Bitcoin: Future or Fad?

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Abstract

Is Bitcoin the payment system of the future? In these notes, we argue that Bitcoin is neither currency nor gold, but that it is a tradable asset and an alternative form of investments. Bitcoin also exhibits some features as an investment asset that are similar to collectibles. The true value of Bitcoin lies not in its speculative nature but in the embedded technology which has the long term potential of revolutionalizing traditional finance. Blockchain technology can povide solutions to Big Data challenges and provide an off-ramp during political uncertainty. Bitcoin's long-term survivability and viability as an asset will largely depend on its diversification role, institutional adoption, tax treatment and regulations.

Keywords: Bitcoin, Cryptocurrencies, Blockchain Technology, smart contracts, digital assets, CBDC, NFTs, Payment Systems, Money, Central Bank, Stablecoins, Financial Intermediation

*Email: dtut@ryerson.ca. These notes are based on a lecture on ***"Cryptocurrencies and Blockchain Technology"*** given at the Ted Rogers School of Management as part of a course on ***Financial Intermediation.*** The notes are for a wider consumption and are partly inspired by a rather elegant question posed by Tyler Mathisen on CNBC: ***"What the hell is Bitcoin?"***

1 Introduction

"When I look at Bitcoin, I can't decide whether it is a commodity, a currency, an investment, a collectible, a cash proxy- What the hell is it? And where, if anywhere, does it fits in a normal person's portfolio? And I am not suggesting that people that have Bitcoins are abnormal in any way!" Tyler Mathisen- 16/2/21.

Despite the worldwide attention that Bitcoin (and Cryptocurrencies in general) has garnered, there are still significant uncertainties regarding the nature and the role of Bitcoin in an individual's portfolio. These notes examine whether Bitcoin is a commodity, a currency, an investment, a collectible, a store of value, or a cash proxy and its potential role in a regular person's portfolio. The notes also discusses how the Blockchain technology that underpins Bitcoin's protocol can be used to address some of the challenges in Big Data.

Bitcoin is a digital currency that uses a Blockchain protocol in which digital signatures are cryptographically validated via timestamp, independent of a financial intermediary. A hash function that links transactions of any arbitrary size to a fixed value size is used to chain the timestamped blocks together. A hashcash proof-of-work (PoW) algorithm validates all transactions and blocks, creating a verifiable distributed timestamp digital ledger[1]. TO ensure the continutiy of the blockchain, node operators or "miners" are incentived and rewarded in Bitcoin for every successfully validated block in the chain. The Blockchain technology underlying Bitcoin protocol potentially has wide range of applications and has been used to create new digital assets. Blockchain technology also has the potential to address some of the challenges underlying Big data. In this chapter, we provide some evidence on how Blockchain techonolgy can be used to address some of the Big Data challenges in the healthcare sector, supply chains and control over access and use of private data.

[1]See: Nakamoto (2008) for detailed discussions on Bitcoin protocol

Bitcoin was originally intended to be a peer-to-peer electronic cash, a potential replacement and an alternative to fiat currency. However, this paper demonstrates that Bitcoin fails to function as an effective unit of account since in a universe in which cash exists, transacting parties will always revert to using cash over Bitcoin. Bitcoin has lower scalability and higher transaction costs relative to alternative payment processes such as credit cards. And because of to its inherent price volatility, Bitcoin does not fair better than gold as a store of value, as an inflation-hedge and as a currency hedge. The value of Bitcoin is determined by sentiments; that is by speculative and heterogeneous beliefs regarding the asset. Bitcoin has a high sharpe ratio and its speculative nature can provide for some alpha opportunities for institutional investors and hedge funds[2]. But given its speculative nature, it is not clear yet what role Bitcoin can serve in a regular person's portfolio.

We conclude that Bitcoin is neither gold nor currency, but that it is a tradable asset and an alternative form of investment. Bitcoin also exhibit some features as an investment asset that are similar to collectibles. Bitcoin can also provide an important off-ramp during political uncertainty especially for those under dictatorial regimes. The true value of Bitcoin lies not in its speculative price appreciation but in the embedded technology (Blockchain, Defi and Distributed Ledger Technologies) which has the long term potential of revolutionalizing traditional finance. Bitcoin's long-term survivability and viability as an asset will largely depend on its diversification role, institutional adoption, tax treatment and government regulations.

The rest of this work is organized as follows. Section 2 describe our data sources. Section 3 examines whether Bitcoin is the future of payment systems and section 4 examines whether

[2]See Makarov and Schoar (2020) speculation and arbitrage trading opportunities in cryptocurrency exchanges

Blockchain technology can address some of the challenges in Big data and the potential impact of regulations on cryptocurrency space. Section 5 concludes.

2 Data

We obtained daily and monthly data from Coinmarketcap.com, Federal Reserve Bank St. Louis (FRED) and Yahoo finance for the period 2009-2022.

3 Is Bitcoin the Future of Payment Systems?

3.1 Bitcoin as a Cash Proxy

Is Bitcoin "Money"? Bitcoin was originally intended to be a "purely peer-to-peer (p2p) version of electronic cash....allow online payments to be sent directly from one party to another without going through a financial institution....a solution to the double-spending problem using a peer-to-peer network" (Nakamoto, 2008). In order to understand whether Bitcoin can actually function as "Money", we need to examine whether it satisfies and meets the criteria for an item or for an object to be considered as "Money". There are four major acceptable attributes of money[3]: [1] Medium of Exchange [2] Method of Payment [3] Unit of account and [4] Store of Value.

Bitcoin meets the first two criteria since Bitcoin's protocol allows for transactions to be transferred from one account to another. So how does Bitcoin protocol achieve this? First, the smallest unit of Bitcoin is denominated as BTC and it is tradable peer-to-peer, new transactions are communicated to nodes, each node then collects all the transactions into blocks and the block is then communicated to all nodes once a node finds a proof-of-work

[3]See: Smithin, 2002, Davies 2010

(PoW) . The block is only accepted if the transactions under consideration are verified as having been not already spent. Once transactions are verified and validated the nodes start working on creating and adding a new block to the chain. Transactions are considered only valid after they are verified through a community consensus, that is by the majority of the network nodes (Song and Aste 2020, Akcora et al. 2018). The network rejects any transaction whose referenced output does not exist or has already been spent; such a transaction is not included in the Blockchain. In creation of the block, a transaction is only added into the wallet if the sum of block creation fees and transactions fees are greater than the coinbase value. Additionally, any matching transactions are deleted from the pool before the block is relayed to peers and added as part of the main branch in the chain via a merkle tree. Effectively, Bitcoin eliminates double-spending problem using digital signature algorithm, proof-of-work via hash function which provide some security and allows users to engage in exchanges (Lipton and Trecanni, 2021). Thus, Bitcoin can serve as a medium of exchange and a method of payment (Yermack, 2013).Indeed, Figure [1] shows that the price, volume and market capitalization of Bitcoin has been on a steady rise, reflecting the increase demand and interest in Bitcoin.

