Bitcoin could be the first cryptocurrency to reach a market capitalization of one trillion dollars*

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ABSTRACT

Bitcoin blockchain possesses immense potential for future opportunities, well beyond its current use in financial services underpinning cryptocurrencies, i.e. replacing traditional trusted third parties with trusted machines. Despite over a decade has passed since Nakamoto Satoshi launched Bitcoin in January 2009, it still continues to face barriers, challenges as well as a major regulatory hurdle in the U.S. and Europe. This paper looked into three hypothetical scenarios where the price of bitcoin surges over $50,000 (scenario 1), $100,000 (scenario 2), and $1,000,000 (scenario 3). Although new path-breaking technologies and inventions (i.e. Bitcoin) will continue to forge ahead unabated regardless of doubters, doomsayers, skeptics, pessimists, disbelievers, and short-sighted politicians (President Trump); however, these scenarios can only become a reality if the Trump administration and law makers stop constantly running headlong into backlash to cryptocurrencies (Bitcoin and Libra coin in particular). For future price growth of Bitcoin and altcoins, cryptocurrency markets need more people like Christine Lagarde, the former Managing Director of the IMF (currently, president of the European Central Bank), who urged central banks not to ignore "winds of change" and consider looking into the case of central bank digital currency.

Keywords: Bitcoin; Cryptocurrency; Blockchain; Electronic Cash; Reserve Currency

JEL classification: G12, G21, G32, E4, E5, E51, E59, D40, C52

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1.0 Introduction

Electronic cash (also referred to as crypto-currency, digital coin, virtual money, etc.) without a third-party intermediation was inevitable in the evolution of money, start of which dates back to prehistoric times when the humankind made the vital shift from the primitive Stone Age existence to agrarian life 10,000 years ago. Before money was invented (i.e. coin, paper, credit, and crypto), barter was used to facilitate exchange goods for other goods without the use of a monetary medium; Adam Smith (1776) described barter as primitive[1] in the "The Wealth of Nations" (also see Smith, 2008). However, in the new millennium (especially since the 2008 global financial crisis), the reincarnation of barter trade was noticed[2] (e.g. Chapman, 1980); countries that usually use barter as an alternative are; i) heavily indebted with insufficient foreign reserves; ii) imposed sanctions by the United States (i.e. Iran, North Korea, Russia, Turkey, etc.); attempting to avoid the use of dollars in local, regional and international trade[3]; and iv) interested in reducing current account[4] and trade deficits[5].

Although new technological and financial innovations can be potentially disruptive, G20 Governors share the view that crypto-assets pose no threat (but not insinuating they are completely free of risk). Despite challenges[6] provided by electronic cash, G20 Leaders noted that the vast scalability aspect of stablecoins (Libra) is an undeniable benefit to the global financial system (FSB, 2019). Those who fear cryptocurrencies (i.e. US president Donald Trump, the Fed) have no clue of the inner workings of money's natural evolution. Medium of exchange constantly evolve, its arduous journey so far has gone through seven stages; barter (goods are used to exchange for other goods); commodity money (a commodity is used to get other needs and wants); metallic money (coins made from copper, silver, gold, or a mix of various metals); paper money (bank notes, Fed notes); credit money (store credit, cheques, letter of credit, line of credit, revolving business account); plastic money (credit cards, debit cards, department store cards, pre-paid cash cards); digital

[1] Barter provides some advantages; goods and services are exchanged without paying money out of pocket. Unlike paper money, the terms of a barter deal must be negotiated till an agreement reached by all parties involved, goods and services are received after the agreement (see Cellarius, 2000; Hennart, 1990; Kaikati, 1976; Orme, 2004).

[2] Reports by Private Bartering Systems (PBS) and International Reciprocal Trade Association (IRTA, 2009) reveal that at least one-fifth of businesses across the world engage in barter trading.

[3] Due to the U.S. abuse of sanction power and adverse effects of the dollar on economies of other nations, countries formed associations, besides the European Union (EU) of 28 nations in Europe; BRICS (Brazil, Russia, India, China and South Africa), ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand); see Taskinsoy (2013a; 2013b).

[4] Top 10 countries with largest current account deficit (2017, billion US dollar); the U.S. ($462), the UK ($91.4), Canada ($55.6), Turkey ($39.9), Brazil ($29), France ($28.9), Algeria ($22.9), Argentina ($22.1), Australia ($21.7), Egypt ($19.8).

[5] Top 10 countries with the largest trade deficit (2017, billion US dollar); China ($357), Mexico ($76), Japan ($20), Germany ($56), Ireland ($39), Vietnam ($38), Italy $28), Malaysia ($21), India ($21), and South Korea ($21).

[6] Challenges include; disruptions to global financial stability; consumers' privacy protection and exploitation of users' data; cyber security; illicit activities on terrorism-financing, money-laundering, illegal drugs and human trafficking; regulatory compliance and supervision; national security; discrepancies in country-specific regulation/supervision, rules and laws; unbanked people; gaming the system; transparency and governance; sovereign currencies; tax matters; and uncertainty.

money (electronic cash, digital coin, and crypto-currency). Because cryptocurrencies are still not accepted same as fiat currencies, the search for a viable alternative still goes on.[7]

Table 1: Earlier electronic payments systems & proposals

ACC	CommerceSTAGE	Hashcash	Mini-Pay	PayMe	Secure Courier
Agora	Cybank	HINDE	Minitix	PayNet	Semopo
AIMP	CyberCash	iBill	MobileMoney	**PayPal**	SET
Allopass	CyberCoin	IMB-MP	Mojo	PaySafeCard	SET2GO
n-money	CyberGold	InterCoin	Mollie	PayTrust	SubScrip
BankNet	DigiGold	Ipin	Mondex	PayWord	Trivnet
Bitbit	Silk Road	Javien	MPTP	Peppercoin	TUB
Bitgold	E-Gold	Karma	Net900	PhoneTicks	Twitpay
Bitpass	ECash	LotteryTickets	NetCard	Playspan	VeriFone
C-SET	eCharge	Lucre	NetCash	Polling	VisaCash
CheckFree	eCoin	MagicMoney	NetCheque	Proton	Wallie
ClickShare	First Virtual	MicroMint	NetFare	Redi-Charge	Way2Pay
CommerceNet	FSTC	Micromoney	No3rd	S/PAY	WorldPay
CommercePOINT	Globe Left	MilliCent	One Click Charge	Sandia Lab E-Cash	X-PAY

