman Sachs File Patent Application for Securities Settlement Using Cryptocurrencies*, BITCOIN MAGAZINE (Dec. 1, 2015, 3:16 PM), <https://bitcoinmagazine.com/articles/goldman-sachs-files-patent-application-for-securities-settlement-using-cryptocurrencies-1449000967> [<https://perma.cc/GY5G-DYK9>].

I. THEORIES OF MONEY AND THE HISTORY OF CURRENCY

A. *What is Money*

Those untouched by the graces of economists and business school can readily identify money. Money is cash and coin—the green, silver, and brownish stuff found in wallets and purses. When someone needs money they already own, possession is as simple as swiping a card at an ATM or engaging in a short conversation with a teller.

Veterans of business school have a more nuanced understanding of money.¹⁹ A favorite game of business school professors involves a classroom of first-year MBA students and one hundred dollars.²⁰ The professor takes her hundred dollars and deposits it in a bank (one of the students). Based on the rules of the game, the student must hold on to ten percent of the deposit but can lend out the remainder. The student is encouraged to do so. Another bank (a different student) then receives that ninety dollars on credit, keeps nine dollars in reserve, and lends out the remaining eighty-one dollars. After allowing a few more rounds to complete, the professor asks her students to calculate how much the money supply increased from its starting point of one hundred dollars.

This game sets the stage for the professor to explain a few of the crucial concepts needed to understand what money is today. As the students quickly realized, the amount of money in circulation quickly exceeded the original, hundred-dollar deposit made by the professor. As the professor would explain, the monetary base—also known as

¹⁹ FELIX MARTIN, *MONEY: THE UNAUTHORIZED BIOGRAPHY* 221 (Knopf, Random House 2013).

²⁰ NIALL FERGUSON, *THE ASCENT OF MONEY: A FINANCIAL HISTORY OF THE WORLD* loc. 658–93 (Penguin Publishing Group, Kindle Edition 2008) (ebook).

“high-powered money” or “M0”²¹—“is equal to the total liabilities of the central bank, that is, cash plus the reserves of private sector banks on deposit at the central bank.”²² M1—also known as “narrow money”²³—includes deposit accounts that can be accessed on demand. In the above example, after three rounds of play, M0 equals one hundred dollars, but M1 is equal to two hundred and seventy one. Higher numbers of “M” include increasing amounts of assets. For example, certificates of deposit, savings accounts, and money market deposit accounts are included in M2.²⁴

The important conceptual reward of playing the professor’s game is that money is not just the green and metal stuff found in wallets, purses, and bank vaults. Rather, money comes in a variety of forms which can be distinguished from each other on a multiplicity of axes. For example, M0 is called the monetary base because it includes all of the currency backed by the central bank of the United States, the Federal Reserve.²⁵ All other forms of money are ultimately based on the monetary base.²⁶ M1 can be distinguished from M2 based on how quickly and easily the owner of the money asset can acquire possession of it.²⁷

The business school account of money is based on three defining characteristics of modern monetary systems.²⁸ Niall Ferguson describes these characteristics as “(a) cashless

²¹ *Id.* at loc. 664–80.

²² *Id.* at loc. 666–67.

²³ *Id.* at loc. 672–79.

²⁴ *Id.*

²⁵ *Id.* at loc. 664–71.

²⁶ *Id.* at loc. 664–78.

²⁷ *Id.* at loc. 671–78.

²⁸ *Id.* at loc. 680–85.

intra-bank and inter-bank transactions b) fractional reserve banking and c) central bank monopolies on note issue, the very nature of money evolved in a profoundly important way.”²⁹ Each of these features shall be discussed later. For now, it is important to keep in mind that these features did not emerge until at least the 17th century.³⁰ There is no guarantee that these features will remain constant going forward. Thus, the business school explanation of money is useful as a description of today’s monetary system but requires theoretical augmentation to offer insight into the development and future of money.

B. Theories of Money

1. The Traditional Account

Surprising to some, but all too predictable to others, economists approach money in a way distinct from and perhaps foreign to business school graduates.³¹ Adam Smith formulated what has become the traditional account of money in *An Inquiry into the Nature and Causes of the Wealth of Nations*.³² Smith thought it logical that the original human societies would exchange goods through barter.³³ Individuals and communities would satisfy needs and desires by exchanging goods they could produce for those they were unable to provide for themselves. A prototypical example would be one farmer with an excess of apples bartering some of that excess for the surplus citrus of his neighbor.

²⁹ *Id.*

³⁰ *Id.* at loc. 700 (“There is no question, certainly, that the financial revolution preceded the industrial revolution.”).

³¹ MARTIN, *supra* note 19, at 220–21.

³² *Id.* at 8.

³³ *Id.* at 11.

The primary problem with barter systems, according to the traditional account, was the difficulty of finding trading partners who both had precisely what one desired and desired precisely what one had at the right time.³⁴ An additional problem concerned the ability of barterers to store value in preparation for hard times or to save for a particularly costly exchange due to the perishable nature of many goods.³⁵ Though barter systems allowed human beings to satisfy more wants and needs than solitary existence, practical and logistical shortcomings imposed rigid limits on the scope and extent of trade.

Money arose due to inefficiencies characteristic of barter societies.³⁶ The solution to the practical and logistical shortcomings of barter systems was to choose one commodity to treat as a medium of exchange.³⁷ No longer must trading partners have the precise goods the other is looking for; instead, one could pay in the commodity chosen as the means of exchange, and the other could take that commodity and exchange it for his preferred goods elsewhere. Additionally, the value of perishable goods could now be stored by saving some of the exchange commodity one received in the course of trading. The first money, according to the traditional account, was whatever commodity was first chosen by some community as a medium of exchange.³⁸

According to the traditional account, rare metals—particularly gold and silver—eventually became the dominant exchange commodity because those commodities were especially capable of storing value and serving as a

³⁴ FERGUSON, *supra* note 20, at loc. 315–28.

³⁵ *Id.* at loc. 315–30.

³⁶ MARTIN, *supra* note 19, at 8–10.

³⁷ *Id.*

³⁸ *Id.*

means of exchange.³⁹ These rare metals—known as “specie”—did not lose their value over time and was already considered valuable by many societies for religious or cultural reasons.⁴⁰ Thus, transacting parties could trust that each partner would be willing to accept specie as payment, and those receiving specie in payment could trust that the value received could be stored and used in future transactions.

However, specie itself imposed limitations on trade. Metals are heavy and relatively difficult to secure. Additionally, metals have independent value, raising the prospect that enterprising individuals would melt down coin to sell the specie at market value.⁴¹ Finally, the supply of gold and silver was a variable that proved to have debilitating consequences on emerging national economies. When the supply of specie dwindled, money became artificially scarce.⁴² When the supply suddenly increased—such as in Spain upon the discovery of the New World—price inflation would result regardless of the underlying economic situation⁴³.

The traditional theory posits that paper currency emerged to solve the problems inherent in metals. The value of paper was, at least until the 20th century, tied to the value of specie. Paper offered obvious advantages when compared with coin and metal bars. Paper currency is light and readily transferred. It is easier to store due to its weight and size. Though paper is easier to lose or destroy than metals, the practical and logistical advantages it offered to transacting partners were irresistible.

³⁹ *Id.* at 9.

⁴⁰ FERGUSON, *supra* note 20, at loc. 315–30.

⁴¹ MARTIN, *supra* note 19, at 124–25.

⁴² FERGUSON, *supra* note 20, at loc. 318–49.

⁴³ *Id.* at loc. 349–65.

So long as the value of paper currency was linked to the value of specie, money supply problems common to economies that use metals directly as the exchange commodity remained. The problem was what to do when more money was needed than the supply of gold allowed.⁴⁴ One solution would be for the currency provider to accumulate more gold and correspondingly print more dollars. Another would be to print additional dollars, thus devaluing all existing currency and altering the ratio between the value of currency and the price of gold. Specie naturalists, starting with Locke and running through to the present day, believe that the value of money is nothing but the value of the underlying commodity; thus, to preserve the value of a nation's paper money, the sovereign must maintain a steady ratio between the value of paper money and the market price of gold.⁴⁵ Less naturalistic traditionalists accept that currency providers may, on occasion, need to print additional paper without acquiring a corresponding quantity of specie to account for money shortages.⁴⁶

To the chagrin of specie naturalists, the early 20th century time and time again saw the less naturalistic traditionalists emerge victorious.⁴⁷ Due largely to the cost of war, all major combatants in World War One, except for the United States, abandoned the gold standard, though even the United States suspended use of the gold standard while the troops were overseas.⁴⁸ The interwar period was a time of currency crises the world over, as reparations and the difficulty of rebuilding Europe sent shockwaves throughout

⁴⁴ MARTIN, *supra* note 19, at 123–25.

⁴⁵ *Id.* at 124–28.

⁴⁶ *Id.* at 123–24.

⁴⁷ *Id.* at 211–14.

⁴⁸ FERGUSON, *supra* note 20, at loc. 1333–1418.

the world economy.⁴⁹ During the Great Depression, each major currency abandoned the gold standard at one point or another.⁵⁰ And during World War Two, government intervention and control were the defining feature of economies the world over.⁵¹

The end of World War Two brought with it the Bretton–Woods international monetary system.⁵² Though ostensibly backed by gold, Bretton–Woods functioned by treating the U.S. dollar as the world’s reserve currency.⁵³ All other currencies were pegged to the U.S. dollar through international agreements. The U.S. dollar was linked to the price of gold directly until the late 1960s. Until 1968, the U.S. government actively participated in the gold market to keep prices in line with the monetary needs of the economy.⁵⁴ However, in 1968 the government chose to cease its fight to keep the price of gold down.⁵⁵ Instead, a two-tiered system was imposed. By 1971, President Nixon decided that the façade of a gold standard was no longer needed.⁵⁶ His executive order ended the convertibility of U.S. dollars for gold. Since then, all major currencies have become fiat currencies.⁵⁷ Most of these currencies currently float against each other on international markets, though

⁴⁹ *Id.*

⁵⁰ *Id.* at loc. 1351–1412.

⁵¹ *Id.* at loc. 4044–54.

⁵² *Id.* at loc. 4054–75.

⁵³ *Id.*

⁵⁴ *Id.* at loc. 4065–90.

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ MARTIN, *supra* note 19, at 177.

some governments choose to peg their currency to the currency of some other nation.⁵⁸

Specie naturalism breaks down in the fiat currency world, for the value of currency no longer has anything to do with the value of any metal. A wide variety of traditional theorists have proposed alternative explanations for why the character of money changed in the 20th century.⁵⁹ Many of these explanations claim that the nature of money changed over time due to developments in banking and the growth government control of the money supply. However, there is an alternative account of money the views fiat currency as a return to the fundamental essence of money rather than a deviation.

2. The Alternative View: Money as Sufficiently Transferable Credit

Felix Martin begins his explanation of the concept of money as transferable credit by means of a story. In the Pacific, on a very small island, dwell the Yap people.⁶⁰ Their society was small; their economy was simple and comprised of but a few exchangeable goods.⁶¹ Nonetheless, Yap society had developed their own monetary system using doughnut shaped carved stones called *fei* as currency.⁶² The larger the *fei* and the finer its grain, the more value it represented.⁶³ In one Yap village there was a tremendously wealthy family.⁶⁴ Everyone recognized that this family, in addition to the stones stored on their domain, possessed one of if not the

⁵⁸ FERGUSON, *supra* note 20, at loc. 4084–95.