[INSERT FIGURE 1 & FIGURE 2 ABOUT HERE]

However, Bitcoin, at best, partially meets the third criteria: "Unit of account". In order for Bitcoin to be a stable and effective unit of account, transacting parties should be able to price goods and services in Bitcoins. The daily fluctuations in Bitcoin prices, as shown in Figure (2), suggests that it might neither be in the best interest of the buyer nor the seller if goods were to be priced in Bitcoins. For example, consider a one time transaction between a buyer and a seller. If the value of Bitcoin is precipitously falling (downward pressure), the buyer might be willing to exchange their Bitcoin holdings for a basket of goods while

the seller will be unwilling to accept Bitcoin as a form of payment. And if the the value of Bitcoin is on the rise (upward pressure), then buyers will find it difficult to depart with their Bitcoin holdings yet this is precisely the time during which sellers are more than willing to accept and priced goods in Bitcoin.

This simple example illustrates that transactions are likely to be incomplete when goods are priced in Bitcoin. The inefficiency in transacting using Bitcoin becomes even more apparent when we consider important issues in the labor markets (wages, pensions) and in the financial markets (valuations, earning reports). And because of these inefficiencies, it is difficult to make forward-looking valuation and to engage in future contracts when goods are priced in Bitcoin. The inefficiency arises because relative to alternative forms of payment, such as cash and credit cards, Bitcoin has higher transaction costs as mining of tokens is costly and users have to utilize exchanges to receive tokens before engaging in any transactions (Thum 2018, Stoll et al. 2019). Exchanges such as Coinbase and Binance.US serve as trusted third-parties in the network. Additionally, each BTC block is limited to 1MB size and cannot handle more than eight transactions per second[4]. This limits the scalability and wider adoption of Bitcoin as a form on payment on a global scale[5]. As a result, in a universe in which cash exists, rational employers and employees will always revert to using cash over Bitcoin.

[4]Credit cards such as Visa can process about 20,000 transactions per second with significant less energy consumption per transaction]

[5]The updated BSV 1.0.7 (released, 2021) has no block size limit and the protocol can handle scalable transactions but it is not yet clear whether this will lead to scalability at the global level- MNP (2021).

3.1.1 Stablecoins

One potential solution to the volatility of Bitcoin as a currency is the emergence of stablecoins[6]. Stablecoins are digital currencies whose value is pegged to a fiat currency (US dollars) or a basket of currencies. The aim is to use Blockchain technology to create a stable, cryptographically secured coin similar to fiat currency that will reduce volatility for investors in the cryptocurrency market. Stablecoins are, therefore, particularly useful for those investors who want to reedem or exit their positions in the cryptocurrency market.

In order to peg a stablecoin to a fiat currency, the coin can either be backed by cash-equivalent reserves such as Treasury bills, backed by gold or backed by a smart-contract on the blockchain[7]. The smart-contract ensure that the peg holds by buying or selling the required amount of coins once pre-set conditions are met[8]. Figure (3) shows that while Tether coin experienced noticeable volatility, it has nevertheless been stable over recent years. While on average the value of Tether is highly correlated with the value of US dollar, the volume is highly dependent on Bitcoin. The correlation between Tether volume and Bitcoin volume is about 91%. This suggests that the observed volatility in Bitcoin has real implications for stablecoins. During periods of significant volatility in Bitcoin, redemption risks in stablecoins are likely to increase, potentially leading to rollover risk in the cryptocurrency market and this potentially explains why stablecoins tend to trade at a premium relative to the U.S

[6]These types of coins are sometimes referred to as "Realcoins".

[7]Stablecoin could also be backed by a commodity. For example, Tether issue a gold-backed cryptocurrency whose value is backed by real physical gold.

[8]Note that there is a new emerging type of stablecoins which are generally issued by a financial intermediary. For example, JP Morgan uses "JPM Coin" for intra-day repurchase agreements and for liquidity management. Nevertheless, there is still ongoing debtate as to whether these types of coins are actually stablecoins or simply digitized alternative forms of payment system- JP Morgan, 2020.

dollar as shown in Figure 4.[9].

[INSERT FIGURE 3 & FIGURE 4 ABOUT HERE]

3.2 Bitcoin vs Gold: A Store of Value?

Can Bitcoin replace gold and other precious metals as a store of value and a hedge against inflation? First, for an asset to be considered a store of value it must meet several requirements: [1] Maintain purchasing power over a long duration of time [2] Asset must be easy to transport and durable [3] Asset should have some element of inherent value, either due to historical adoption, government backing or because of economic and industrial use.

Gold meets all of these three requirements. Gold is limited in supply and as a result it tends to maintain its purchasing power over time, making it a reliable hedge against inflation (Capie, Mills and Wood, 2005). Gold is valued for its aesthetic qualities and does not degrade over time. There has also been a long history of gold being accepted globally in one form or another as a store of value since the end of the 5^{th} century (Graeber 2012, Taleb 2021); thus gold provides some protection against within-country or regional political uncertainties. Gold-backed exchange traded funds make it easy to transport, trade and to own gold as a store of wealth since investors do not necessarily need to hold the actual physical gold. Similarly, Bitcoin is limited in supply as there are only hard-coded 21 million coins and the supply growth is expected to decrease over time due to the deflationary nature of Bitcoin protocol (Nakamoto, 2008). This suggest that the value of Bitcoin cannot be devalued by any central authority such as a Central Bank. However, Bitcoin is yet to be globally accepted as a store of wealth, partially because of its high volatility and because it has been in existence for only a very short span of time, about a decade or so. The volatility

[9]See: Liao and CarMichael 2022, Gordon and Zhang 2020,Lyons & Viswanath-Natraj 2020 for some discussion on stablecoins.

of Bitcoin significantly weakens its ability to be an effective store of value and a diversifier in an individual's portfolio.

Additionally, during the early 19^{th} century, gold served as an automatic stabilizing mechanism as most major currencies were backed by or linked to gold. As a result, gold has historically served as an important asset during market downturns. In particular, investors tend to hold gold when a currency is depreciating in value and reduce their gold holdings when a currency appreciates in value. In this regard gold has served as an effective exchange rate hedge; that is both against a decline in domestic currency's purchasing power and against domestic currency's purchasing power relative to a basket of foreign currencies (Capie et al. 2005). Unlike fiat currency or gold, the demand for Bitcoin is unpredictable, difficult to stabilize as price appreciation encourages hoarding which could lead to deflation if Bitcoin is the base currency in an economy (Dowd 2013, Selgin 2015). Thus, it is not clear yet what role Bitcoin could play during periods of significant currency fluctuations and whether it can serve as an effective exchange rate hedge. Additionally, Figure [5] shows that relative to gold, Bitcoin performed poorly as an inflation hedged during market downturn in March 2020.