Source: Narayanan et al (2016)

Since the late 1990s, contemporaneous crises have collectively cost the world's economies over $30 trillion. Some of the foundational work since the late 1970s paved the road to the inevitable birth of crypto money, but the advent of the Internet in the early 1990s transfigured commerce resulting in exponential surges in online sales, and this gradually fostered money's evolution into cryptocurrency which has occurred in three waves. The first wave of cryptocurrency research began in early 1980s with Chaum's proposal for "untraceable payments" (Chaum, 1982). The second wave consisting of variations and extensions of the antecedent research was in the 1990s that proved to be a decade for groundbreaking events that took a leap of faith that internet would make the dream of electronic cash a reality (e.g. Woodford, 2000; Camenisch et al., 2005; Okamoto & Ohta, 1992). Applications such as combating email spam (Dwork & Naor, 1992; reasons of failure, see Laurie & Clayton, 2004), internet-based payment system (Sirbu & Tygar, 1995) and minting digital coins (Rivest & Shamir, 1997) never saw a widespread deployment. Furthermore, skepticism among risk-averse investors caused the notable attempts by DigiCash (Chaum et al., 1998; Schoenmakers, 1998) and Peppercoin (Rivest. 2004) to fail, in turn DigiCash (1990) filed for bankruptcy in 1998. In the late 1990s, two attempts at creating a decentralized digital currency emerged; "b-money"[8] by Wei Dai (Dai, 1998) and Bitgold by blockchain pioneer Nick Szabo[9] (Goldschlag & Stubblebine. 1998; Vishnumurthy et al., 2003; Okamoto & Ohta, 1992; Kocherlakota, 1998; Sander & Ta-Shma, 1999). The last of the Mohicans, e-

[7] For a longer perspective and detailed discussions on this topic and other related topics, interested readers are welcome to check out Taskinsoy (2012; 2013; 2018; 2019; 2020).

[8] http://www.weidai.com/bmoney.txt

[9] Szabo (2005), "Bit Gold" available at: http://unenumerated.blogspot.rs/2005/12/bit-gold.html

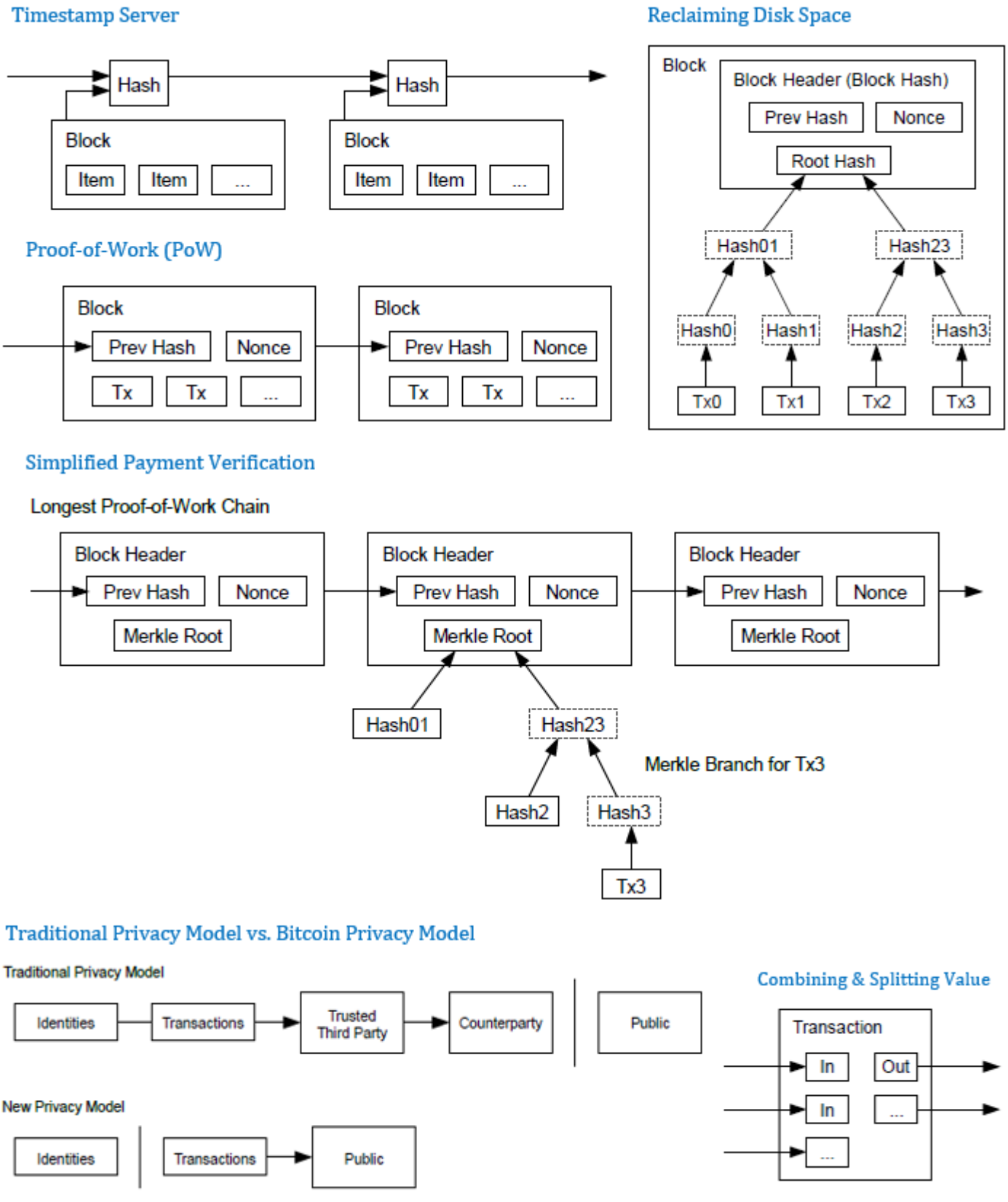
gold (established in 1996) after reaching several million users was shut down by the US government in 2008 citing legal issues (regulatory hurdle is a major issue for the future of cryptocurrencies).