⁵⁹ MARTIN, *supra* note 19, at 10.

⁶⁰ *Id.* at 3.

⁶¹ *Id.* at 5.

⁶² *Id.* at 5–6.

⁶³ *Id.* at 5.

⁶⁴ *Id.* at 7.

largest stones in the entire society.⁶⁵ This family traded on the value of that stone with no eyebrows raised. The only problem, from a Western perspective, was that the stone dwelled at the bottom of the sea—a ship transporting the *fei* had sunk before reaching the village long ago.⁶⁶

Both Keynes and Friedman recognized the power of this story and the complications it poses for the traditional account of money.⁶⁷ According to Smith, the Yap people by all rights should have engaged in barter due to the relative paucity of exchangeable goods.⁶⁸ Even if the Yap people had some reason to create money, the heavy, cumbersome stones are hardly a viable exchange commodity. Furthermore, a perplexed traditionalist could only wonder why Yap society treated that wealthy family as the owner of value that in fact belonged to sea.

The money as transferable credit approach has much less difficulty understanding Yap's economy. The stones—like all currency—were nothing but the means chosen to record ownership of value and facilitate exchange. The actual money underlying the stone currency was something else entirely.⁶⁹ In opposition to the traditionalist account of money as a privileged commodity, Martin proposed that money is “the system of credit accounts and their clearing that currency represents.”⁷⁰ According to this approach, the value that currency represents is ultimately a credit relationship between the holder of currency and all other

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.* at 15.

⁶⁸ *Id.* at 5.

⁶⁹ *Id.* at 26–29.

⁷⁰ *Id.* at 14.

users of that currency.⁷¹ Money is thus a system of relationships that facilitates the transfer of credit in exchange for goods and services. Pulling these concepts together, Martin describes money as follows:

At the centre of this alternative view of money—its primitive concept, if you like—is credit. Money is not a commodity medium of exchange, but a social technology composed of three fundamental elements.⁴⁰ The first is an abstract unit of value in which money is denominated. The second is a system of accounts, which keeps track of the individuals' or the institutions' credit or debt balances as they engage in trade with one another. The third is the possibility that the original creditor in a relationship can transfer their debtor's obligation to a third party in settlement of some unrelated debt.⁴¹ This third element is vital. Whilst all money is credit, not all credit is money: and it is the possibility of transfer that makes the difference.⁷²

According to the alternative view of money, the Yap people treated the wealthy family as if it possessed the stone under the sea because physical possession of the stones was not the critical component of Yap money. Rather, the social relationships underlying Yap's monetary system were such that all relevant parties knew how much credit each other party could use for trade without relying on the stones to keep track. Indeed, as Martin points out, the common Yap practice was to conclude transactions without physically moving the stones from one location to another.⁷³ This is likely because the stones were, as a traditionalist would note, a rather infeasible means of exchange. But that infeasibility

⁷¹ Ferguson also holds this view of money. See FERGUSON, *supra* note 20, at loc. 381–401.

⁷² Martin, *supra* note 19, at 27.

⁷³ *Id.* at 5–6.

did not constrain the Yap economy. One could imagine that even if all of the stones disappeared, Yap society would remember who owed who how much, and trade would continue based on this common knowledge.

The alternative view of money claims legitimacy due to its historical and empirical accuracy.⁷⁴ For example, anthropologists concluded in the 1980s that no society ever employed barter as its primary means of trade.⁷⁵ Instead of focusing on some mythical transition from barter to trade, the alternative view sees innovation and growth in the transferability of debt as the driving forces in the history of money.⁷⁶ The transferability of debt is itself governed by two overarching concerns. First, a seller receiving a debt obligation owed to the buyer as payment for the seller's goods or services must trust that the buyer's debtor will make good on his promise to pay.⁷⁷ This is ultimately a concern about creditworthiness. Second, a seller must believe that the debt obligation received in payment can itself be used to make future purchases from third parties.⁷⁸ This is ultimately a concern about liquidity. According to the alternative view of money, the history of money is a history of creditworthiness and liquidity—trust and demand.

C. A Brief History of Transferable Credit

According to the alternative theory of money, monetary society first emerged when obligations payable in kind were transformed into obligations payable in

⁷⁴ *Id.* at 16–30.

⁷⁵ *Id.* at 12.

⁷⁶ *Id.* at 28.

⁷⁷ *Id.*

⁷⁸ *Id.*

currency.⁷⁹ Historically, this first occurred at the confluence of Homeric Greece and ancient Mesopotamia.⁸⁰ The Greek city states that emerged starting in the 9th century BC were influenced by the social innovations of their Homeric ancestors and the technologies of their eastern neighbors.⁸¹ This intellectual milieu contained three components necessary for monetary society. The first was the idea of a “universally applicable unit of value” derived from the Homeric Greek tradition of equal participation in ritual sacrifice.⁸² The second was “the practice of keeping accounts” in that unit of value, a combination of the first component and the Mesopotamian familiarity with accounting.⁸³ The third was a “principle of decentralized negotiability,” the result of using a recognized, recordable unit of value to facilitate exchange rather than relying on a central authority.⁸⁴ These components allows the citizens of Greek city states to exchange goods and services based on their respective worth in the unit of value. It should be no surprise, claims Martin, that coins spread quickly throughout Greek society, for coins are nothing but a way of recording amounts of the underlying unit of value.⁸⁵

Monetary society was introduced to the Western world at large by the Romans.⁸⁶ The Roman government coined currency whose value could be trusted.⁸⁷ Larger

⁷⁹ *Id.* at 85–86.

⁸⁰ *Id.* at 55–66.

⁸¹ *Id.* at 55–56.

⁸² *Id.* at 61.

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.* at 60–62.

⁸⁶ *Id.* at 82.

⁸⁷ *Id.*

transactions were executed using credit instruments similar to today's promissory notes and bonds.⁸⁸ Even smaller consumer purchases could be made on credit.⁸⁹ By the time of the Roman Empire, it was widely recognized that land was not the sole source of wealth.⁹⁰ Money as well could provide income once extended as credit. Banks and international finance flourished, and with them the occasional credit crisis.⁹¹

Rome's monetary system did not survive the fall of its empire. Military and political setbacks across the empire weakened the government and eroded the bonds holding together Roman society.⁹² Records from the fourth century no longer bear mention of bankers.⁹³ Around the fifth century, Britain abandoned—or rather, was abandoned by—the Roman monetary system, and the system ceased to exist within a few centuries thereafter.⁹⁴ Without the trust ensured by Rome's power, the credit system underlying the Roman monetary system collapsed. Such trust was not to return for centuries. Throughout the Dark Ages, money was lost to the Western world.⁹⁵

The reintroduction of money in Europe was a slow and tumultuous process. Charlemagne's empire saw the introduction of pounds, shillings, and pence as monetary units, but the Frankish monetary system was short-lived.⁹⁶

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ *Id.* at 83.

⁹¹ *Id.*

⁹² *Id.* at 85.

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ *Id.* at 85–86.

Remonetization did not fully commence until the latter half of the twelfth century.⁹⁷ Around that time, princes and other lords began coining currency using precious metals.⁹⁸ As happened with the Romans, a moneyed class whose wealth was based mainly on ownership of money, not land, emerged.⁹⁹ Conflicts between the sovereign—whose wealth was largely tied up in land and feudal obligations—and the moneyed class were a characteristic feature of Medieval and Renaissance politics.¹⁰⁰

According to the alternative account of money, these conflicts and their ultimate resolution were one driving force behind the centuries-long transition from coin to paper currency. Princes would, with some regularity, decrease the amount of specie in the realm's coin without altering the face value of said coin.¹⁰¹ This allowed princes to increase their seignorage—the gain realized by a currency producer based on the difference between the cost of creating currency and that currency's face value.¹⁰² However, decreases in the amount of specie had a very serious negative impact on the realm's moneyed interests. Once discovered, depreciation of the specie in coin inevitably led to a devaluation of the currency.¹⁰³ Because the sovereign was not constrained by the moneyed interests, princes could devalue currency on a whim (typically due to the needs of war).¹⁰⁴

⁹⁷ *Id.* at 86.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.* at 85–92.

¹⁰¹ *Id.*

¹⁰² *Id.* at 88.

¹⁰³ *Id.* at 92.

¹⁰⁴ *Id.* at 88.

Moneyed interests could not let the situation stand. According to the alternative theory of money, the first great bargain between the sovereign and moneyed interests was an implicit agreement that the sovereign would maintain and not devalue a steady supply of coin in exchange for a guaranteed seignorage on each coin coined.¹⁰⁵ Though never honored in full, the implicit agreement established the contours for political disputes between the sovereign and moneyed interests. However, in times of extremis, princes and kings would, as they had before the rise of moneyed interests, abandon sound monetary policy.¹⁰⁶

The second driving force in the rise of paper currency was the growth of banking throughout Europe.¹⁰⁷ Functioning across sovereign jurisdictions, private networks of bankers began to emerge by the 15th century.¹⁰⁸ These bankers originated in the Low Countries and the Italian city states, though by 1555 the most important fair for clearing transactions occurred in Lyons.¹⁰⁹ Bankers, then as today, were in the business of extending credit at interest. This served the important role of allowing sovereigns and private persons to fund ventures through debt.

One important consequence of the rise of banking was an increase in the money supply.¹¹⁰ First, bankers then as now practiced fractal lending—the practice of keeping on hand only a fraction of the funds needed to pay out all accounts deposited with the bank.¹¹¹ The rest of the funds

¹⁰⁵ *Id.* at 93–94.

¹⁰⁶ *Id.* at 95.

¹⁰⁷ *Id.* at 105–08.

¹⁰⁸ *Id.* at 97–99.

¹⁰⁹ *Id.*

¹¹⁰ *Id.* at 108.

¹¹¹ *Id.* at 104.

were lent out at interest. Second, banks issued their own paper to facilitate transactions denominated in differing currencies.¹¹² Monetary deposits often took the form of the local sovereign-backed coin. Banks would issue notes to depositors that could be redeemed at another location in a different currency. The first paper money was created by banks to facilitate large transactions and exchanges across great distances. By the time of the 1555 Lyons fair, bankers were covered in obligations noted on paper, and the fair was used as an opportunity to clear transactions that had been piling up for some time.

City-states and nations were not immune to the lure of credit. The Renaissance was a time of great innovation but also fantastic sovereign bankruptcies.¹¹³ Eventually, bankers and sovereigns realized that each had something to offer the other.¹¹⁴ Bankers had a trust problem. Ultimately, the paper money employed by banks was backed up by nothing but the bank's name. This name had sway within the banking community, but it was nothing like the respect and trust generated by a King or Queen. Sovereigns had a money problem. Their demand was greater than their ability to regularly tax and otherwise bring in funds. What the sovereign needed was a personal bank that would not call in loans at the wrong time.

The solution to both parties' problems was the creation of a national central bank.¹¹⁵ The paper currency used to note promises between banks and patrons would now be backed by the word of the state. The state itself would benefit by having some control over the central bank, thus facilitating extensions to and servicing of the government's

¹¹² *Id.* at 100–04.