Unlike gold, Bitcoin is not an homogeneous asset as there exists a continuous stream of competing cryptocurrencies assets, these also makes Bitcoin less sutiable as an inflation or currency hedge for investors. And Bitcoin has no obvious industrial usage, if anything the cost of Bitcoin mining and energy consumption is significantly higher than the cost of minting fiat currency (Antonopoulos, 2015). Figure [6] shows that mining difficulty has been steadily increasing while block size, time between blocks and number of transactions have been declining. In 2019, the average transaction in Bitcoin consumed about 0.51 megawatts-hours and Bitcoin's protocol energy consumption was about 0.3% of global

energy consumption (Lipton, 2021). Note that the cost of gold mining, processing, production and energy consumption is generally already priced in due to its long history of usage. This suggest that in order for Bitcoin to replace gold in the near future, its energy consumption cost has to significantly decline, otherwise at this stage Bitcoin is not an effective alternative to gold and its diversification benefit during a market downturn remains questionable.

[INSERT FIGURE 5 & FIGURE 6 ABOUT HERE]

3.3 Bitcoin: Investment and Diversification Role

Is Bitcoin an investment? And where does if fit in an individual's portfolio? Investors have to be able to value an asset in order to determine its relative impact on their portfolio. An asset is likely to have diversification role if it is positively correlated with another asset in the portfolio and it has an hedging role if it is negatively correlated with an asset in the portfolio (Baur and Lucey 2010, Chan, Le and Wu 2019). Bitcoin has no fundamentals and therefore it is difficult to value. Given that Bitcoin has no intrinsic value or industrial usage, its price can range from zero to infinity. The price can be zero because Bitcoin neither pay out dividends nor has future earnings; the present value of Bitcoin price is therefore zero (Taleb, 2021). The price of Bitcoin can rise to infinity due to irrational exuberance. In particular, Bitcoin prices are mosly driven by market sentiments and price appreciation (Weber, 2016). The expectation of a continuous increase in prices divorced of any fundamental value can lead to an irrational bubble (Dale et al. 2005, Shiller, 2005). The fluctuations in the prices of Bitcoin, as shown in Figure 2 above, provide for some opportunities for speculative trading (Dywer 2014, Cheah and Fry, 2015).

So why is there institutional interest in Bitcoins? First, the price fluctuations in Bitcoin

and in other cryptocurrencies provide some alpha and some profit making opportunities. Given that other cryptocurrencies are currently priced in Bitcoin, it provide for some arbitrage opportunities as well. Arbitrage opportunities exist because of price differentials between crypto-linked assets in traditional finance and on-chain products; making Bitcoin potentially valuable in portfolio management (Karniol-Tambour et al. 2022, Tully and Lucey 2017, Dyhrberg 2016). Second, institutional investors might treat Bitcoin as a long-duration asset, anticipate that due to its limited supply and potential price appreciation, there would be opportunities in the future to offload it at a higher price. Third, institutional investors are investing indirectly in Bitcoin and in the cryptocurrency space via venture capitals that uses Blockchain technology as it aligns well with their investment mandates (Karniol-Tambour et al. 2022). In particular, high-frequency trading (HFT) funds and long-short equity funds that use cash-and-carry strategy have netted an average return of at least 10% by buying Bitcoin and selling CME futures. Institutional investors are therefore able to reduce risk exposure from investing in cryptocurrency space by either investing in the early stages of these exchanges or by using sophisticated trading strategies[10]

One advantage of investing in Bitcoin is that it provides some protection against inflation as the central bank cannot devalue it. But this protection comes at the expense of increasing volatility in the portfolio. The speculative fervor, pump-and-dumb strategies in the cryptocurrency space suggest that individuals should be concerned about the level of exposure in their portfolio. Profit making opportunites for retail traders are likely to decline as institutional investors and hedge funds using sophisticated trading strategies take advantage of the mispricing and other market inefficiencies in the cryptocurrency

[10]Some of these strategies include: tail-risk hedging, factor-based investing, stock-picking and asymmetric bets using options that leverage the inefficiencies in the cryptocurrency market.

space. The fact that the hedging and diversification roles of Bitcoin also depends on the data frequency[11], in the long run, can only make Bitcoin less desirable relative to alternative assets. Figure [7] shows that Bitcoin returns are more volatile than S&P500 returns over the same duration. Trades per minutes have also been on the rise across all exchanges (Figure 8). Liquidity, as proxy by bid-ask spread in Figure 9, has also been steadily increasing, reflecting growing interest in Bitcoin.

Additionally, the price of Bitcoin remains high, liquidity is low relative to major indices and there is some evidence of price manipulation in the cryptocurrency space (Griffin and Shams, 2020). These factors could potentially limit and discourage ownership in Bitcoin and related cryptocurrencies. However, the rise of exchange-traded funds (ETFs) in this space provides for some opportunities for small and regular investors to have an indirect exposure to the cryptocurrency market. Figure 10 shows that there is a high correlation between Bitcoin's ETFs and Bitcoin's price. There is also an increase in the number of Bitcoin ETFs on the market after 2020, reflecting growing demand and interest in Bitcoin as an investable asset.

[INSERT FIGURE 7A,B, C 8, 9 & FIGURE 10 ABOUT HERE]

3.3.1 Bitcoin: Political Uncertainty and Dictatorial Regimes

Is Bitcoin a safe haven? Bitcoin can provide a channel for transferring large amount of funds across international borders independent of any third-party or entity. This provide some protection against dictatorial regimes or during periods of political uncertainty. Case in point, Figure 7C shows that Bitcoin price and returns increased significantly when compared to gold during the immediate onset of the ongoing Russian-Ukrainian conflict. This, to some extent, illustrates that Bitcoin can serve as a safe asset during periods of political uncertainty.

[11]See: Bouri et al. 2017, Chan et al. 2019

3.4 Is Bitcoin a Collectible Asset?

Collectibles are a form of alternative investments. These generally include: fine arts, baseball cards, rare coins, comic books and rare books. In addition to the pecurniary benefits, alternative investments generally provide some subjective utility to the owners. Bitcoin can be a collectibe in an individual's portfolio. Bitcoin can be considered to be a "rare" collectible since it is limited in supply. There are only 21 million hard-coded Bitcoin and 90% have already been mined; thus Bitcoin has a residual value that makes it valuable to hold into the future. The holders of Bitcoin might also infer some value from both the embedded technology and in being a part of a new and potentially useful innovative idea.