In the pre-Bitcoin world (see Table 1); sending, receiving, paying and transferring electronic cash in a centralized payment system relied on trusted third parties who performed three essential tasks; (i) to govern/validate all of transactions; (ii) to ensure secured execution of transactions; and (iii) to maintain a chronology of transaction history. However, virtually all of the electronic cash schemes and online payment systems launched prior to Bitcoin[10] failed to see their widespread deployment. Nevertheless, their invaluable contribution to further developments of enhanced future technologies (i.e. blockchain) could not be ignored. A decade has passed since the launch of Bitcoin in January 2009, many of us still do not understand blockchain technology (Katz & Lindell, 2014; Levy, 2001; Ferguson et al., 2012); in fact, some people see blockchain as a magical invention to solve all our problems, but there may be unforeseeable hazards to this prophecy (Clarke, 1962).

The seeds of cryptocurrencies and blockchain as the underlying infrastructure technology (DeVries, 2016) might have been inadvertently planted via decisions at the 1944 Bretton Woods Conference. In the post-WWII era, the seeds have flourished thanks to the new monetary order (dollar hegemony) and its watchdog institutions (IMF, World Bank, WTO, etc.), all of which make sure that the U.S. can keep enjoying the dollar's "exorbitant privilege." In 2007-08, the highly criticized dollar hegemony had a hiccup; the agonizing financial losses resulted from the 2008 global financial crisis (GFC) gave birth to the first successful cryptocurrency – a mysterious creator under the alias Satoshi Nakamoto (2008) launched Bitcoin in Jan 2009 as a purely peer-to-peer electronic cash where bitcoin serves as the digital unit of account of the Bitcoin network, removing trusted third party. Satoshi developed Bitcoin public good in mind, he registered the domain name *bitcoin.org* (August 2008) and posted a White Paper *"Bitcoin: A Peer-to-Peer Electronic Cash System"* to the Cypherpunks mailing list (October 2008). In the absence of a financial intermediary (trusted third party), Bitcoin solves double spending underpinned by its infrastructure technology blockchain which acts as the trusted machine.

Bitcoin uses a mining process based on the cryptographic Proof-of-Work (PoW) protocol to validate blocks that are made immediately visible to all nodes via distributed ledger (Figure 1). Franco (2014) states that understanding Bitcoin requires knowledge of software (language and cryptography), hardware (computer network), and underlying technology (blockchain). Before sending and receiving bitcoins, each user must have (i) sender's own public key (an alphanumeric string), (ii) sender's own private key (i.e., password linked to the address), and (iii) recipient's public address.

[10] Bitcoin with a capital "B" refers to the electronic cash system; bitcoin with a lowercase "b" is the digital currency.



Source: Nakamoto (2008)
Figure 1: Overview of Bitcoin Blockchain Protocol

2.0 Literature Review

A chorus of economists and scholars argue that cryptocurrencies (Bitcoin and nearly 7,000 altcoins) have emerged due to inherent weaknesses of centralized financial systems using state-controlled fiat currencies (intrinsically useless paper), values of which fluctuate based on contributing and driving domestic and macroeconomic forces (see Bernanke, 2013; Bordo, 2007; Davies, 2000, 2002; Kasper, 2017; Keynes, 1936; Nakamoto, 2008; Kiyotaki & Wright, 1989). A decade after its launch in January 2009, Bitcoin[11] has become a household name despite the fact that the US regulators and law makers have been constantly running headlong into backlash to cryptocurrencies (Bitcoin and Libra coin in particular). While US President Donald J. Trump slammed Bitcoin and Libra by tweeting[12] "I am not a fan of Bitcoin and other cryptocurrencies, which are not money, and whose value is highly volatile and based on thin air," Christine Lagarde[13], former Managing Director of the IMF, urged central banks not to ignore "winds of change" and consider looking into the case of central bank digital currency (Lagarde, 2018; Bech & Garatt. 2017; Mancini-Griffoli, 2018; McLeay et al., 2014).

Advocates of cryptocurrencies believe that the dollar's days are numbered and Bitcoin as a viable alternative could become a reserve currency (Cermak, 2017); however, pessimists are inclined to think that Bitcoin and Libra will face the same predicament as other failed cryptocurrency projects. The CEO of Coinbase claims that bitcoin will replace the U.S. dollar as world reserve currency.[14] In spite of Bitcoin's increased popularity, some traditional economists still find it difficult to get a grasp on the Bitcoin phenomenon (Sovbetov, 2018). To this day, there is no universally agreed definition of Bitcoin; Yermack (2013) contends Bitcoin is a currency, but Berentsen and Schär (2018) argue that it has applications suitable to become an asset class, but not a currency. On the other hand, Baek and Elbeck (2015) see Bitcoin as an asset or a speculative investment vehicle; in line, a Goldman Sachs executive feels that Bitcoin is more of an asset rather than a currency.[15] Some Fed presidents assert that Bitcoin fails three basic functions of money (i.e. medium of exchange, store of value, and unit of account (for bitcoin as real currency, see David, 2014).[16] Bitcoins are used as electronic cash to buy goods and services online, or sent, received and transferred among users (Kelly, 2014; Dwyer, 2014; Eichengreen, 2009); according to Kristoufek (2015), Bitcoin serves as a store of value.

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[11] As of 11 September 2020, 6,697 coins are traded with the combined market cap of $334 billion; Bitcoin alone has 56.8% of the market share, which amounts to a market cap of $189.7 billion (Ethereum is second with $41.3 billion).

[12] Following Facebook's formal announcement of its Libra project on 18 June 2019, about three weeks later Trump tweeted (3:15 AM – Jul 12, 2019); https://www.foxbusiness.com/markets/bitcoin-price-tumbles-trumps-criticism