¹¹³ *Id.* at 112–13.

¹¹⁴ *Id.* at 114–15.

¹¹⁵ *Id.* at 115–18.

debt. The Bank of England was the first national bank to emerge, though many states developed their own shortly thereafter. As Martin puts it, moneyed interests—particularly bankers—and the sovereign agreed to split the seignorage of the monetary system.¹¹⁶ The sovereign received ultimate control over the money supply and a reliable source of funding. Bankers received the blessing of the state and with it the trust of the citizenry and foreign governments.

Until the 20th century, the currencies produced by national banks were tied to the price of gold. These commodity-backed paper money economies suffered whenever the demand for money exceeded the amount of money that could be printed based on the nation’s underlying reserve of specie.¹¹⁷ During a monetary shortage, the price of goods would increase along with the cost of servicing debt.¹¹⁸ Debtors would look for whatever cash was available to satisfy their obligations, but the lack of liquidity often resulted in prices well below fair market value. Default by too many debtors would ruin the balance sheets of their creditors. In a world of leveraged finance, defaults due to monetary shortage could spread until someone provided enough currency for payments to resume.

Two schools of thought developed to resolve the money shortage problem. The first was pragmatic and advocated printing more paper currency in response to shortages in the money supply.¹¹⁹ This would devalue the

¹¹⁶ *Id.* at 118.

¹¹⁷ *Id.* at 122–24.

¹¹⁸ *Id.*

¹¹⁹ *Id.* at 124–25, 129 (“Lowndes and other practical men of business had similar feelings about Locke’s disastrous recoinage policy. They were baffled by the great philosopher’s argument, which seemed to them to fly in the face of acknowledged facts—starting with the self-evident truth that there was no intrinsic link between the silver content of coins

nation's paper currency against gold but would provide sufficient means of exchange to keep the economy going. The second school belonged to the specie naturalists, with John Locke at the forefront.¹²⁰ His victory in Britain in the 17th century established a rigid gold standard worldwide for the following centuries.

However, from the perspective of the alternative theory of money, the rigid gold standard never truly dominated the world of finance. First, whenever a serious credit crisis appeared, national governments would inevitably print more paper money despite their promises to obey Locke's naturalism.¹²¹ The most glaring example of this perfidy occurred in World War One, when nearly every major combatant printed currency regardless of the gold

and their nominal value, nor had there ever been. The monetary standard had always been flexible: indeed, that was precisely what the perennial struggle between the sovereign and his mercantile subjects had always been about. The value of money depended not on the stuff that the coinage was made of but on the creditworthiness and authority of the sovereign who stood behind the tariff that specified the nominal value of the coin.”).

¹²⁰ *Id.* at 125, 130–31 (“The truth was that Locke was only too well aware of the political importance of the monetary standard. Indeed, the origins of Locke’s monetary theory resided precisely in his political thought. For three decades, through all the turmoil of the Restoration, the Exclusion crisis, and the Glorious Revolution, Locke had laboured incessantly to demolish the intellectual credentials of absolute monarchy and secure the claims of political Liberalism and constitutional government. At the centre of his philosophical system was the axiom that the property rights of the individual exist by nature—not by dint of sovereign approval. This principle was the foundation on which Locke’s defence of civil liberties against the infringement of absolute power had been constructed and the ideological basis of the new regime of constitutional government. There was no question that money—self-evidently one of the most important of all classes of property—could be exempted from this reasoning.”).

¹²¹ *Id.* at 137–38, 188–96.

standard while promising to return to that standard upon the end of hostilities. Second, linking the national currency to a rigid gold standard does nothing on its own to prevent increases in the money supply through private banking.¹²² Banks continued to provide a means of exchange for transactions made infeasible or prohibitively expensive by the gold standard. Whenever national governments fail to provide a currency suitable to the needs of the nation's economy, "Monetary Maquis" pick up the slack.¹²³

Thus, according to the alternative theory, the fall of the gold standard in the 20th century was nothing but a return to the fundamental character of money. This character has no resemblance to a commodity. As Martin explains,

In today's modern monetary regimes, there is no gold that backs our dollars, pounds, or euros—nor any legal right to redeem our banknotes for it. Modern banknotes are quite transparently nothing but tokens. What is more, most of the currency in our contemporary economies does not enjoy even the precarious physical existence of a banknote. The vast majority of our national money—around 90 percent in the U.S., for example, and 97 percent in the U.K.—has no physical existence at all. It consists merely of our account balances at our banks. The only tangible apparatus employed in most monetary payments today is a plastic card and a keypad. It would be a brave

¹²² FERGUSON, *supra* note 20, at loc. 741-55 ("Had that principle been adhered to, and had the money supply of the British economy genuinely hinged on the quantity of gold coin and bullion in the Bank of England's reserve, the growth of the UK economy would have been altogether choked off, even allowing for the expansionary effects of new gold discoveries in the nineteenth century. So restrictive was Bank of England note issuance that its bullion reserve actually exceeded the value of notes in circulation from the mid 1890s until the First World War. It was only the proliferation of new kinds of bank, and particularly those taking deposits, that made monetary expansion possible.").

¹²³ MARTIN, *supra* note 19, at 70.

theorist indeed who maintained that a pair of microchips and a Wi-Fi connection are a commodity medium of exchange.¹²⁴

Rather, fiat currency draws attention to the fact that money is ultimately a social technology, the components of which are the economic, personal, and political relationships that determine who is willing to promise whom how much at any given time. For example, the U.S. dollar is backed solely by the “full faith and credit” of the United States,¹²⁵ yet individuals and organizations around the world have faith in the greenback’s value because of the economic might, military prowess, and civil society characteristic of America. On the other hand, the choice of currency is merely a choice between different ways of counting money and facilitating transactions.

With this, the questions at the heart of this Note can be asked. What is digital currency, and how should it be treated?

II. DIGITAL CURRENCY, FEDERAL REGULATION, AND SETLCOIN

Preliminarily, it must be admitted that the phrase “digital currency” is misleading, for the question facing economists, regulators, and legislatures is whether or not digital currency is truly a currency or something else. The situation is much clearer with electronic money. Electronic money is nothing but an electronic representation of some

¹²⁴ *Id.* at 14–15.

¹²⁵ Jabally et al., FEDERAL RESERVE BANK OF BOSTON, *What Does the Fed Do?* 11, <https://www.bostonfed.org/news/exhibits/what-does-the-fed-do/what-does-the-fed-do.pdf> (last visited Feb. 5, 2016).

national currency.¹²⁶ The numbers that appear when one signs onto an online bank account represent electronic money. When a purchaser makes a payment through their online bank account, the stuff transmitted from the purchaser’s account to the seller is electronic money. Electronic money is valuable only insofar as its underlying national currency is valuable—there is no market for electronic U.S. dollars separate from the international market for greenbacks. Ultimately, electronic money, like paper currency, is just a means of counting who is entitled to what share of the value underlying the relevant national currency.

Digital currencies are separate from any national currency. The IRS has described digital currencies as follows, using the synonymous phrase “virtual currency”:¹²⁷

Virtual currency is a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value. In some environments, it operates like “real” currency—i.e., the coin and paper money of the United States or of any other country that is designated as legal tender, circulates, and is customarily used and accepted as a medium of exchange in the country of issuance—but it does not have legal tender status in any jurisdiction.

Virtual currency that has an equivalent value in real currency, or that acts as a substitute for real currency, is referred to as “convertible” virtual currency.

¹²⁶ DAVID EVANS & RICHARD SCHMALENSEE, *PAYING WITH PLASTIC: THE DIGITAL REVOLUTION IN BUYING AND BORROWING* loc. 3518–35, 3585–60 (2nd ed. MIT Press 2005) (ebook).

¹²⁷ The important distinction is between digital or virtual currencies on the one side and national currencies on the other. National currencies are currently all fiat currencies, though in the past they had been commodity-based. Electronic money is a digital representation of a national currency and is thus not a digital or virtual currency.

Bitcoin is one example of a convertible virtual currency.¹²⁸

As the IRS recognized, digital currencies are a means of exchange that represent some value but lack the backing of any government.¹²⁹ Thus, like real currencies, digital currencies count something; however, what digital currencies count is not the value underlying any nation's monetary system.¹³⁰ Digital currencies may be convertible for an equal value of some real currency, but that convertibility is not a defining feature of digital currency generally.¹³¹

Digital currencies must not be confused with online payment systems such as Paypal and Apple Pay. Those payment systems facilitate transactions denominated in some national currency.¹³² Neither Paypal nor Apple Pay functions is a separate system for counting value; rather, each enjoys the benefits of transacting in national currencies. The same applies to credit card transactions, both in person and online.

A. DIGITAL CURRENCY

Melanie Swan offers an in-depth account of digital currency and its potential uses in her book, *Blockchain: Blueprint for a New Economy*.¹³³ According to Swan,

¹²⁸ I.R.S., Notice 2014-21 (Jan. 17, 2016, 12:20 PM), <https://www.irs.gov/pub/irs-drop/n-14-21.pdf> [<https://perma.cc/D6GE-ZSX8>].

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² EVANS & SCHMALENSEE, *supra* note 126, at loc. 3585–60.

¹³³ MELANIE SWAN, *BLOCKCHAIN: BLUEPRINT FOR A NEW ECONOMY* (1st kindle ed. 2015) (ebook).

emerging 21st century digital currencies¹³⁴ have three characteristic components: the digital currency itself (for example, Bitcoin), the software that performs transactions, and the underlying ledger on which all transactions are recorded.¹³⁵ The “top level” of the digital currency stack—the currency itself—is a string of code. The code serves to identify the currency object and includes cryptographic features to secure the system as a whole and protect individual users from hackers.¹³⁶ It is possible for the currency’s code to include additional information as well.

The bottom two levels of the stack—the transaction software and underlying ledger—are analogous to the back office work performed by financial institutions today.¹³⁷ The ‘middle level’ transaction software provides the means by which digital currency can be transmitted from one user to another. This software deals with movements of the digital currency itself. It is important to distinguish this software from digital wallets. Digital wallets are software programs that store digital currency.¹³⁸ These programs are external to the digital currency stack.

The bottom floor of the stack is a ledger that records all transactions denominated in the digital currency.¹³⁹ Each

¹³⁴ Swan uses the term ‘cryptocurrency’ to point to the same technology that the terms “digital currency” and “virtual currency” point to in federal regulations and guidance. The term “cryptocurrency” accurately draws attention to the cryptographic technologies used to make the technology secure from hackers. However, I use the term digital currency for consistency.

¹³⁵ SWAN, *supra* note 133, at loc. 255–86.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *Id.* at 295–355; *see also*, CLARK, *supra* note 2, at loc. 90–155.