Bitcoin protocol has become a useful and an important baseline for generating the new wave of cryptocurrencies, building smart-contract-based tokens and other distributed ledger technology (DLT). Smart-contracts are simply a set of rules stored in the Blockchain that are automatically executed once pre-set conditions are met; thereby facilitating exchanges and transactions independent of a third-party. The utility that comes from being at the forefront of this new movement and in leveraging Big data in the cryptocurrency space makes Bitcoin a valuable collectible asset. Collectibles are transferable inter-generational assets and given that the block creation fee is projected to go down to zero in the year 2140, this could potentially explains why about 70% of Bitcoins are contained in less active and dormants accounts (Cheat and Fry, 2015). Additionally, the rise of non-fungible tokens (NFTs) which are digital collectibles and enable users to authenticate ownership and provenance as transactions are recorded on a Blockchain, demonstrate that Bitcoin and other cryptocurrencies as an asset class have some common features with collectible assets. In the traditional art markets artists share indirectly in the value of their works; the value of secondary works is highly dependent on

the existing demand and the historic prices of an artist's previous works. Using Ethereum blockchain, smart-contracts can be designed such that owners or creators can receive royalty based on a set of criteria even if they do not have any precious sold works. Blockchain technology can therefore be utilize to transfer control rights from the "Buyer/Owner" to the "Artist/Creator"; thereby creating additional value by removing the middleman ("dealers/auction houses/galleries") from the transaction process.

4 Blockchain Technology and Regulations

4.1 What is Bitcoin's Real Contribution?

Cryptocurrencies, Big Data and Blockchain Technology

What is the long-term value and contribution of Bitcoin to society? Bitcoin protocol and Blockchain technology has been utilized to create a wide arrays of new cryptocurrency assets and new digital products. For example, Ethereum utilize Bitcoin's protocol to build a decentralized transaction-based state machine that uses a cryptographic hash to collate transactions into a blockchain (Wood, 2015). Thus, the built-in Turing-programming language in the Ethereum blockchain can quickly create smart contracts from an arbitrary set of codes and the PoW simply then ensures absolute confidence in the future viability of the protocol since each mined block has a reward attached to it (Buterin 2013, Lipton 2021). Additionally, Ethereum provides a potential solution to the ASICs problem in Bitcoin protocol via the Ethash algortithm (Buterin 2013, Dryja 2014, Jentzsch 2015). However, Ethereum has scalability problems since supply is limited to only 18 million ETH per year. Ethereum underlying protocol is quite costly to use as smart-contracts tend to require a large collateral in their operations (Lipton 2021, Antonopoulos and Wood 2018).

Bitcoin Blockchain technology is also currently being utilized to build decentralized finance (DeFi). DeFI are based on a Consensus as a Service (CaaS) and can be used to create smart-contracts based (cryptocurrency) exchanges independent of a third-party (Lipton 2021).

Furthermore, Blockchain technology is potentially a useful tool for solving Big data challenges. For example, healthcare providers are faced with challenges ranging from access to patients' health data, legal issues, secure storage and ownership of the data. Blockchain technology can provide a secured structure in which healthcare providers store patient's metadata in a blockchain and then the patient is provided with a unique key that they can use to access their health data anywhere (Gupta et al. 2016, Rapke 2016). Applications such as "Storj" that use blockchain technology to ensure secured peer-to-peer authentication of storage contracts are potential solutions to Big data challenges in the healthcare sector (Zhang et al. 2019). Blockchain technology can also be used in protecting intellectual property rights and in authenticating ownership of digital arts. An interesting implementation and application of Blockchain technology in this area is the "Secure Public Online Ownership Ledger" (SPOOL), which can be use for documenting transactions, transferring ownership of each edition of the artwork and recording it in a blockchain, which allows for tracking and authentification of ownership (Dimitri and McConaghy 2016, McConaghy and Holtzman 2015, Karafiloski 2017). Some applications of Blockchain technology in marketing and supply chain management include "Omnilytics and "Provenance" (Depa et al. 2021). Blockchain in these applications is used to collate sales, industry trends, marketing and product information data during each point in the supply chain (Kim and Laskowski 2018). For example, Walmart and IBM have utilized blockchain (Hyperledger Fabric) to create a food traceability system and early tests of this system

have shown that Blockchain technology can significantly reduce the time it takes to trace the provenance of a produce in the supply chain from days to mere seconds (Hyperledger, 2019). These applications demonstrate that Blockchain technology usability goes beyond simply the creation and minting of new digital coins and that it can potentially provide solutions to real challenges for both individuals and businesses. These applications also demonstrate that the emerging technologies underpinned by blockchain or by smart-contracts can be engine and sources of economic growth.

4.2 Government Regulations

Understanding the role of government regulations on the cryptocurrency space is important as regulations affect both Bitcoin's long-term adoption as a currency and tax treatment as an asset. Aristotle argued that that money derives its value not from nature but from the law and can therefore be altered or abolished at will (Crisp 2014). This clearly demonstrates that the potential long-term global adoption of Bitcoin by both retail and institutional investors largely depends on governmental regulations.

Why should the government be interested in the cryptocurrency space? And why should investors care about regulations? There are two important reasons: [1] Bitcoin is a potential channel for money laundering which could potentially impact the value of the reserve currency (U.S dollar) and other major currencies. If the U.S government decides to ban Bitcoin and related digital currencies, then this would automatically drive their values to zero, making them less desirable for investors. And if the government decides to introduce its own digital currency alongside Bitcoin, then this can only increase Bitcoin's price volatility and weakens its diversification role. Indeed, the ban on cryptocurrency mining and initial coin offerings by the Chinese government in 2017 led to a precipitous

drop of about 7.8% in the price of Bitcoin. China, driven by concerns regarding the potential impact of a decentralized digital currency on monetary policy and subsequent impact on fiat currency (Renminbi), is in the process of introducing a Central Bank Digital Currency (CBDC). Cryptocurrencies users are more likely to use CBDC than their alternative decentralized digital currencies as it acts as a "safe" asset[12,13]. [2] Bitcoin and other cryptocurrencies are potential sources of revenue since they can be treated as taxable investment vehicles. Some countries such as Canada (CRA) consider cryptocurrecies as commodities and are taxed as either business income or as capital gains (50%). And if cryptocurrency are used for exchange of goods and services then they are treated as barter transactions. Hungary tax any cryptocurrency income at 15% once it has been converted to fiat currency regardless of the source(s). The U.S government (IRS), as of 2022 tax year, treat Bitcoin and other cryptocurrencies as "property" and therefore taxable assets. The long-term impact of IRS policy is yet to be clear but this could only facilitate a wider adoption and lead to further increase in the price volatility of Bitcoin, at least in the short-run. Taxes will further erode some of the gains, making Bitcoin less attractive to investors relative to alternative assets that might have more favorable tax treatment. However, there are some exception to this as government might allow investors to have Bitcoin in tax-sheltered investment accounts. In Canada, Bitcoin ETFs can be bought and sold in registered "Tax Free Saving Accounts (TFSA)".

[12]Following China's ban, some miners moved their rigs to energy-rich countries such as Kazakhstan-Oxford Analytica, 2021

[13]CBDC (Renminbi) can also serve as a digital reserve currency potentially challenging the reserve status of the U.S dollar.