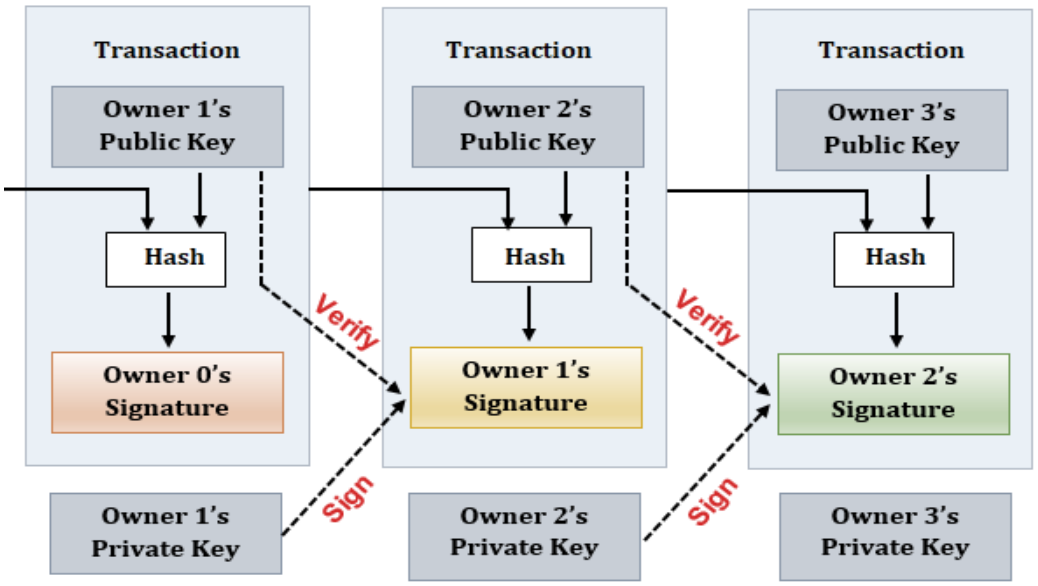
[13] Since November 2019, Christine Madeleine Odette Lagarde (a French politician and lawyer) is serving as President of the European Central Bank (ECB).

[14] https://99bitcoins.com/coinbase-ceo-claims-bitcoin-will-replace-dollar-as-world-reserve-currency/

[15] https://www.technologyreview.com/s/610783/bitcoin-would-be-a-calamity-not-an-economy/

[16] http://fortune.com/2018/04/20/bitcoin-new-york-fed-central-bank-jack-dorsey/

Bitcoin as a minable cryptocurrency is not backed by any government or asset with intrinsic value. Under the decentralized Bitcoin blockchain; proof-of-work (PoW) - similar to Adam Back's Hashcash (Back, 2002) is employed to solve the double spending problem (Figure 1). Instead of introducing a "mint" (a central authority like Facebook's Libra Association) to govern and validate all transactions, Bitcoin blockchain uses a timestamp server together with a distributed ledger to publish the hash in chronological order to all nodes in the Bitcoin network (e.g. Dai, 1998), this proves that the data (and transactions) exist that cannot be modified, cancelled, or deleted (for a fuller discussion, see Bayer et al., 1993; Haber & Stornetta, 1991, 1997; Massias et al., 1999).

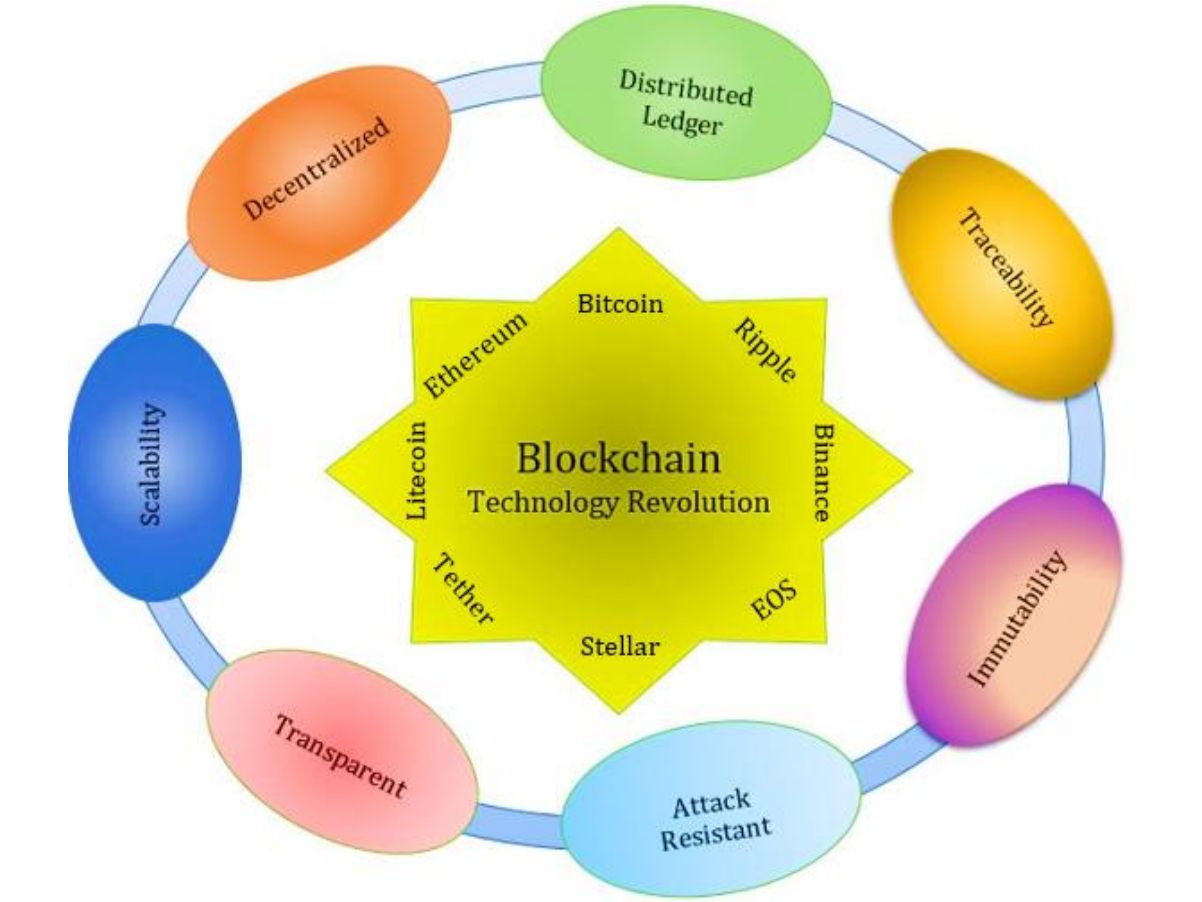


Source: Adapted from Nakamoto (2008)