¹³⁹ SWAN, *supra* note 133, at loc. 255–86; *see also*, CLARK, *supra* note 2, at loc. 39–42.

transaction denominated in a digital currency is automatically recorded onto the currency's ledger. The ledger in many ways resembles a detailed cash flow statement, but for an entire currency rather than just one company. Unlike a bank's ledger, the Bitcoin recording system tracks ownership of transacted Bitcoins, not the quantity of Bitcoin owned by each owner.¹⁴⁰

Chris Clark explains in *Bitcoin Internals: A Technical Guide to Bitcoin* that there are two ways to keep track of ownership of currency.¹⁴¹ Either ownership tracks possession of some token (such as the U.S. dollar), or ownership tracks access to some ledger.¹⁴² Digital currencies track ownership based on who has access to some ledger.¹⁴³ Checks, credit cards, and Paypal track ownership in the same way.¹⁴⁴ =

Digital currencies of all kinds face two challenges: the “double-spend” and “Byzantine General” computing problems.¹⁴⁵ The double-spend problem concerns a digital

¹⁴⁰ CLARK, *supra* note 2, at loc. 360–65 (“Bitcoin’s ledger, known as the block chain, can be thought of as a record of receipts for all transactions that have ever occurred in the Bitcoin system. Unlike a typical bank’s ledger, it doesn’t contain any account balances. Rather than recording a quantity of bitcoins for each owner, it records an owner for each quantity of bitcoins transacted. The owner is just the recipient listed on the transaction receipt in the block chain (until the bitcoins in that transaction are spent). To spend bitcoins, the owner creates a new transaction that takes the bitcoins from a prior transaction (one that was sent to the owner) and assigns them to someone else. The owner is the only one who has the ability to create such a transaction because it requires their digital signature.”).

¹⁴¹ *Id.* at loc. 349–60.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ SWAN, *supra* note 133, at loc. 273–300.

currency user’s ability to spend the same “digital dollar” twice. This problem has an analog in banking, namely the problem of a person signing two checks that draw on the same funds.

The Byzantine General problem involves the difficulty of coordinating communication among parties that do not trust each other.¹⁴⁶ The Byzantine General problem was first described in an article from the 1980s.¹⁴⁷ A general needs to coordinate his officers in the morning’s attack, but the officers are conniving and treacherous. In the banking and finance worlds, the Byzantine General problem is solved by means of trusted third party institutions, such as clearing houses. Visa and Mastercard play the same role for credit card transactions. In the digital currency context, the Byzantine General problem connotes the difficulty of properly confirming transactions and records in a purely digital environment.

B. Bitcoin

Bitcoin is the most successful digital currency as of yet. On December 30, 2015, there were 15,025,975 Bitcoins in existence.¹⁴⁸ On that day, each Bitcoin was worth almost \$427.¹⁴⁹ In the week starting December 28, 2015, there were

¹⁴⁶ CLARK, *supra* note 2, at loc. 481–500.

¹⁴⁷ Leslie Lamport et al., *The Byzantine Generals Problem*, 4 ACM TRANSACTIONS ON PROGRAMMING LANGUAGES AND SYSTEMS (1982), http://www-inst.eecs.berkeley.edu/~cs162/fa12/handouts/Original_Byzantine.pdf [<https://perma.cc/3ZCG-RP98>] (last visited Jan. 17, 2016, 1:30 PM).

¹⁴⁸ See BITCOIN WATCH, <http://www.bitcoinwatch.com> [<https://perma.cc/RWL9-UFM2>]; BITCOIN CHARTS, <http://bitcoincharts.com> [<https://perma.cc/TU98-SWLU>]. These sites provide constantly updated price and volume information for Bitcoin.

¹⁴⁹ COINDESK, *Bitcoin Calculator*, <http://www.coindesk.com/calculator/> [<https://perma.cc/YL5P-CVTR>] (last visited Jan. 4, 2016, 10:30 AM).

157,880 total Bitcoin transactions.¹⁵⁰ Many transactions using Bitcoins are for values less than that, so a significant amount of Bitcoin transactions involve only fractions of the digital currency. A Bitcoin is considered to have eight decimal places based on the programming of the digital currency.¹⁵¹ Future technology may allow for even greater decimal expansion should there be a need for additional exchangeable pieces of Bitcoins.¹⁵² The programming behind Bitcoin has predetermined that there will only ever be 21 million Bitcoins,¹⁵³ but even when limited to 8-decimal point expansion, the number of exchangeable pieces of Bitcoin will eventually grow to 2.1×10^{15} .

Bitcoin was designed to solve the double spend and Byzantine general problems with two additional desiderata in mind. First, the Bitcoin system was intended to preserve a high level of anonymity among its participants.¹⁵⁴ Second, the Bitcoin system was constructed to function without need of a centralized intermediary.¹⁵⁵ The technical details of the digital currency stem from these two goals.

The top level of the Bitcoin digital currency stack is comprised of Bitcoins themselves.¹⁵⁶ Each Bitcoin is a string of computer code. Owners of Bitcoins can access and transact with their Bitcoins by means of a private digital

¹⁵⁰ COINDESK, *Bitcoin – Daily Number of Transactions*, <http://www.coindesk.com/data/bitcoin-daily-transactions/> [<https://perma.cc/QB32-CT7Y>] (last visited Jan. 4, 2016, 10:45 AM).

¹⁵¹ CLARK, *supra* note 2, loc. 143–48.

¹⁵² See BITCOINWIKI, *Help: FQA*, <https://en.bitcoin.it/wiki/Help:FAQ> [<https://perma.cc/5AL3-EX6Z>].

¹⁵³ CLARK, *supra* note 2, loc. 33–40.

¹⁵⁴ SWAN, *supra* note 133, at loc. 86–90.

¹⁵⁵ *Id.* at loc. 28–30.

¹⁵⁶ *Id.* at loc. 254–89.

address, or “key.”¹⁵⁷ A high level of anonymity is preserved in this way, for ownership is based on a numerical code rather than actual names. Anonymity is not complete, however, for the public keys addresses are publicly available.¹⁵⁸ Additionally, Bitcoin users employ digital wallets to organize, track, and exchange their Bitcoins, and these wallets include some identifying information.¹⁵⁹ Thus, the Bitcoin ecosystem is best thought of as pseudonymous rather than fully anonymous, for any transaction member of the Bitcoin system has likely provided some identifying information at some point which could be linked by an assiduous investigator to the public keys used by that member to transact.¹⁶⁰

The transaction level of the Bitcoin stack is made up of private and public keys along with the data transmitted by means of those keys.¹⁶¹ Owners of Bitcoins can spend their digital currency by using their private keys. To send a Bitcoin to another party, a Bitcoin owner would use her private key and the other party’s public key.¹⁶² The public key serves an analogous role to a routing number and directs the owner’s Bitcoins to the right location.¹⁶³ The receiving party can then access the sent Bitcoins by using her corresponding private key.

The bottom level of the Bitcoin stack is known as the blockchain.¹⁶⁴ This name is misleading, for Bitcoin is not

¹⁵⁷ *Id.* at loc. 302–50.

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ *Id.* at loc. 86–91.

¹⁶¹ CLARK, *supra* note 2, at loc. 92–130.

¹⁶² *See supra* text accompanying note 155.

¹⁶³ CLARK, *supra* note 2, at loc. 143–48.

¹⁶⁴ SWAN, *supra* note 133, at loc. 96–118.

the only technology to employ a block chain as a recording mechanism.¹⁶⁵ Rather, it is more accurate to say that Bitcoin transactions are recorded in the Bitcoin blockchain, thus distinguishing it from other similar technologies. The Bitcoin blockchain is a public record of every transaction involving the exchange of Bitcoins.¹⁶⁶ Possession of every Bitcoin is tracked on the public ledger.

Transactions are recorded by decentralized individuals and organizations known as “miners.”¹⁶⁷ The process of recording a Bitcoin transaction is known as “mining.”¹⁶⁸ When a Bitcoin is exchanged for a good or service, the data representing the transaction is put into an online pool full of similar pieces of data.¹⁶⁹ Each transaction is then checked to make sure that the sender actually owned the sent Bitcoins and that the sent Bitcoins arrived where they were intended.¹⁷⁰ The Bitcoin ecosystem is relatively unique in that the checking mechanism is decentralized.¹⁷¹ Bitcoin miners are individuals and companies that have purchased the hardware and software needed to confirm Bitcoin transactions. Anyone can become a Bitcoin miner, provided they make the necessary investments.¹⁷² Once a transaction has been confirmed by a miner, a cryptographically secured representation of the transaction is recorded on the public ledger.¹⁷³ Miners are occasionally

¹⁶⁵ *Id.* at loc. 108–18.

¹⁶⁶ *Id.* at loc. 73–97.

¹⁶⁷ CLARK, *supra* note 2, at loc. 527–52.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.* at loc. 527–52, 624–66.

¹⁷⁰ *Id.* at loc. 550–73.

¹⁷¹ *Id.* at loc. 316–20.

¹⁷² *Id.* at loc. 666–73.

¹⁷³ *Id.* at loc. 527–52.

awarded a predetermined quantity of Bitcoins upon successfully confirming a transaction. Bitcoin users can also attach a “tip” to their transactions to encourage more timely processing by the miners.¹⁷⁴ By incentivizing a decentralized clearing system, the Bitcoin ecosystem avoids the need for a centralized intermediary.

C. *The Regulatory Response*

The high level of anonymity and lack of central supervision characteristic of the Bitcoin ecosystem could not help but attract a wide range of characters to the digital currency. Some are libertarians or technologists convinced that Bitcoin is ultimately superior to other means of exchange.¹⁷⁵ These individuals have been largely interested in increasing the number of merchants and service providers willing to accept Bitcoin as payment. Many are also investors in the underlying hardware and software. Other interested parties are speculators. These persons and organizations are less interested in the long-term potential of Bitcoin and more attracted to the digital currency’s widely fluctuating exchange rate with the U.S. dollar.

Investors and speculators played some role in getting Bitcoin onto the radar of federal regulators. The Winkelvoss Twins’ push for a New York-based Bitcoin exchange certainly garnered significant media attention.¹⁷⁶ Increasing use of and trade in Bitcoin led federal regulators to pass a variety of tax and financial regulations.¹⁷⁷ This increase also

¹⁷⁴ *Id.* at loc. 600–25.

¹⁷⁵ *See supra* text accompanying notes 13–14.

¹⁷⁶ Pete Rizzo, *Bitcoin Exchange Gemini Approved for Launch in New York*, COINDESK (Oct. 5, 2015), <http://www.coindesk.com/bitcoin-exchange-gemini-new-york/> [<https://perma.cc/85HB-XYLZ>] (last visited Jan. 17, 2016, 4:00 PM).

¹⁷⁷ *See supra* text accompanying notes 20–22.

spurred regulators to issue guidance regarding consumer protection in the digital currency context.¹⁷⁸ However, a large amount of regulatory focus has been placed on the more dangerous side of Bitcoin. Criminals and terrorists are known to transact in Bitcoin regularly.¹⁷⁹ The high level of anonymity and lack of centralized supervision are ideal for funding nefarious activity.

Federal regulation of digital currency began in earnest in 2013.¹⁸⁰ Comprehensive state regulation has taken longer to emerge—New York adopted protocols specific to Bitcoin (“BitLicense”) in October 2015.¹⁸¹ Though regulation has largely been spurred by concerns related to Bitcoin, most regulations and regulatory guidance are worded to apply to digital currency generally. Regulation has focused on four areas: illegal activities funded with virtual currency, security, and financial regulation.