5 Conclusion

Is Bitcoin the payment system of the future? In these notes, we argue that Bitcoin is neither currency nor gold, but that it is a tradable asset and an alternative form of investments. Bitcoin also exhibits some features as an investment asset that are similar to collectibles and can act as a safe haven during periods of political uncertainty. The true value of Bitcoin lies not in its speculative nature (price appreciation) but in the embedded technology (Blockchain, Defi and Distributed Ledger Technologies) which has the long term potential of revolutionalizing traditional finance. Blockchain technology can povide solution to Big data challenges; that is in collecting, organizing, controlling and storing a large amount of data. Bitcoin's long-term survivability and viability as an asset will largely depend on its diversification role, institutional adoption, tax treatment and government regulations.

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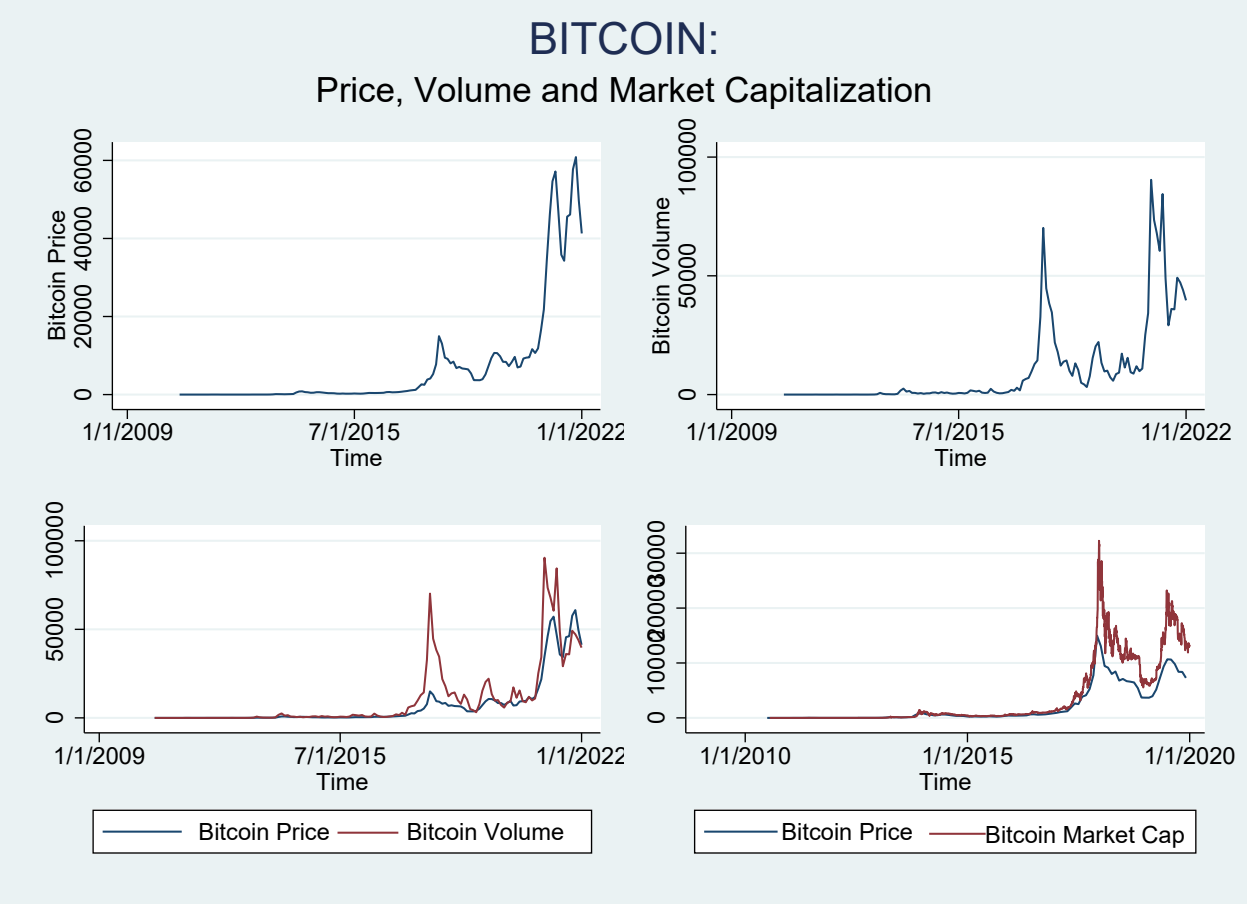

Figure 1: ***Bitcoin:***

These figures present timeseries evolution of Bitcoin's price, volume and market capitalization. The figures reflect increase demand and growing interest in Bitcoin as an asset.