Figure 2: Schematic overview of Bitcoin transactions

As shown in Figure 2, under Bitcoin blockchain protocol, to transfer and receive bitcoins among users or to pay for products and services purchased online, a set of private and public keys are used; an owner (sender) digitally signs a hash of the previous transaction and the public key of the receiver (e.g. Nakamoto, 2008; Merkle, 1980; 1987). The use of cryptographic techniques, proof-of-work or proof-of-stake, along with blockchain characteristics such as immutability, traceability, transparency, and tamper-proof (i.e. resistant to attacks) make Bitcoin blockchain highly secure (Figure 3). The anonymity (identity of users is not revealed) aspect of blockchain prompted governments to call for greater scrutiny of cryptocurrencies on terrorism financing, money laundering, illegal drugs (i.e. Silk Road) and human trafficking (see Adrian & Mancini-Griffoli, 2019; Cuthell, 2019; Duffie, 2019; Milne, 2018; Sapienza & Zingales, 2012). Even though more than a decade has passed since Bitcoin's launch, still many countries have taken actions to ban or regulate cryptocurrencies. The US Treasury does not

define Bitcoin as a currency; furthermore, the US Internal Revenue Service (IRS) for taxation purposes categorizes Bitcoin as a property.[17] If Bitcoin and other cryptocurrencies are argued to be associated with extreme volatility, this is in most part due to increased regulatory efforts in the U.S. and Europe to curb true potential of Bitcoin and the upcoming Libra. Like any life-changing invention, blockchain and cryptocurrencies will continue to forge ahead unabated regardless of doubters, doomsayers, skeptics, pessimists, disbelievers, and short-sighted politicians to put another nail in the coffin.



Source: Author

Figure 3: Key characteristics of Bitcoin blockchain

Blockchain is a decentralized mechanism without the need of a trusted third party intermediation, its distributed ledger technology (DLT) relies on cryptographic proof. Any hashed data that added to a block (chained) is inalterable, meaning it could not be changed, modified, or deleted. A decentralized

[17] Cryptocurrencies are regulated as: Israel, taxed as asset; Bulgaria, taxed as financial asset; Switzerland, taxed as foreign currency; Argentina & Spain, subject to income tax; Denmark, subject to income tax and losses are deductible; United Kingdom, corporations pay corporate tax, unincorporated businesses pay income tax, and individuals pay capital gains tax. Due to a 2015 decision of the European Court of Justice (ECJ), gains in cryptocurrency investments are not subject to value added tax in the European Union Member States. For further details, see LLC (2018), http://www.law.gov

blockchain removes any Fed like de facto central authority, therefore decisions are reached by a *consensus protocol* (Ben-Sasson et al., 2014; Buchman et al., 2018; Yin et al., 2018). No single entity or individual controls Bitcoin blockchain which is designed as a permissionless network (Massias et al., 1999; Haber & Stornetta, 1991; Ray, 2017). Under permissioned blockchains (i.e. Libra), trust is centralized where authorized nodes (or a group of validators) govern transactions, and access to data by non-validators is restricted (Ganne, 2018; Pike, 2018; Hileman & Rauchs, 2017).

Blockchain is temper-proof, meaning resistant to attacks by hackers; Bitcoin blockchain is highly secure (Casey & Vigna, 2018). Traceability (changes are easily tracked), transparency (transactions are visible to all users at all times), immutability (documents can easily be authenticated), share-ability (distributed ledger eliminates database backups and prevents loss of data since most nodes have a copy), and consensus algorithm (blocks are created and published via consensus) make Bitcoin blockchain more resilient to both fraud and cyberattacks than traditional databases (Merkle, 1980; Schoenmakers, 1998; Staples et al., 2017; Risberg, 2018; Vishnumurthy et al., 2003; Wood, 2016). Security and integrity of a system may be bridged or compromised by a group of hackers, designers, or nodes who are in charge of running the network. In the event of an attack, Bitcoin blockchain can still function correctly even half (51%) of the network is controlled by validators or hackers (Castro & Liskov, 1999; Bernstein et al., 1987; Buchman et al., 2018; Vukoli´c, 2015; Yin et al., 2018).

Bitcoin blockchains uses a consensus approach to ensure high security. Nakamoto (2008) derived proof-of-work (PoW) hashing scheme from Adam Back's Hashcash (Back, 2002) that uses SHA-256 hash function. Transactions via a mining process are hashed in a Merkle tree (Merkle, 1980, 1987; Eastlake & Hansen, 2011) which verifies and validates the accuracy of the hash value in the block header. However, PoW is slow and inefficient (Bonneau et al., 2015), seven transactions per second – (Cascarilla, 2015) compared to Ethereum's 15, Ripple's 1,500, and Libra's estimated 1,000. Different methods[18] are used under POS[19] to prove ownership of cryptocurrency (i.e. stake); it is argued that an attack by owners with the highest stakes is less likely. POS is certainly better and more economical than PoW, but POS may lead to unfairness and domination by a single person or entity with the largest

[18] Also see the Ripple Protocol Consensus Algorithm, here subnetworks (i.e. server for consensus and client for the transfer of funds). Each server has a unique node list (UNL), for consensus purposes, UNLs with 80% or higher are included in the ledger and UNLs with less than 20% are considered to be faulty (see Schwartz et al., 2014). Although Bitcoin is mineable, out of the top-100 list by market capitalization, about two-thirds or 64 cryptocurrencies are non-mineable such as Ripple-XRP, Binance Coin, Tether, EOS, Stellar, UNUS SED LEO, Chainlink, Tezos, NEO, and IOTA. Consensus protocol without mining used by Tendermint involves three stages; pre-vote step, pre-commit step, and the final commit step; after rounds of voting, a block that gets two-thirds or more of commits is accepted and published as a new block (see Kwon, 2014).

[19] Delegated proof of stake (DPOS) is a close variation of POS; the difference between the two is while in POS the selection is random whereas in DPOS blocks are generated and validated by nodes selected by stakeholders like a corporation. After the first proof of stake verification on Ethereum platform different methods of verification have emerged; "proof of authority" (PoA), "proof of importance" (PoI) and "proof of history" (PoH).

holding of coins; to avoid this, POS uses random selection along with stake size and coin age (i.e. older coins with larger stake), this had been employed by Blackcoin (Vasin, 2014) and Peercoin respectively (King & Nadal, 2012; Vukoli´c, 2015). Another consensus algorithm used by blockchains is Byzantine Fault Tolerant, which is based on military combat where generals must decide whether attack or retreat (Lamport et al., 1982). Variations of BFT have been developed; as such, a replication of BFT as Practical Byzantine Fault Tolerance (PBFT)[20], Stellar Consensus Protocol (SCP), Delegated Byzantine Fault Tolerance (dBFT); for a longer discussion, see Mazieres (2015), Miguel and Barbara (1999).