¹⁷⁸ *Id.*

¹⁷⁹ ISIS has been known to use Bitcoins to fund its activities. Brooke Satti, *ISIS: Are They Using Bitcoin to Fund Criminal Activities?*, SECURITY INTELLIGENCE (Oct. 29, 2014), <https://securityintelligence.com/isis-are-they-using-bitcoins-to-fund-criminal-activities/> [<https://perma.cc/WVW9-G28D>] (last visited Jan. 17, 2016, 4:05 PM); *See also* Jonathan Chester, *How Questions about Terrorism Challenge Bitcoin Startups*, FORBES (Dec. 14, 2015, 11:06 AM), <http://www.forbes.com/sites/jonathanchester/2015/12/14/is-bitcoin-the-currency-of-terrorism/#2715e4857a0b68009f0d5e7c> [<https://perma.cc/9TF4-A938>] (last visited Jan. 17, 2016, 4:15 PM). For commentary on Bitcoin’s functionality for criminals, *see* Jim Edwards, *CLAIM: Bitcoin Is Basically for Criminals*, BUSINESS INSIDER (Nov. 27, 2014, 12:30 PM), <http://www.businessinsider.com/claim-bitcoin-is-basically-for-criminals-2013-11> [<https://perma.cc/3ZCF-SS2S>] (last visited Jan. 17, 2016, 4:20 PM).

¹⁸⁰ *See supra* text accompanying notes 20–22.

¹⁸¹ *See supra* text accompanying note 23.

A major concern of regulators so far has been illegal activity funded with Bitcoins. Assistant Attorney General John Carlin has suggested that Bitcoin may be used to fund ISIL.¹⁸² Elected officials have gotten involved in the conversation as well. Senator Joe Manchin (Democrat, West Virginia) demanded that federal regulators ban Bitcoin.¹⁸³ Representative Jared Polis (Democrat, Colorado) responded to worries about Bitcoin’s propensity for illegal transactions by ironically calling for a ban on the U.S. dollar, arguing that paper currency is used to break countless laws all the time.¹⁸⁴ Representative Polis has a point, but his comments ignore the features of Bitcoin that make it particularly attractive to the more nefarious elements of society. Online payments in U.S. dollars are ultimately traceable through the intermediaries that facilitate electronic money transactions. Bitcoin adds additional layers of anonymity by masking the identities of transacting partners through numerical keys and addresses. Additionally, criminals can use the Bitcoin ecosystem to launder illicit gains denominated in U.S. dollars.¹⁸⁵

¹⁸² John P. Carlin, Assistant Att’y Gen., Dep’t of Justice, Nat’l Sec. Div., Remarks at the International Institute for Justice and the Rule of Law’s Event on More Effective Responses to the Foreign Terrorist Fighter Threat (Sept. 28, 2015).

¹⁸³ See Press Release, U.S. Sen. Joe Manchin (Feb. 26, 2014), <http://www.manchin.senate.gov/public/index.cfm/2014/2/manchin-demands-federal-regulators-ban-bitcoin> [<https://perma.cc/KB6G-P75H>].

¹⁸⁴ See Press Release, U.S. Sen. Jared Polis (March 5, 2014), <http://polis.house.gov/news/documentsingle.aspx?DocumentID=371808> [<https://perma.cc/CYY8-FZGW>].

¹⁸⁵ Jennifer Shasky Calvery, Director of FinCEN, U.S. Dep’t of Treasury, Statements Before the State Senate Committee on Banking, Housing and Urban Affairs (Nov. 19, 2013), https://www.fincen.gov/news_room/testimony/html/20131119.html [<https://perma.cc/CYY8-FZGW>].

The Federal Trade Commission¹⁸⁶ has issued warnings regarding the risks associated with owning digital currency. Like any information stored on a computer, digital currency is vulnerable to theft by hackers. The protections offered by banking law do not apply to digital currency, so losses caused by theft cannot be easily recouped. Additionally, unlike cash deposits, there is no Federal Deposit Insurance Corporation (FDIC) securing the digital currency held in an account.¹⁸⁷

Users of digital currency also risk losing their digital currency should they forget needed information. Without the appropriate key, an owner of Bitcoins cannot actually use the Bitcoins she owns. It is the digital key that elevates Bitcoin ownership to possession. There is no centralized source a user can contact to get the digital-currency analog to a new password. Storing passwords on a computer raises heightened data security concerns, and written notes can be misplaced or stolen. Descendants risk losing the value of the deceased's Bitcoins should the deceased fail to pass on the needed keys.

The IRS provided guidance for the taxation of virtual currency on April 14, 2014.¹⁸⁸ The IRS chose to treat all

¹⁸⁶ Kristin Cohen, *Before paying with bitcoins...*, FTC: CONSUMER AFFAIRS (Jan. 17, 2016, 8:45 AM), <https://www.consumer.ftc.gov/blog/paying-bitcoins> [<https://perma.cc/HG47-F9DD>]; see also Press Release, Federal Trade Commission, App Developer Settles FTC and New Jersey Charges It Hijacked Consumer's Phones to Mine Cryptocurrency (June 29, 2015).

¹⁸⁷ See *FDIC: Understanding Deposit Insurance*, FEDERAL DEPOSIT INSURANCE CORPORATION, <https://www.fdic.gov/deposit/deposits/> [<https://perma.cc/VM6Q-J5LK>] (last visited February 25, 2017).

¹⁸⁸ See IRS Publication 525 (Jan. 15, 2015); IRS Notice IR-2014-36 (Mar. 25, 2014); IRS Notice 2014-21 (Mar. 25, 2014).

virtual currencies as non-currency property.¹⁸⁹ In its 2014 guidance, the IRS clearly stated that the general provisions applicable to non-currency property apply to digital currencies as well. One consequence is that taxpayers who use virtual currencies must account for associated capital gains and losses. These taxpayers must track the value of their virtual currency at the time it was received and sent out in U.S. dollars. The IRS provides that the basis for virtual currency received by the taxpayer is the fair market value of the currency in US dollars at the time the currency is received by the taxpayer.¹⁹⁰ The value of the virtual currency when spent by the taxpayer is based on the currency's fair market value at that time.¹⁹¹ This applies even if the virtual currency is exchanged for something other than U.S. dollars.¹⁹² The IRS imagines that any transfer of virtual currency passes through a U.S. dollar conversion no matter the ultimate destination. In line with capital gains taxation generally, increases in the value of Bitcoin over basis are taxed at the preferential rate only if they have been held for over one year. Additionally, users of Bitcoin may be subject to information reporting requirements common to non-currency property transactions.¹⁹³ Payments of value in excess of \$600 to independent contractors must be reported on Form 1099-MISC.¹⁹⁴ Miners of Bitcoin receive gross income upon receipt of a Bitcoin in exchange for

¹⁸⁹ See IRS Publication 525 (Jan. 15, 2015); IRS Notice IR-2014-36 (Mar. 25, 2014); IRS Notice 2014-21 (Mar. 25, 2014).

¹⁹⁰ See IRS Publication 525 (Jan. 15, 2015); IRS Notice 2014-21 (Mar. 25, 2014).

¹⁹¹ See sources cited *supra* note 188.

¹⁹² See IRS Notice 2014-21 (Mar. 25, 2014).

¹⁹³ *Id.*

¹⁹⁴ *Id.*

successfully adding a transaction to the blockchain.¹⁹⁵ Gross income equals the fair market value of the mined Bitcoin. Individuals and organizations in the business of transacting in or exchanging Bitcoins must also report their related earnings as gross income not subject to preferential capital gains treatment.¹⁹⁶

Some have argued that the Treasury should treat digital currency as if it were a foreign currency for tax purposes.¹⁹⁷ Reclassifying a digital currency as a foreign currency would likely ease the tax and reporting burdens on ordinary users of a digital currency. Generally, ordinary users would not have to worry about taxes when conducting personal transactions.¹⁹⁸ Under 26 U.S.C. § 988(e), individuals need only pay capital gains taxes on currency gains over \$200.¹⁹⁹ Because exchange rates between major currencies are significantly more stable than the exchange rate between a digital currency and national currencies, it is likely that most ordinary users fail to meet the \$200 minimum. However, most investors and business involved in a digital currency ecosystem would likely come out worse should the foreign currency tax regime be applied instead of digital currency-specific guidance. Foreign currency gains arising from non-personal transactions are generally subject to the ordinary income tax, but 26 U.S.C. § 988(a)(1)(B) allows taxpayers to elect for capital gains treatment for currency gains arising from currency-related investing activity.²⁰⁰ Taxpayers that so elect are subject to the 60–40

¹⁹⁵ *Id.*

¹⁹⁶ *Id.*

¹⁹⁷ Nicole Mirjanich, *Digital Money: Bitcoin's Financial and Tax Future Despite Regulatory Uncertainty*, 64 DEPAUL L. REV. 213, 214 (2014).

¹⁹⁸ 26 U.S.C. § 988 (2012).

¹⁹⁹ *Id.*

²⁰⁰ *Id.*

split required by 26 U.S.C. § 1256 rather than usual capital gains treatment.²⁰¹ Digital currency guidance treats all digital currency gains or losses as capital gains or losses. This treatment is preferable to that for ordinary income and beats out the blend for digital currency held longer than one year. Thus, businesses that transact in digital currencies certainly prefer the Treasury’s digital currency-specific guidance, as do long-term investors. Only short-term investors would benefit from the Treasury imposing 26 U.S.C. § 1256 treatment onto digital currency transactions.

The Treasury,²⁰² SEC,²⁰³ and CFTC²⁰⁴ have each addressed virtual currency from a financial regulation perspective. The Financial Crimes Enforcement Network (FinCEN) issued guidance in 2013 identifying administrators and exchangers of digital currency as money

²⁰¹ 26 U.S.C. § 1256.

²⁰² See FinCEN Guidance, FIN-2013-G001 (Mar. 18, 2013), <https://www.fincen.gov/resources/statutes-regulations/guidance/application-fincens-regulations-persons-administering> [<https://perma.cc/3DGV-T4UC>]; FinCEN Ruling, FIN-2014-R011, (Oct. 27, 2014), <https://www.fincen.gov/sites/default/files/shared/FIN-2014-R011.pdf> [<https://perma.cc/YB6A-7M7Q>].

²⁰³ SEC v. Shavers, 2014 WL 4652121 (E.D. Tex. 2014); Voorhees, Securities Act Release No. 9592, SEC Docket 3-15902 (ALJ Jun. 3, 2014).

²⁰⁴ See generally *In re* TeraExchange LLC, CFTC Docket No. 15-33 (Sept. 24, 2015); Vincent McGonagle, CFTC No-Action Letter, CFTCLTR No. 15-29 (May 15, 2015); Thomas J. Smith, CFTC Exemptive Letter, CFTCLTR No. 15-33 (Feb 19, 2015); Press Release, Commodities Futures Trading Comm’n, CFTC Settles with TeraExchange LLC, a Swap Execution Facility, for Failing to Enforce Prohibitions on Wash Trading and Prearranged Trading in Bitcoin Swap (Sept. 24, 2015); Press Release, Commodities Futures Trading Comm’n, CFTC Orders Bitcoin Options Trading Platform Operator and its CEO to Cease Illegally Offering Bitcoin Options and to Cease Operating a Facility for Trading or Processing of Swaps without Registering (Sept. 17, 2015).

services businesses (MSB).²⁰⁵ MSBs are subject to FinCEN regulations for reporting, recordkeeping, and registration.²⁰⁶ Users and individuals subject to certain limited exceptions do not qualify.²⁰⁷ The specific MSB regulations applicable to a particular digital currency administrator or exchanger are based on the type of digital currency used.²⁰⁸ FinCEN clarified the 2013 guidance in 2014.²⁰⁹ Of greatest help is the following:

Whether a person is deemed to be an MSB depends on how that person uses the convertible virtual currency, and for whose benefit. The mechanism by which the virtual currency is obtained is not material in determining MSB status.²¹⁰

So far, the SEC has been mainly interested in guaranteeing its jurisdiction over traditional areas of enforcement that are funded through Bitcoin.²¹¹ In *SEC v. Shavers*, the SEC claimed jurisdiction over a Ponzi scheme funded through Bitcoin.²¹² In *In the Matter of Erik T.*

²⁰⁵ See sources cited *supra* note 202.