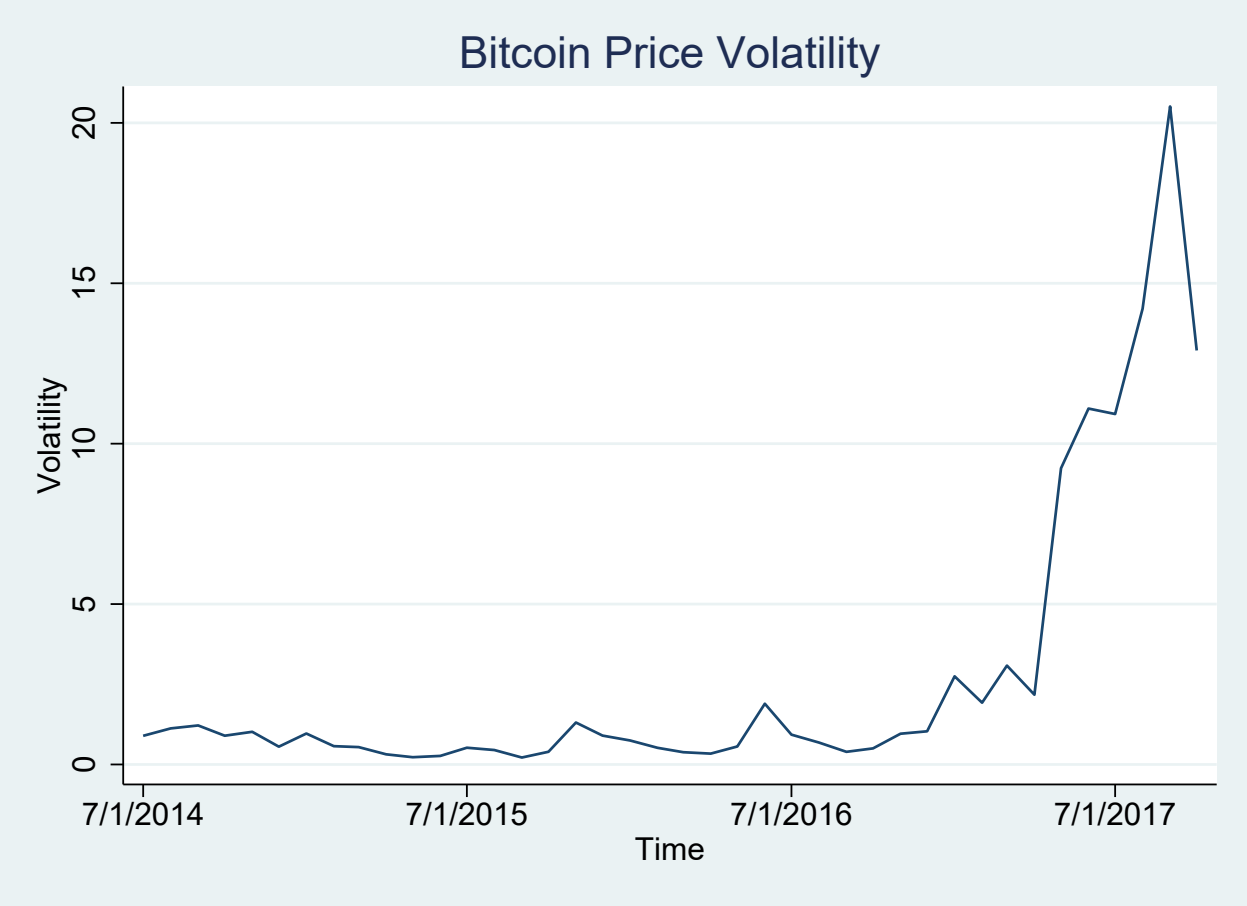

Figure 2: ***Bitcoin Price Volatility:***

This figure shows that inspite of the increase demand and interest in Bitcoin, Bitcoin price volatility has been steadily increasing over time.

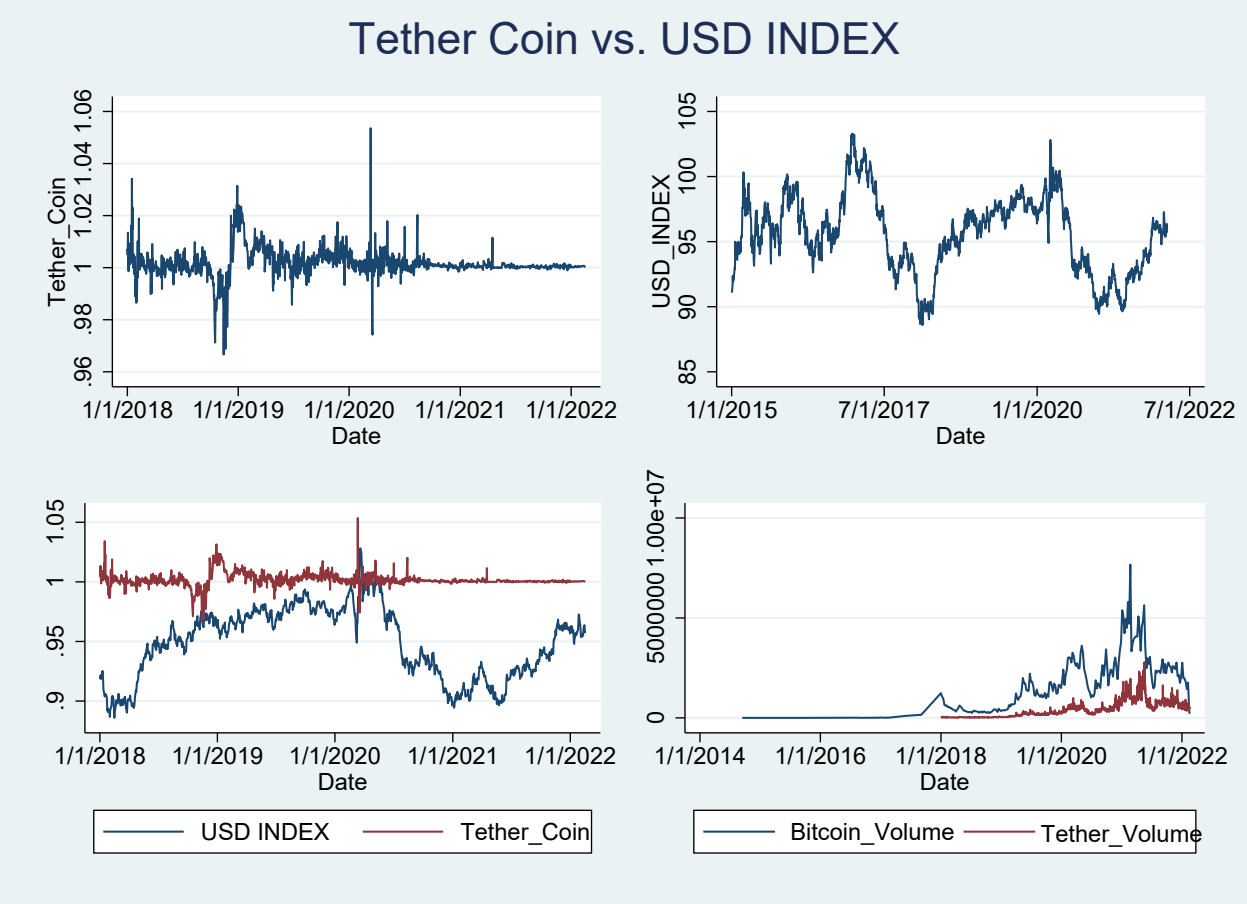

Figure 3: ***Stablecoin: Tether vs USD Index***

These figures illustrate the time series evolution of Tether relative to USD Index. And Tether Volume relative to Bitcoin Volume.