Blockchain offers anonymity, immutability, scalability, and traceability. Bitcoin blockchain has great potential to revolutionize how humans conduct business, interact and transact with each other as well as with trusted machines. Bitcoin blockchain facilitates purely peer-to-peer payments, stores records, manages inventory of wealth (tangible and intangible assets), transfers and receives funds within seconds. Bitcoin blockchain provides anonymity (identity of users is not revealed). This aspect of blockchain prompted governments to call for greater scrutiny of cryptocurrencies on terrorism financing, money laundering, illegal drugs (i.e. Silk Road[21]) and human trafficking (Adrian & Mancini-Griffoli, 2019; Cuthell, 2019; Duffie, 2019; Milne, 2018; Sapienza & Zingales, 2012). Scalability has been a concern for Bitcoin blockchain due to slower PoW verification and the mining process where a new block limited to 1 MB is mined every ten minutes (see Vukoli´c, 2015; Ray, 2017).

Table 2: Blockchain segmented by permission model

Blockchain Types	Type		Read	Write	Commit	Example
	Open	Public permissionless	Open to anyone	Anyone	Anyone	Bitcoin, Ethereum
		Public permissioned	Open to anyone	Authorized participants	All or subset of authorized participants	Supply chain ledger for retail brand viewable by public
	Closed	Consortium	Restricted to an authorized set of participants	Authorized participants	All or subset of authorized participants	Multiple banks operating a shared ledger
		Private permissioned "enterprise"	Fully private or restricted to a limited set of authorized nodes	Network operator only	Network operator only	External bank ledger shared between parent company and subsidiaries

Source: Hileman and Rauchs (2017)

[20] PBFT protocol was used in Hyperledger project Available: https://www.hyperledger.org/
[21] On October1, 2013 the FBI shut down the black market website Silk Road and seized its assets including 26,000 bitcoins.

Blockchains are classified as permissionless versus permissioned and public versus private or consortium. Blockchains, in terms of access to data, are formed as permissioned, permissionless, public, private or consortium (Table 2). Permissionless Bitcoin blockchain imposes no restrictions on who can access and validate transactions; conversely, in permissioned blockchains (i.e. Facebook's planned Libra coin), access is controlled by a de facto central authority which authorizes the level of access by participants and validators (Ganne, 2018).

Table 3: Electricity cost to mine one bitcoin[22]

Albania	$3,894	Ireland	$11,105	Rwanda	$8,922
American Samoa	$10,706	Israel	$6,087	Saudi Arabia	$3,172
Argentina	$4,560	Italy	$10,310	Serbia	$3,133
Australia	$9,913	Jamaica	$7,867	Singapore	$5,936
Bahrain	$16,773	Japan	$8,723	Slovakia	$4,746
Bangladesh	$2,379	Jordan	$9,913	Slovenia	$7,645
Belarus	$2,177	Kazakhstan	$2,835	Solomon Islands	$16,209
Belgium	$13,482	Kiribati	$12,966	South Africa	$5,948
Brazil	$6,741	Kosovo	$3,133	South Korea	$26,170
Brunei	$4,758	Kuwait	$1,983	Spain	$11,103
Bulgaria	$4,362	Laos	$4,845	Siri Lanka	$11,630
Cambodia	$8,307	Latvia	$7,122	Surinam	$2,956
Canada	$3,965	Lithuania	$5,155	Sweden	$4,746
Chile	$9,120	Luxembourg	$7,693	Switzerland	$7,494
China	$3,172	Macedonia	$3,914	Tahiti	$11,103
Colombia	$7,157	Malaysia	$5,147	Taiwan	$3,774
Cook Islands	$15,861	Malta	$6,079	Thailand	$4,943
Croatia	$5,551	Marshall Islands	$14,751	Tonga	$14,671
Cyprus	$8,723	Mexico	$7,645	Trinidad A. Tobago	$1,190
Denmark	$14,275	Moldova	$4,651	Turkey	$4,984
Egypt	$3,172	Montenegro	$6,384	Tuvalu	$14,493
Estonia	$5,551	Myanmar	$1,983	Uganda	$7,637
Ethiopia	$2,855	Nepal	$3,569	Ukraine	$1,852
Fiji	$5,155	Netherlands	$9,449	UAE	$3,569
Finland	$7,122	New Zealand	$7,593	United Kingdom	$8,402
France	$7,930	Nicaragua	$8,613	United States	$4,758
Georgia	$3,316	Nigeria	$5,321	Uruguay	$8,723
Germany	$14,275	Norway	$7,784	Uzbekistan	$1,789
Gibraltar	$5,710	Pakistan	$7,137	Vanuatu	$13,085
Greece	$9,120	Palau	$9,053	Venezuela	$531
Guyana	$10,627	Papua New Guinea	$9,913	Vietnam	$4,717
Hong Kong	$7,930	Paraguay	$3,140	Western Samoa	$12,689
Hungary	$5,365	Peru	$4,140	Zambia	$3,569
Iceland	$4,746	Philippines	$7,137		
India	$3,274	Poland	$6,931		
Indonesia	$4,329	Portugal	$10,825		
Iran	$3,217	Romania	$5,698		
Iraq	$6,543	Russia	$4,675		

Source: Elite Fixtures; MarketWatch

Notes: The cost figures were calculated based on the average electricity rate per country

[22] https://www.marketwatch.com/story/heres-how-much-it-costs-to-mine-a-single-bitcoin-in-your-country-2018-03-06