²⁰⁶ See Matthew Kien-Meng Ly, *Coining Bitcoin's Legal-Bits: Examining the Regulatory Framework for Bitcoin and Virtual Currencies*, 27 HARV. J. L. & TECH. 587, 601 (2014).

²⁰⁷ *Id.*

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ See FinCEN Ruling FIN-2014-R011 (Oct. 27, 2014).

²¹¹ However, not all commentators believe the SEC's classifications hold up. See Kevin V. Tu & Michael W. Meredith, *Rethinking Virtual Currency Regulation in the Bitcoin Age*, 90 WASH. L. REV. 271, 338–39 (2015) (arguing that the SEC could treat Bitcoin as analogous to foreign currency which is generally not subject to United States securities regulation).

²¹² *SEC v. Shavers*, 2014 WL 4652121 (E.D. Tex. 2014).

Voorhees, the SEC’s rules for securities were found to apply even though the securities were purchased with Bitcoin.²¹³

Like the SEC, the CFTC has been primarily interested in regulating the futures, options, and other derivatives traditionally falling within the agencies remit. To accomplish this goal, the CFTC has defined digital currencies as commodities.²¹⁴ In September 2015, the CFTC applied its ruling in two cases, finding that the usual regulations applicable to those involved in the trading of commodities apply in the digital currency context as well.²¹⁵ However, as Professor Shadab pointed out in his written statement to the CFTC, the CFTC has not yet issued guidance on the particular type of commodity digital currencies qualify as, specifically whether digital currencies are exempt or excluded commodities.²¹⁶ Exempt commodities include energy interests and metals, while excluded commodities include financial interests and currencies.²¹⁷ Should the CFTC ultimately accept the Treasury’s definition of digital currency as non-currency property, then digital currencies would qualify as excluded

²¹³ *Voorhees*, *supra* note 203.

²¹⁴ *In re Coinflip, Inc.*, CFTC No. 15-29 (Sept. 17, 2015) (finding that digital currency qualifies as a commodity under 7 U.S.C. § 1a(9)).

²¹⁵ See *In re TeraExchange LLC*, CFTC Docket No. 15-33 (Sept. 24, 2015); Press Release, Commodities Futures Trading Comm’n, CFTC Orders Bitcoin Options Trading Platform Operator and its CEO to Cease Illegally Offering Bitcoin Options and to Cease Operating a Facility for Trading or Processing of Swaps without Registering (Sept. 17, 2015), <http://www.cftc.gov/PressRoom/PressReleases/pr7231-15> [<https://perma.cc/869U-MB85>].

²¹⁶ Letter from Prof. Houman Shadab to the DFTG Global Markets Advisory Committee (October 9, 2014), http://www.cftc.gov/idc/groups/public/@aboutcftc/documents/file/gmac_100914_bitcoin.pdf [<https://perma.cc/3C98-TM3U>].

²¹⁷ *Id.*

commodities. However, should the CFTC decide to treat digital currencies as bona fide currency, the exempt commodity classification is more appropriate.

Reactions to federal regulations have been mixed. Some Bitcoin users and investors are worried that the IRS's tax guidance imposes unrealistic tracking obligations on everyday users of the digital currency.²¹⁸ The worry is that ordinary users will be unwilling or unable to track gains and losses due to changes in the fair market value of Bitcoin between the time of acquisition and purchase. The tracking and reporting requirements imposed on ordinary users of digital currencies are significantly more burdensome than similar requirements in the foreign currency setting. Generally, Americans using foreign currency need track foreign exchange rates in two situations. First, the IRS collects taxes in U.S. dollars, so taxpayers must convert income received in a foreign currency into U.S. dollars based on the exchange rate at the time income was received to determine their tax obligation.²¹⁹ Second, some taxpayers must worry about crossing the \$200 minimum from 26 U.S.C. § 988.²²⁰ In both of these situations, tracking and reporting are relatively painless. To the contrary, Bitcoin users need track the daily—and perhaps hourly—fluctuations in the Bitcoin exchange rate to determine the capital gain or loss on any particular transaction. Bitcoin users also must worry about the timing of expenditures, since the tax rate on any Bitcoin decreases markedly once a year has passed. However, it appears that wallet software

²¹⁸ Jose Pagliery, *Spent bitcoins? Expect a tax headache*, CNNMONEY ONLINE (Jan. 7, 2015, 10:11 AM), <http://money.cnn.com/2015/01/07/technology/bitcoin-taxes/> [<https://perma.cc/JR2B-VZHQ>].

²¹⁹ Functional Currency, 26 C.F.R. § 1.985 (2016).

²²⁰ 26 U.S.C. § 988.

technology is up to the task.²²¹ New software may be able to automatically calculate Bitcoin users' tax obligations on a transaction-by-transaction basis, thereby lessening the onus of the IRS's guidance significantly. Perhaps a more pressing concern is the Form 1099 reporting requirement. However, there is little to suggest that this reporting requirement is significantly more burdensome than similar reporting requirements already in place.

D. Problems on the Horizon

By treating Bitcoin as non-currency property, federal regulators were able to avoid two sticky questions surrounding the regulation of private currencies: regulatory avoidance, including tax dodging, and inflation caused by unsupervised increases to the money supply.²²² There are many payment systems characterized as private currencies currently active in the United States. For example, the Berkshires in Massachusetts issues its own currency—Berkshares—that can be used at local stores and service providers.²²³ Most private currencies are intended to bolster the local economy by limiting consumption options for

²²¹ Danny Bradbury, *Libra Promises Bitcoin Tax Services to Ease Compliance With IRS Guidance*, COINDESK (Apr. 3, 2014, 7:47 GMT), <http://www.coindesk.com/libra-bitcoin-tax-service-irs-guidance/> [<https://perma.cc/RR4G-E4GW>]; *New Software to Lead the Bitcoin Tax Industry*, ALTCOIN TODAY (Sept. 20, 2014), <http://www.altcointoday.com/bitcoin-expense-tracking-software-to-make-tax-compliance-easier/> [<https://perma.cc/SYK2-SGQA>].

²²² A private currency is a currency issued by a non-governmental issuer.

²²³ See BERKSHARES, INC., <http://www.berkshares.org/> [<https://perma.cc/BD7H-QBNH>] (last visited Feb. 26, 2017, 3:46 PM); see also Blake Ellis, *Funny Money? 11 Local Currencies*, CNNMONEY ONLINE (Jan. 27, 2012, 3:05 PM), <http://money.cnn.com/galleries/2012/pf/1201/gallery.community-currencies/> [<https://perma.cc/34CH-PTEH>].

holders of the currency.²²⁴ Income received in Berkshares and other private currencies is generally taxed as ordinary income.²²⁵ The holder of Berkshares need not worry about changes in the rate of exchange between the private currency and the U.S. dollar because the rate is predetermined by the issuer.

Regulators have paid little attention to private currencies due to their relatively small footprint compared with the national economy.²²⁶ They have sprung into action only when a private currency was used for illegal activities²²⁷ or if it illegally resembled the currency of the United States.²²⁸ However, should private currencies increase in use, regulators would probably have to become more involved. First, it is likely that only some of the transactions denominated in private currencies are recorded for tax purposes.²²⁹ This could result in serious tax dodging if a substantial amount of transactions were performed in

²²⁴ MARTIN, *supra* note 19, at 71.

²²⁵ *BerkShares Basics*, BERKSHARES, INC., http://www.berkshares.org/legal_accounting [<https://perma.cc/624D-EXUH>] (last visited Feb. 26, 2017, 3:46 PM).

²²⁶ MARTIN, *supra* note 19.

²²⁷ Kyle Chayka, *How Digital Currencies Led to the Biggest Money Laundering Case Ever*, PACIFIC STANDARD MAGAZINE (Feb. 5, 2014), <https://psmag.com/how-digital-currencies-led-to-the-biggest-money-laundering-case-ever-7e377d0b903#.8q5to81v4> [<https://perma.cc/WJX8-GX8V>].

²²⁸ See *U.S. v. Von NotHaus*, No. 5:09CR27-RLV, 2014 WL 5817559, at *14 (W.D.N.C. Nov. 10, 2014).

²²⁹ Kelly Phillips Erb, *Funny Money or New Economy? Alternative Currency Raises Tax, Other Challenges*, FORBES (Jul. 23, 2013, 12:22 AM), <http://www.forbes.com/sites/kellyphillipserb/2013/07/23/funny-money-or-new-economy-alternative-currency-raises-tax-other-challenges/#2715e4857a0b68fd92613ae0> [<https://perma.cc/32L8-Z3HX>]. The same applies to barter transactions.

private currency. Second, there is little to stop an aggressive issuer from printing more and more private currency while maintaining a predetermined peg to the U.S. dollar. Theoretically, this could result in a substantial increase in M0 unsanctioned by the Federal Reserve. Additionally, the issuer would receive significant seigniorage benefits at the expense of holders of U.S. dollars, who would experience the cost of inflation.

By treating Bitcoin and digital currencies generally as non-currency property, regulators avoided directly addressing the problems presented by private currencies. Unfortunately, silence on the private currency front will not prevent the problems surrounding private currency from emerging in the digital currency context. Two concerns are especially pressing. First, how should regulators decide whether an emerging technology is a digital currency or something else designed to avoid federal regulatory requirements? Second, how should regulators decide whether a digital currency introduces risks to United States monetary policy? The classification concern is ultimately a worry about channeling. Without an objective understanding of what digital currency is and the unique risks it poses, regulators may be encouraged to apply digital currency-specific guidance inappropriately or in lieu of alternative regulations when presented with an emerging technology labeled as “digital currency.” The monetary concern worries that the two sticky issues common to private currencies generally may be especially pernicious in the digital currency context.

Regulators might have chosen to avoid these questions because they believed digital currencies, like existing private currencies, have too small an economic footprint to merit further regulation. For example, though there are more than enough exchangeable parts of Bitcoins to replace U.S. dollars as the monetary base, there are not nearly enough individuals and organizations willing to

transact in the digital currency. This is likely due to two worries. The first concerns the still volatile price of Bitcoin. As merchants and bankers since Feudal times recognized, an unstable currency is bad for business. Second, digital currencies lack the protections and assurances baked into national currencies. For example, the FDIC protects bank accounts denominated in a national currency, not Bitcoin. Federal capital requirements for banks cannot be met by holding Bitcoins. Perhaps most important, existing digital currencies lack a central authority tasked with stabilizing the digital currency's value. Though the amount of Bitcoins in circulation and the rate of "coinage" is predetermined by algorithm, there is no Federal Reserve ready to combat shortages and excesses in the Bitcoin supply or the predations of speculators. Simply put, not enough people trust digital currencies as a stable representation of value.