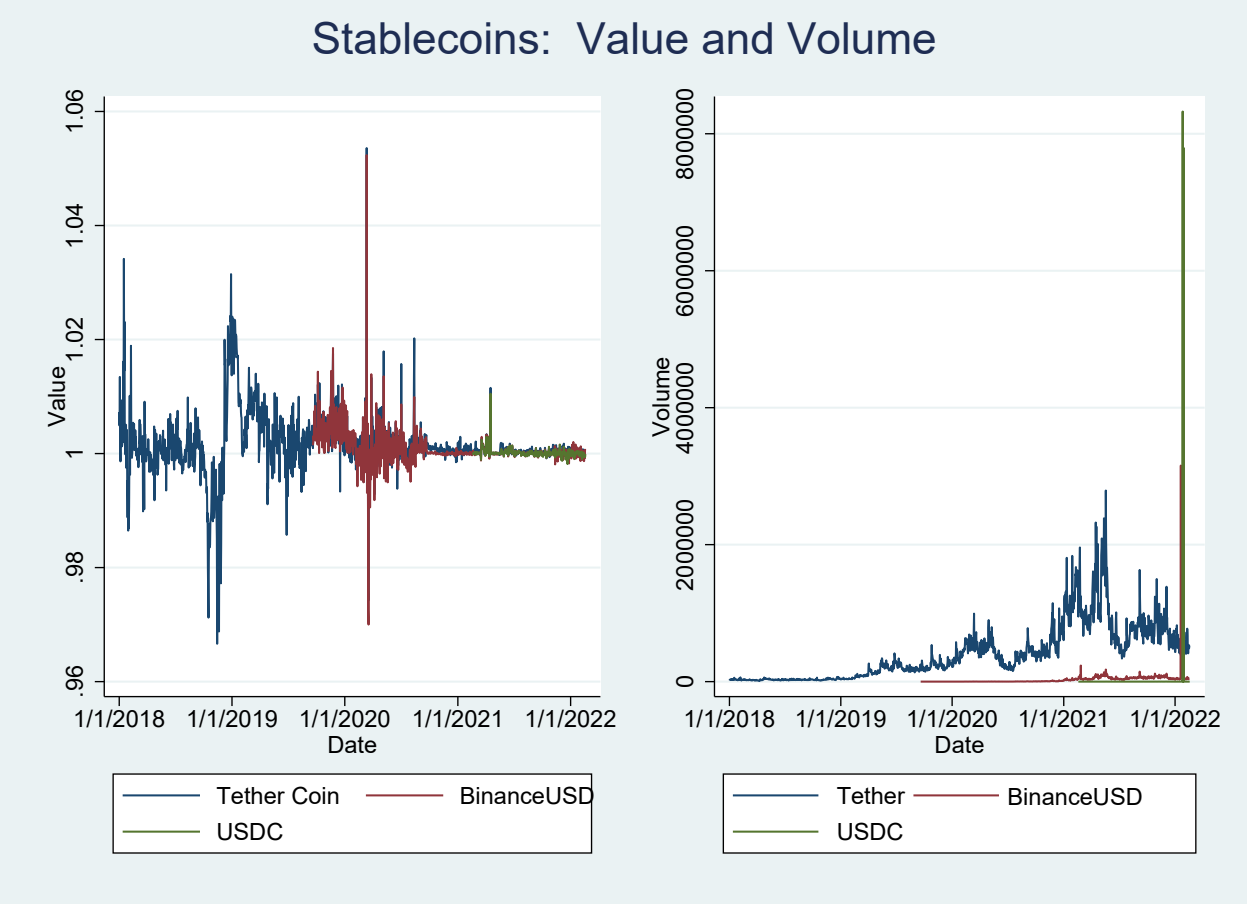

Figure 4: ***Stablecoins***

These figures illustrate the time series evolution of Tether relative to USD Index. And Tether Volume relative to Bitcoin Volume.

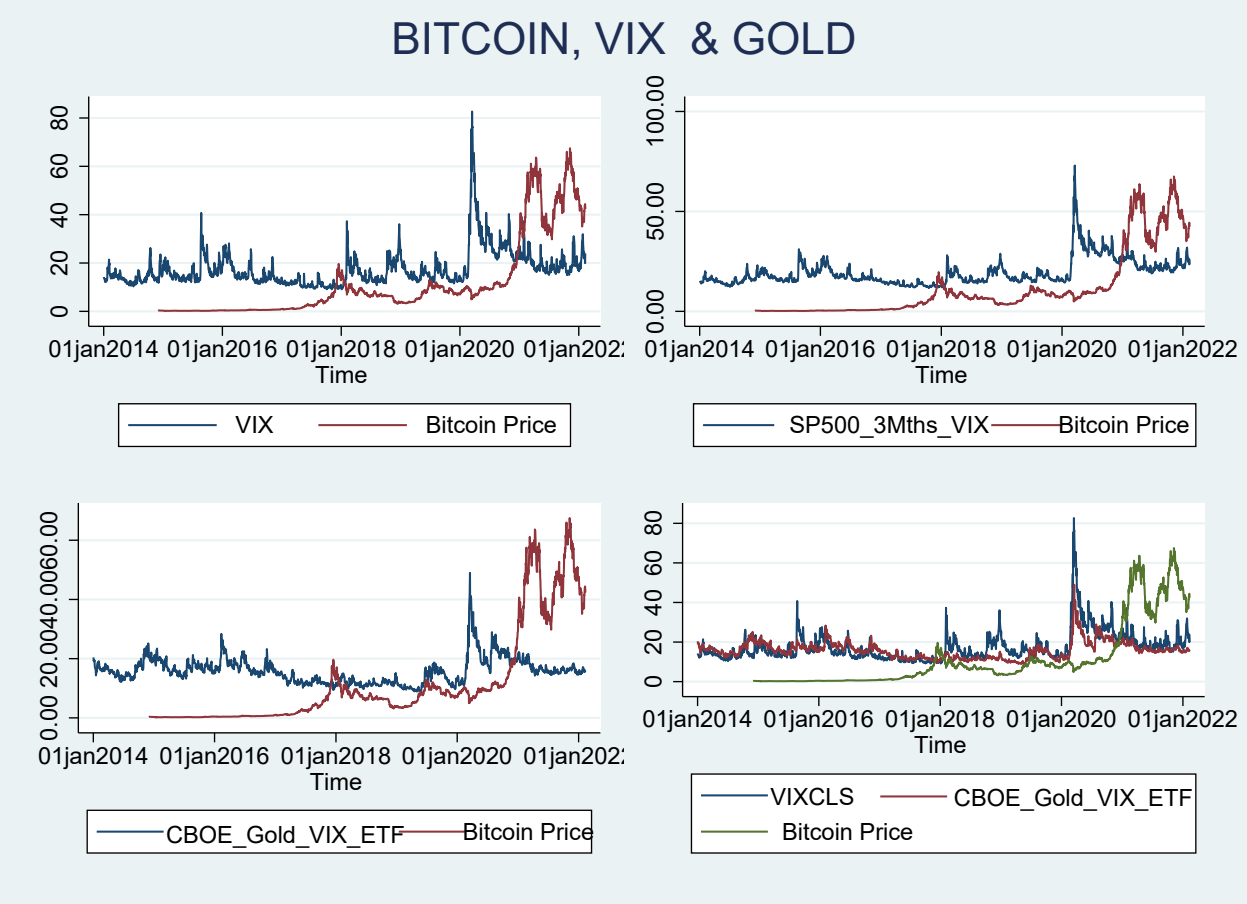

Figure 5: ***Bitcoin vs. Gold :***

Thesse figures present a time series analysis of VIX, S&P500, CBOE Gold VIX ETF and Bitcoin prices. Observe that in March 2020, when there was a market downturn, Bitcoin prices diverged from VIX and Gold, indicating that Bitcoin does not perform as well as gold as an inflation-hedge.