3.1 Scenarios on Future Prospects for Bitcoin Price

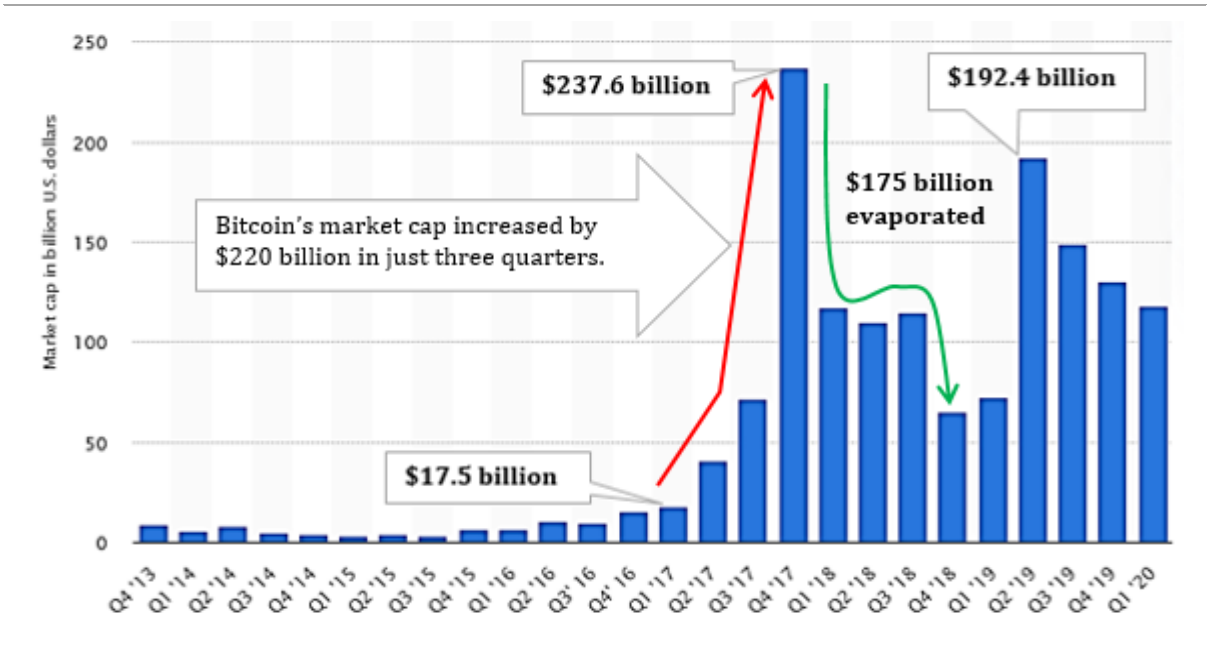
Bitcoin has a fixed maximum supply of 21 million coins, 88% of which (18.5 million bitcoins) have been already mined and released into circulation (Hayes, 2017). Because bitcoins enter circulation only via a mining process, bitcoin miners (or nodes) receive a reward for every block successfully added to the blockchain (Houy, 2014; Kroll et al., 2013). The reward system began with 50 BTC[23] per block and the first halving occurred in 2012 to 25 BTC (currently at 6.25 BTC); the cost of mining a single bitcoin based on electricity rate varies significantly among countries (Table 3).[24] Vigna and Casey (2016) draw attention to how blockchain has changed the global economic order; an article in the Economists (2015) describes purely peer-to-peer decentralized blockchain as a powerful technology and argues that "...the blockchain is an apparently mundane process that has the potential to transform how people and businesses co-operate."[25]

After Bitcoin's genesis block was mined in early January 2009; on January 12, Satoshi sent 10 BTC in a symbolic transaction to a computer engineer Hal Finley (Nakamoto, 2008). However, a sale of a good involving bitcoin occurred at the end of 2009, a bitcoin user swapped 10,000 BTC for an order of two pizzas from Papa Jones in the U.S.[26] (Kristoufek, 2015; Phillips & Gorse, 2017). In the absence of an official exchange, bitcoin's arduous price journey began with literally $0.00. Since no central bank set bitcoin's price, it is determined by trust, acceptance, and a degree of speculation; for this reason, the price of bitcoin could be anything in its eco system people are willing to pay. December 27 (2010) marked a historic moment when the price of bitcoin hit $0.29. As bitcoin price quietly topped $1 BTCUSD, investors took notice of it; but when the price hit $100 ($108 in August 2013) and then $1,000 ($1,017 in February 2017), Bitcoin fever quickly spread across the world and turned into a mania as the price passed the historic $10,000 mark on November 17, 2017; moving forward, even ordinary folks become avid buyers (bitcoin hit intraday high of $20,089 on December 17, 2017).

In the literature, Bitcoin mania is used interchangeably with synonyms "speculative mania", "Ponzi scheme", "speculative bubble," or "irrational exuberance"[27] (Samuelson, 1957; Garber, 1989). Bitcoin mania is also often compared with the Dutch tulipmania of the 17th century. Although the levels of speculation were more severe in Bitcoin than tulipmania, but their sudden collapse and the duration

[23] The first halving was in 2012 (from 50 BTC to 25 BTC), next in 2016 (to 12.5 BTC), recently in May 2020 (to 6.25 BTC).
[24] https://www.marketwatch.com/story/heres-how-much-it-costs-to-mine-a-single-bitcoin-in-your-country-2018-03-06
[25] https://www.economist.com/leaders/2015/10/31/the-trust-machine
[26] Most expensive two pizzas ever sold in the history; valued at $208,900,000 at bitcoin price of $20,089 on December 17, 2017. Available online: http://www.bitcoin2040.com/bitcoin-price-history.
[27] During the Clinton administration, the term "irrational exuberance" was first coined by the former Fed Chairman by Alan Greenspan in a 1996 speech, "The Challenge of Central Banking in a Democratic Society". Later, the economist Robert Shiller has used irrational exuberance as the title of his book published in 2000.

it took were almost identical, i.e. extraordinary price rises in each event occurred in the last month of the year (December 1636 and December 2017 respectively) and both crashes were followed by sharp price falls. In a matter of several days in December 2017, the price of bitcoin doubled from $10,000 to intraday high of $20,089 on December 17, 2017; at its peak, Bitcoin's market capitalization stood at $237.6 billion ($348 billion at the intraday high price of $20,089). With the arrival of the New Year (January 2020), Bitcoin underwent one of the biggest price corrections; in just one year, the price of bitcoin dropped below $4,000 and its market cap to $65 billion (Figure 4).



Source: Statista; https://www.statista.com/statistics/377382/bitcoin-market-capitalization/

Figure 4: Market capitalization of Bitcoin from 4th quarter 2013 to 1st quarter 2020

Currently (September 16, 2020), Bitcoin's market capitalization stands at $200.9 billion with 18.49 million bitcoins in circulation. Other top 8 altcoins by market cap are; 2. Ethereum ($42.08 billion); 3. Tether ($14.74 billion); 4. XRP ($11.11 billion); 5. Binance Coin ($4.68 billion); 6. Polkadot ($4.67 billion); 7. Chainlink ($4.29 billion); 8. Bitcoin Cash ($4.21 billion); 9. Crypto.com Coin ($3.32 billion).