However, the digital currency landscape continues to evolve. One newcomer is particularly interesting precisely because it lacks many of the features characteristic of Bitcoin and its ilk. In 2014, Goldman Sachs filed a patent for a digital currency known within the bank as SETLcoin.²³⁰ The application describes SETLcoin as a virtual currency, which is defined by Goldman Sachs as a "digital medium of exchange that enables distributed, rapid, cryptographically secure, confirmed transactions for goods and services."²³¹ The value of a SETLcoin is based on the asset or assets included within it.²³² For example, a SETLcoin could include U.S. dollars, securities, or derivative products.

²³⁰ Brian Cohen, *Goldman Sachs Files Patent Application For Securities Settlement Using Cryptocurrencies*, BITCOIN MAGAZINE (Dec. 1, 2015, 3:16 PM), <https://bitcoinmagazine.com/articles/goldman-sachs-files-patent-application-for-securities-settlement-using-cryptocurrencies-1449000967> [<https://perma.cc/9J8Q-VFTN>].

²³¹ *Id.*

²³² *Id.*

The SETLcoin system employs blockchain technology to perform and record transactions.²³³ However, unlike Bitcoin, the SETLcoin system is centralized. Employees of Goldman Sachs play the role occupied by decentralized miners in the Bitcoin ecosystem.²³⁴ SETLcoin also includes functionality allowing for other authorities—such as the SEC—to play a role in verifying and authenticating transactions.²³⁵

One of the main advantages of SETLcoin, according to Goldman Sachs, is its ability to facilitate securities and derivatives transactions without going through a third party intermediary.²³⁶ Parties that transact through a clearinghouse do not face each other in any transaction—the clearinghouse is the counterparty to every trade. Going through a clearinghouse adds costs to and delays transactions. To the contrary, transactions between members of the SETLcoin ecosystem are peer-to-peer and can occur as fast as the digital currency allows.

The conceptual and monetary issues common to digital and private currencies come into much clearer focus with a major financial institution involved. Should regulators accept on face Goldman Sachs' representation of SETLcoin as a digital currency, then regulators may be compelled to apply digital currency-specific guidance in lieu of alternative regulations. Goldman Sachs and its clients perform a substantial number of securities and derivatives transactions. The SETLcoin technology appears to allow

²³³ Prableen Bajpai, *Goldman Sachs Files 'SETLcoin' Patent: What It Is and What It Means*, NASDAQ (Dec. 8, 2015, 9:21 AM), <http://www.nasdaq.com/article/goldman-sachs-files-setlcoin-patent-what-it-is-and-what-it-means1-cm551600> [https://perma.cc/ZE4H-8XF4].

²³⁴ *Id.*

²³⁵ Cohen, *supra* note 230.

²³⁶ *Id.*

these investors and speculators to trade without going through a federally regulated clearinghouse. SETLcoin may very well decrease the time and cost of transacting, but federal regulations exist to impose limits on trading risk. This new digital currency could effectively render those transactions performed within the SETLcoin ecosystem dark to the regulatory world, thereby increasing the risk faced by all market participants. Though SETLcoin is self-labelled as a digital currency, its anti-clearinghouse functionality could be described as an attempt to avoid existing regulations by facilitating precisely the type of peer-to-peer financial transactions that federal regulations intended to push onto regulated clearing houses.

The monetary issues stemming from SETLcoin are speculative, but not nearly so much as in the Bitcoin context. The sheer quantity of transactions performed by Goldman Sachs and its clients guarantees fairly wide SETLcoin circulation should the digital currency get the green light. On any day, tens of billions of dollars worth of stocks are traded just on the New York Stock Exchange.²³⁷ An even greater number of derivatives are traded regularly.²³⁸ Should even a fraction of the value of traded securities and derivatives be captured by SETLcoin, then the SETLcoin ecosystem would contain sufficient, exchangeable parts of value to constitute its own monetary base. Additionally, unlike Bitcoin, SETLcoin is backed by the asset(s) underlying each SETLcoin and supported by major financial institution. Thus, bankers both within and outside Goldman

²³⁷ See *Transactions, Statistics and Data Library*, NYSE.COM, <https://www.nyse.com/data/transactions-statistics-data-library> [<https://perma.cc/8BM2-7C23>] (last visited Feb. 26, 2017).

²³⁸ See *Daily Volumes*, LCH GROUP, <http://www.lchclearnet.com/en/asset-classes/otc-interest-rate-derivatives/volumes/daily-volumes-swapclear-global> [<https://perma.cc/BMP6-BA3T>] (last visited Feb. 26, 2017).

Sachs would likely be willing to extend credit against the value of a debtor's SETLcoins. This would allow the SETLcoin monetary system to extend from M0 to M1 to M2, and possibly even further, for SETLcoin would increase the transferability of assets traditionally understood as too immobile to qualify as part of the money supply.

Goldman Sachs has not proposed a monetary use for its SETLcoin. However, should the digital currency prove cost effective for financial institutions and other traders, it is possible that a new monetary system would de facto emerge among institutions and traders employing SETLcoin as their primary means of exchange. This could occur without Goldman Sachs' intention or effort should the incentives align properly. The Renaissance and early Modern periods were characterized by a similar monetary order, where ordinary folk used the coin of their realm for daily purchases but bankers and princes used the private paper money of the banking houses to perform larger transactions. That economic system experienced regular monetary shortages, credit crises, and exchange rate issues due to the multiplicity of currencies—including banknotes—in circulation. Such monetary problems continue today. For example, one way to understand the contagion caused in 2007 and 2008 by the collapse in the market for mortgage-backed securities (MBSs) is to view MBSs at that time as an asset class that had acquired the characteristics of a monetary system. MBSs were widely exchangeable for other assets, which could themselves then be converted into services or other assets not directly exchangeable for MBSs. The size of the market had become so large, and the underlying security—mortgages—so blindly trusted as a safe investment, that most of the country's financial system was able to conduct a substantial amount of transactions using MBSs as a pseudo-currency. When the market for MBSs crashed, those holding the securities experienced rapid inflation, for the purchasing power of each MBS had decreased. Some holders were no

longer able to meet their obligations. As Renaissance and Early Modern Italian bankers knew all too well, loss of trust in “paper promises” can trigger a monetary shortage, for much of the previous money supply is no longer trusted or in demand.

Even if SETLcoin fails to launch, it is probable that major financial institutions will continue to invest in blockchain-based financial technology (fintech) to capture speed and cost advantages. Indeed, most major banks are already invested in both in-house and third party ventures to develop the blockchain fintech of the future.²³⁹ Emerging fintech will likely face the same two questions common to Bitcoin and SETLcoin. First, how should regulators decide if a particular fintech qualifies as a digital currency rather than something else masquerading as a digital currency to avoid federal regulations? Second, what factors should regulators consider when determining whether a digital currency poses a risk to the United States monetary system?

III. SOLUTION

Existing regulations may prove sufficient to prevent these issues from becoming serious problems in the Bitcoin context. However, emerging fintech with features radically different from those characteristic of Bitcoin pose heightened risks to the United States’ regulatory and monetary systems. What follows are proposals for how to resolve the problems of identifying and properly controlling digital currency.

²³⁹ Jennifer Hughes, *Goldman Sachs files patent for virtual settlement currency*, FINANCIAL TIMES (Dec. 3, 2015), <http://www.ft.com/intl/cms/s/2/b0d8f614-997c-11e5-9228-87e603d47bdc.html#axzz3xXBLx2PS> [<https://perma.cc/FYT7-87DW>].

A. PROBLEM 1: IDENTIFYING DIGITAL CURRENCIES

The threshold problem of identifying digital currencies is made significantly less troubling by Swan's three level description of 21st century digital currencies. According to Swan's description, the top level of a digital currency "stack" functions as the means of exchange and is most readily recognized as part of the digital currency.²⁴⁰ The middle level is made up of the software that facilitates transactions, and the bottom level includes both a record of transactions performed in the digital currency and the software and hardware needed for recording purposes.²⁴¹ This description can readily be adapted into a test. If a particularly fintech serves primarily as a means of exchange, then it is a digital currency and should be treated as such. On the other hand, if the fintech is primarily used to facilitate and record transactions, then it should be classified as something else. The question for regulators boils down to where is the action occurring, at the top level or the bottom two?

Applying this test to Bitcoin, it appears that Nakamoto's brainchild is properly classified as a digital currency. The primary purpose of Bitcoin is to serve as a means of exchange—the cash of the internet. The middle and bottom levels of Bitcoin exist only to facilitate the top level. The fact that Bitcoin miners are compensated to confirm and record transactions suggests that members of the Bitcoin ecosystem view the digital tokens themselves as the reason to be involved. None of this is to suggest that the bottom two levels are unimportant for Bitcoin. Rather, those levels are subordinate to Bitcoin's primary purpose:

²⁴⁰ SWAN, *supra* note 133.

²⁴¹ *Id.*

facilitating the purchase of goods and services without relying on a national currency or a third party authority.

The issue is much less clear with SETLcoin. Goldman Sachs and commentators have promoted this digital currency as a way to increase the speed of trading while decreasing costs.²⁴² Many are interested in the peer-to-peer functionality of SETLcoin because it may allow traders to transact without going through a federally regulated clearinghouse.²⁴³ The description of SETLcoin provided in Goldman Sachs' patent application does not make clear whether the digital currency is to serve primarily as a means of exchange or as a means by which transactions are confirmed.²⁴⁴

If SETLcoin or any other fintech fails to qualify as a digital currency, the issue of identification remains. Issuers of ersatz digital currency will likely claim that the post-2013 regulatory guidance for digital currencies applies to the transactions facilitated by the fintech rather than alternative regulations specific to those transactions. To counter this argument, regulators would need to show that the ersatz digital currency is nothing but a new type of contract subject to the rules and regulations governing the underlying transactions. The concept of a "smart contract" could greatly aid regulators in this task.

Nick Szabo is often credited as the person who first formulated the concept of a smart contract.²⁴⁵ The key idea

²⁴² Brendan McDermid, *Goldman Sachs wants to create its own version of bitcoin*, QUARTZ.COM (Dec. 2, 2015), <http://qz.com/563967/goldman-sachs-wants-to-create-its-own-version-of-bitcoin/> [<https://perma.cc/ZCY4-2APK>]; see also Bajpai, *supra* note 233.

²⁴³ Bajpai, *supra* note 233.

²⁴⁴ Cohen, *supra* note 230.

²⁴⁵ Stefan Thomas & Evan Schwartz, *Smart Oracles: A Simple, Powerful Approach to Smart Contracts*, GITHUB, INC. (Jul. 17, 2014), <https://github.com/codius/codius/wiki/Smart-Oracles:-A-Simple,->

behind smart contracts is that “hardware and software can supplant, enhance, or render obsolete a variety of common contractual clauses in a way that imposes drastic, if not prohibitive, costs on any potential breacher.”²⁴⁶ Smart contracts can be designed to employ blockchain technology.²⁴⁷ These smart contracts use multi-signature protocols requiring all relevant parties to approve a transaction before it can be completed.²⁴⁸ Additionally, blockchain-based smart contracts employ escrow accounts to guarantee payment only upon performance.²⁴⁹

It may be best for regulators to view smart contracts and digital currencies as occupying two ends of the fintech spectrum. The more a fintech is used as a means of exchange, the further down the digital currency side of the spectrum it lies; the more it is used to confirm and record transactions, the nearer it is to a smart contract. This conceptual understanding of fintech would allow regulators to look beyond the labels used by financial institutions and other involved parties and identify fintech based on its functionality and use. Should the “primary function and actual use test” prove indecisive for a particular emerging fintech, regulators may choose to apply both digital currency guidance and financial regulations. Excessive regulation may slow innovation, so regulators should place a premium on efficiently integrating discrete regulatory schemes.

Powerful-Approach-to-Smart-Contracts) [<https://perma.cc/TK7S-JSQH>].

²⁴⁶ See Jeffrey Glass, *Smart Contracts and Consumer Protection*, COLUMBIA BUS. L. REV. ONLINE (Nov. 15, 2015, 11:20 PM), <http://cblr.columbia.edu/archives/13560> [<https://perma.cc/R6G9-66CP>].

²⁴⁷ *Id.*

²⁴⁸ *Id.*

²⁴⁹ *Id.*

B. Problem 2: Determining when the Monetary System may be at Risk

It would not be easy for a digital currency to challenge the primacy of the U.S. dollar domestically or internationally. One need not be a Chartalist²⁵⁰ to recognize the advantages national governments have over the issuers of private or digital currency. The vast majority of United States citizens prefer, and will likely continue to prefer, the security provided by Federal Reserve oversight,²⁵¹ FDIC protections,²⁵² and the ministrations of other regulators. Indeed, most of the world's population trusts the U.S. dollar, at least more than they trust their own national currency. Indeed, international recognition of American stability, prosperity, and strength explains why most nations pegged their currency to the greenback through the Bretton Woods era. The historical correspondence between United States financial, military, and diplomatic hegemony and the status of the U.S. dollar as the world's reserve currency should not be ignored.

Bitcoin will likely never engender the trust or demand needed for it to become the “cash of the internet,” let alone a rival to the U.S. dollar. The association between Bitcoin, terrorism, and crime is enough to earn the distrust of many Americans. Others would never transact in a currency subject to a wildly fluctuating exchange rate against the U.S. dollar. Though Bitcoin investors, technologists, and extreme libertarians will likely tout the digital currency's strengths for years to come, its economic

²⁵⁰ *Chartalism* holds that only the government and its agent are the “only viable issuers of money.” Martin, *supra* note 19, at 28–29.

²⁵¹ *What is the Purpose of the Federal Reserve System?*, THE FEDERAL RESERVE (Nov. 3, 2016), http://www.federalreserve.gov/faqs/about_12594.htm [<https://perma.cc/7TDU-GTMF>].

²⁵² *FDIC*, *Supra* note 187.

footprint will probably not grow large enough to pose any risk to the U.S. monetary system.

Bank-backed digital currencies, though only in their infancy, may prove to be the bigger threat. History is replete with contests between bankers and governments over the money supply. In the Medieval period, these contests were resolved by granting the sovereign a reasonable seigniorage in exchange for the sovereign’s promise not to devalue the realm’s coin. Later, bankers and governments came together to form national banks. Since then, contests between bankers and governments have occurred largely as a result of economic turmoil. To understand the monetary risks associated with bank-backed digital currencies, it may be useful to examine a historical example of what happens when analogous risks have been realized in a private currency setting.

According to Martin, the name “Argentina” still sends a chill down the back of every national banker.²⁵³ Economic turmoil had been brewing in Argentina throughout the 1990s.²⁵⁴ Brazil’s decision to devalue its currency in 1999 proved a breaking point. Refusing to depeg its currency from the U.S. dollar, Argentina soon found itself “priced out of its largest export market.”²⁵⁵ The result was recession. Rather than devalue its currency or otherwise increase the money supply, the Argentinian government chose to maintain its currency peg.²⁵⁶ Businesses and banks found this policy to be untenable.²⁵⁷ By 2002, a substantial percentage of the Argentine economy was transacting by

²⁵³ MARTIN, *supra* note 19 at 67–72.

²⁵⁴ *Id.* at 67.

²⁵⁵ *Id.*

²⁵⁶ *Id.* at 67–68.

²⁵⁷ *Id.* at 68–70.

means of private currencies.²⁵⁸ Store owners, service providers, and local banks would provide IOUs, which individuals and organizations would use to pay for goods and services.²⁵⁹ The Argentine government was not able to get the country's monetary situation under control.²⁶⁰ Fighting against local private currency issuers on one front and international creditors on the other, the government could not maintain the currency peg. In April 2002, the Argentine peso-to-U.S. dollar rate had increased by 400%.²⁶¹ Argentina was forced to default on its external debts.²⁶² As a result, Argentina became a capital market pariah, an unfortunate situation that has continued through the present day.²⁶³

The Argentina crisis reveals the risk contained within every private or digital currency. Should a currency not sanctioned by the government come to dominate a substantial amount of the economy, then it would be very difficult for central bankers and other federal regulators to maintain control over the monetary supply. The risk is heightened whenever a credit crisis occurs, for in those situations individuals and institutions may be incentivized to seek an alternative means of exchange should there be a money shortage. As more and more transactions shift to the alternative currency, it becomes increasingly difficult for the national government to meet its debts for a multitude of reasons. First, transactions denominated in the alternative currency are less likely to be successfully taxed. Second,

²⁵⁸ *Id.*

²⁵⁹ *Id.*

²⁶⁰ *Id.* at 69.

²⁶¹ *Id.* at 67–68.

²⁶² *Id.*

²⁶³ *Id.*

companies paid through an alternative currency may also choose to avoid licensing and other fees and conduct their business without authorization. Third, increased demand for the alternative currency may also drive down demand for the national currency, further devaluing the national currency and increasing the nation's debt obligations. Should the national currency maintain its value despite the emergence of an alternative currency (through government intervention or otherwise), there is still a risk of price inflation due to the increased quantity of money circulating throughout society. Worries of this kind may have led Congress to include in the Stamp Payments Act of 1862 provisions outlawing private tokens, checks, and notes worth less than one dollar.²⁶⁴

Thus, one important factor for regulators to consider when deciding the risk a digital currency may pose to the U.S. monetary system is the percentage of transactions in the national economy that are performed in the digital currency. The higher the percentage, the more worried regulators should be. The quality of transactions denominated in the digital currency must be considered as well. A digital currency that comes to dominate securities or derivatives transactions will pose different risks from one that replaces pocket change. Additionally, regulators should consider whether a digital currency could make the leap from M0 to the more expansive definitions of the money supply. This consideration is largely based on whether financial institutions would be willing to open accounts denominated

²⁶⁴ Timothy McTaggart & Matthew Silver, PEPPER HAMILTON LLP, *Virtual Currency: Recent Federal Regulatory Considerations* (May 2, 2013), <http://www.pepperlaw.com/resource/428/1610> [https://perma.cc/FJ9N-KBS8]; see also Reuben Grinberg, *Bitcoin: An Innovative Alternative Digital Currency*, 4 HASTINGS SCI. & TECH. L.J. 159, 183, 189 (2012) (According to the credit theory of money described in this Note, Professor Mann is correct that each Bitcoin is an obligation and thus may be a “token” as required by the Stamp Act of 1862).

in the digital currency or extend credit against digital currency as collateral.

Finally, and related to the three prior factors, regulators should consider the convertibility of the digital currency. This involves both a technical and empirical investigation. The technical investigation should seek to determine the range of transactions a digital currency could facilitate. For example, SETLcoin's functionality includes peer-to-peer securities transactions. This sort of transaction cannot occur directly within the Bitcoin ecosystem, because all transactions in the Bitcoin ecosystem must include a Bitcoin on one side. It is the movement of Bitcoins which is tracked by the Bitcoin blockchain, not the purchased goods or services. To reach the same result as the peer-to-peer SETLcoin transaction, a Bitcoin user would have to exchange his securities for their value in Bitcoin from one counterparty, then use those Bitcoins to purchase securities from another.

The empirical investigation should seek to determine whether a digital currency's functionality is likely to ever become reality. Bitcoin could, theoretically, replace other online payment systems as the cash of the internet. However, the empirical evidence available so far suggests that this possibility is not very likely. SETLcoin and other blockchain-based fintech have barely gotten out of the development phase. Regulators and central bankers would be wise to allow emerging technologies sufficient breathing room to come into their own. Governments that have passed laws banning Bitcoins from their economy do so at the cost of innovation.

CONCLUSION

Argentina is not the only nation to have seen the rise of private currencies in modern times. On May 4, 1970, representatives of Ireland's most prominent banks

announced that all banks in Ireland had closed or would close as a result of a collapse in the relationship between the nation's banks and their employees.²⁶⁵ The response by the Irish government stands as a clear counterpoint to the decisions made by Argentina's leadership three decades later. Rather than fighting against local businesses, merchants, and service providers, the Irish government came out in strong support of emerging private currencies.²⁶⁶ The Irish economy continued to function throughout the bank closure by means of interpersonal credit relations, often recorded on checks that could not, at least at the time, be redeemed at a teller's window, but sometimes recorded only orally between trust acquaintances.²⁶⁷ Though this haphazard monetary system was not without its flaws, Irish central bankers were amazed to find that the system of private currencies and credit relations prevented the most feared consequences of the bank closure from occurring.²⁶⁸ The banks reopened in November 1970, and the financial sector returned to normalcy by February 1971.²⁶⁹ The biggest problem encountered by the system of private currencies and unredeemable checks was relentlessly practical: with so many checks and currencies moving around, a daunting amount of paperwork had been created.²⁷⁰

The lesson to be learned from Argentina and Ireland is that monetary policy works best when in lockstep with the private sector. The Argentinian government failed to realize

²⁶⁵ MARTIN, *supra* note 19 at 23.

²⁶⁶ *Id.* at 23–26.

²⁶⁷ *Id.*

²⁶⁸ *Id.*

²⁶⁹ *Id.* at 25.

²⁷⁰ *Id.*

that the nation's economy required additional currency on a local level. No matter the exchange rate, workers need to be paid in an exchangeable medium that would allow them to purchase life's necessities and satisfy personal desires. Merchants and service providers require payment to stay in business. Once the national currency failed to satisfy the economy's needs, society found an alternative way to record interpersonal credit relations. Unfortunately, society's solution ran contrary to government policy. The result was economic duress and exclusion from wide swaths of the international credit markets. On the other hand, Ireland was able to work with its citizens and private businesses to keep the economy running despite a complete bank closure.

The emergence of digital currencies in the 21st century is different from what occurred in Ireland and Argentina. No credit or banking crisis spurred the development of blockchain-based fintech. However, the lessons of decades past may still be useful. Ireland's bank closure and Argentina's monetary crisis show that alternative currencies emerge to meet some need or desire not satisfied by national currencies. The digital currencies of the 21st century can be understood as a response to unnecessary costs and delay associated with a financial system that is ultimately based on paper currency. If that is the case, then the best course of action for the federal government would be to work with the private sector to develop a digital national currency. A USDLRcoin could potentially provide the functionality desired by the private sector while maintaining the relative security that comes with a national currency backed by a central bank.