Despite the extreme volatility, Phillip Nunn (a prominent ICO[28] and cryptocurrency expert) predicted that bitcoin price would go up to $60,000 before the end of 2018 (this prediction did not come true, Bitcoin after reaching $20,000 in December 2017 fell sharply in early 2018.[29] Jesse Powell, the CEO of Kraken, also felt more optimistic and anticipated accelerated growth for cryptocurrencies in 2018

[28] Similar to the term IPO which stands for "Initial Public Offering", ICO refers to, Initial Coin Offering.

[29] https://smartereum.com/19440/bitcoin-price-predictions-despite-the-current-situation-in-the-market-experts-insist-that-the-price-of-bitcoin-will-get-to-60000-before-the-end-of-2018-btc-news-tue-dec-4/

(as mentioned above, 2018 was an ugly year for Bitcoin and altcoins).[30] John McAfee, the founder of McAfee antivirus software, claimed that bitcoin price would hit $1 million by 2020 (this also did not materialized, currently the price of bitcoin is at $10,870).[31]

Potential bitcoin future prices are estimated under three hypothetical scenarios. Bitcoin's future price calculations are based on rather simple assumptions that may or may not reflect actual developments, domestic or macroeconomic events. Despite the primitive nature of our analyses absent from any theoretical validations, these mathematical calculations nonetheless deliver an important message that the current price of Bitcoin is well below its peak price of $20,089 reached on December 17, 2018; but more importantly, Bitcoin will regain its dominance in near future after a serious shakeup among cryptocurrencies due to investors' concerns about the growing complexity of altcoins. When this does occur, then Bitcoin can still set unimaginable price records ($1 million?).

Table 4: Estimated potential bitcoin price by 2025 – scenario 1

18.5 million bitcoins in circulation	Supply $	Share of bitcoin %	Assumed new market cap $	Potential price BTCUSD $
Global real estate	217 trillion	0%	0	
Global broad money supply	90.4 trillion	0.5%	452 billion	
All fiat currencies	7.6 trillion	2.5%	190 billion	**$ 53,675**
Stock markets	73 trillion	0.2%	146 billion	
50 richest people	1.9 trillion	5%	95 billion	
Global narrow money supply	36.8 trillion	0.3%	110 billion	

Source of data: Author analysis; https://www.marketwatch.com

Table 5: Estimated potential bitcoin price by 2030 – scenario 2

18.7 million bitcoins in circulation	Supply $	Share of bitcoin %	Assumed new market cap $	Potential price BTCUSD $
Global real estate	217 trillion	0.1%	217 billion	
Global broad money supply	90.4 trillion	1%	904 billion	
All fiat currencies	7.6 trillion	5%	380 billion	**$ 109,946**
Stock markets	73 trillion	0.3%	219 billion	
50 richest people	1.9 trillion	8%	152 billion	
Global narrow money supply	36.8 trillion	0.5%	184 billion	

Source of data: Author analysis; https://www.marketwatch.com

[30] https://smartereum.com/3223/cryptocurrency-market-valuation-to-hit-1-trillion-this-year-cryptocurrency-predictions-2018-news-analysis-tue-dec-4/ (accessed on December 4, 2018).
[31] https://smartereum.com/3330/bitcoin-forecast-can-bitcoin-price-worth-more-than-100k-in-2018-tue-dec-4/

Table 6: Estimated potential bitcoin price by 2050 – scenario 3

19 million bitcoins in circulation	Supply $	Share of bitcoin %	Assumed new market cap $	Potential price BTCUSD $
Global real estate	217 trillion	2%	4.34 trillion	**$ 1,118,157**
Global broad money supply	90.4 trillion	10%	9.04 trillion	
All fiat currencies	7.6 trillion	25%	1.9 trillion	
Stock markets	73 trillion	5%	3.65 trillion	
50 richest people	1.9 trillion	25%	475 billion	
Global narrow money supply	36.8 trillion	5%	1.84 trillion	

Source of data: Author analysis; https://www.marketwatch.com

4.0 Concluding Remarks

Bitcoin blockchain possesses immense potential for future opportunities, well beyond its current use in financial services underpinning cryptocurrencies (i.e. replacing traditional trusted third parties with trusted machines). Even though over a decade has passed since Nakamoto Satoshi launched Bitcoin in January 2009, it still faces immense barriers, challenges as well as major regulatory hurdles. This paper looked into three hypothetical scenarios where the price of bitcoin surges over $50,000 (scenario 1), $100,000 (scenario 2), and $1,000,000 (scenario 3); however, it is worth to mention that these scenarios can only become reality if the Trump administration and law makers stop constantly running headlong into backlash to cryptocurrencies (Bitcoin and Libra coin in particular). For the future sake of Bitcoin and altcoins, we need more people like Christine Lagarde, the former Managing Director of the IMF (currently, president of the European Central Bank), who urged central banks not to ignore "winds of change" and consider looking into the case of central bank digital currency. Last thing Bitcoin needs is criticisms below.

Trump is not alone in his hatred for Bitcoin and other cryptocurrencies, here are the top ten expert criticisms[32]; JP Morgan CEO Jamie Dimon said Bitcoin fits perfect illicit activities and "it is worse than tulip bulb"; Jack Bogle (Vanguard founder) advised people to "avoid Bitcoin like a plague" because Bitcoin unlike stocks and bonds has nothing to offer; Andreas Treichi (Erste Group Bank AG), just like Trump, is not a fan of Bitcoin, told that Bitcoin "will make central banks lose control"; Jim Kramer (CNBC) points to great resemblance between Bitcoin and monopoly money; Tony Robbins (self-made millionaire) said Bitcoin is "very iffy" and "I look at that as it's like going to Vegas" David Gledhill (CIO at DBS) believes Bitcoin is a "Ponzi scheme"; Howard Marks (co-chairman of Oaktree Capital) called

[32] https://coinpedia.org/information/experts-criticisms-bitcoin-cryptocurrencies/

it “an unfounded fad (or perhaps even a pyramid scheme)”; and Michael Novogratz (former Fortress hedge fund manager) said that Bitcoin mania (bubble) is fueled by “a lot of froth and fraud”. Yermack (2013) contends Bitcoin is a currency, and Berentsen and Schär (2018) argue Bitcoin has applications more suitable to become an important asset class, but not a currency (Blundell-Wignall, 2014). Baek and Elbeck (2015) argue that Bitcoin is an investment asset and a speculative vehicle. According to San Francisco Fed President John Williams, Bitcoin does not meet functions of money such as medium of exchange, store of value, and unit of account (also see Kristoufek, 2015).

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