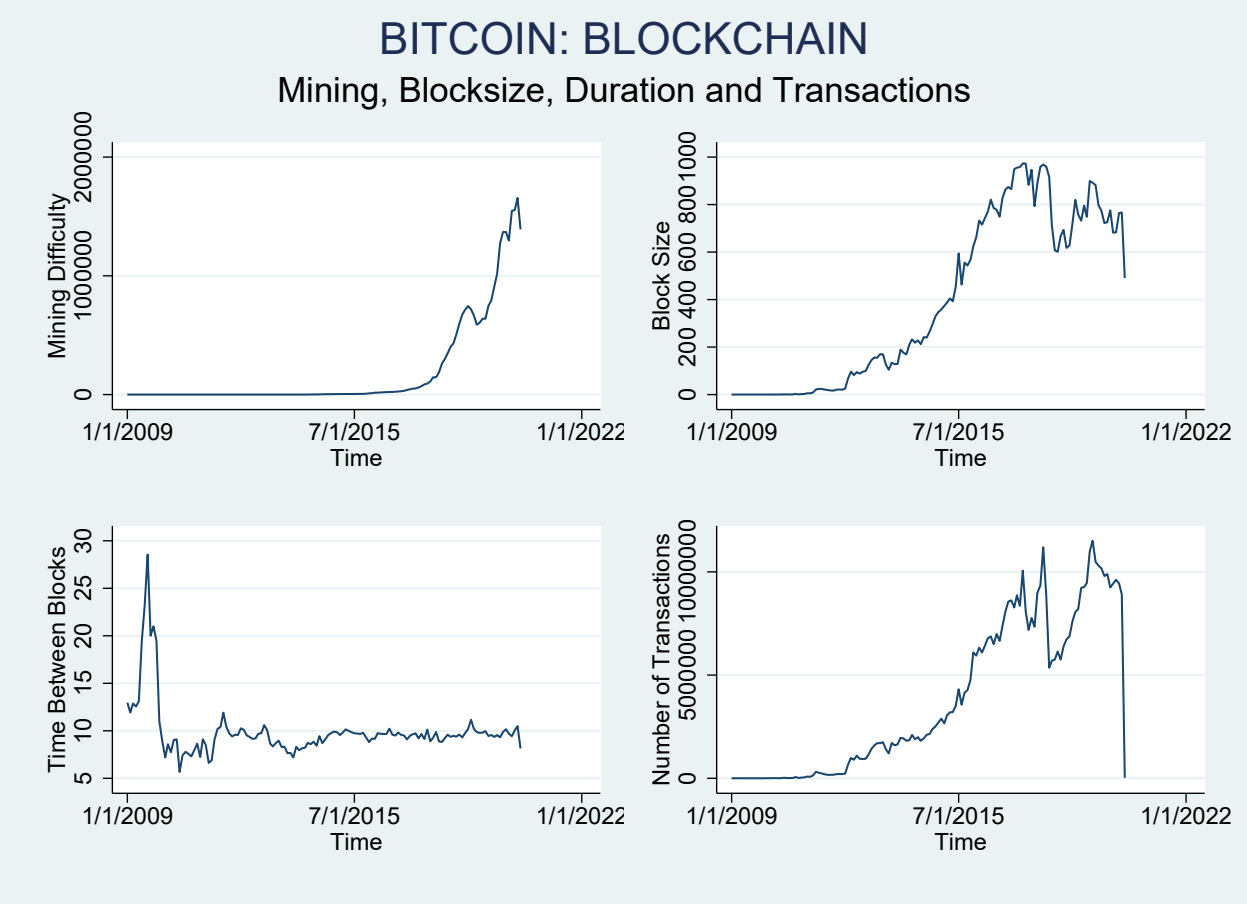

Figure 6: ***Bitcoin Blockchain:***

These figures shows that Bitcoin mining difficulty has been on the rise while the average block size, time between blocks and number of transactions has been declining.

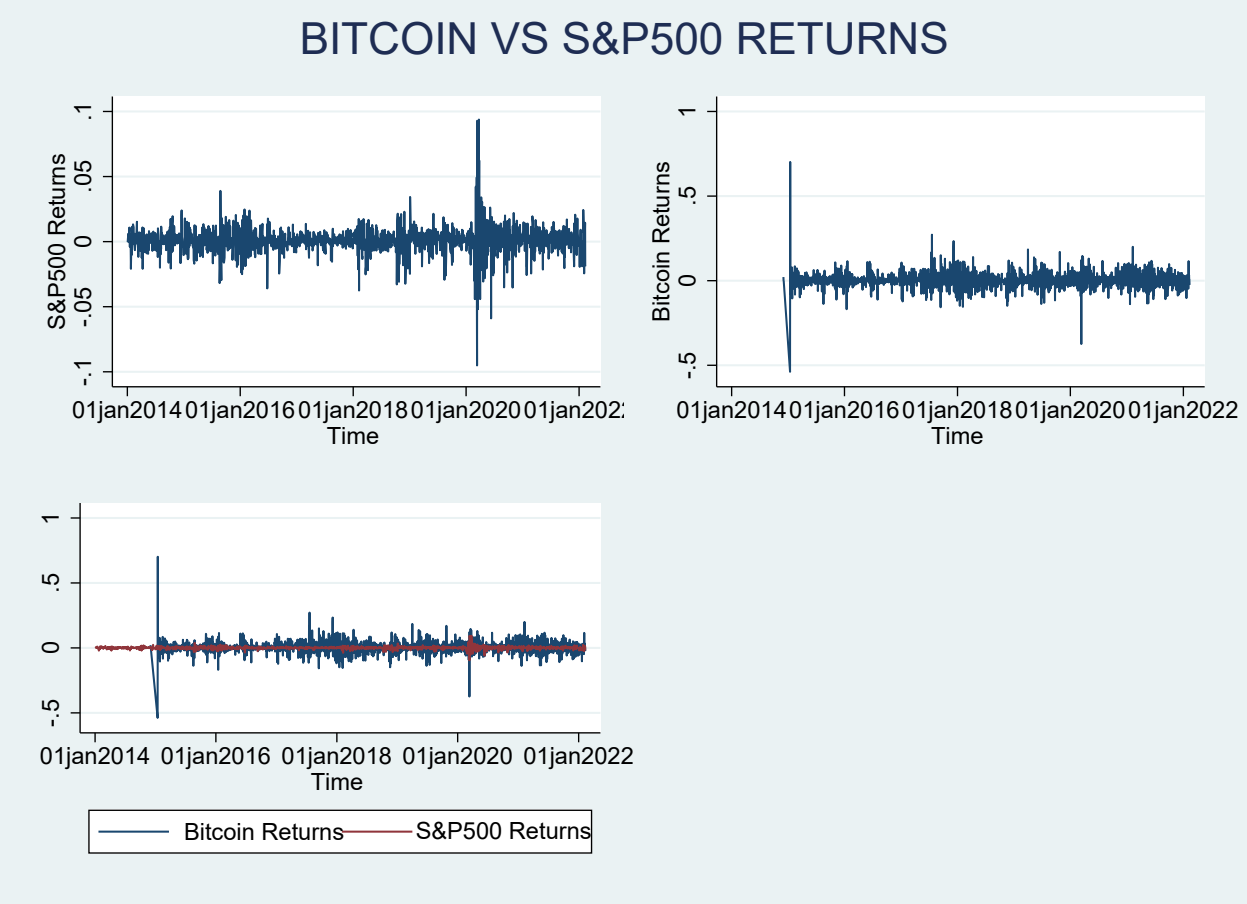

Figure 7A: Bitcoin vs. S&P500 Returns:

These figures compare the average returns of S&P500 to Bitcoin. Bitcoin's returns exhibit higher variability when compared to S&P500's returns.

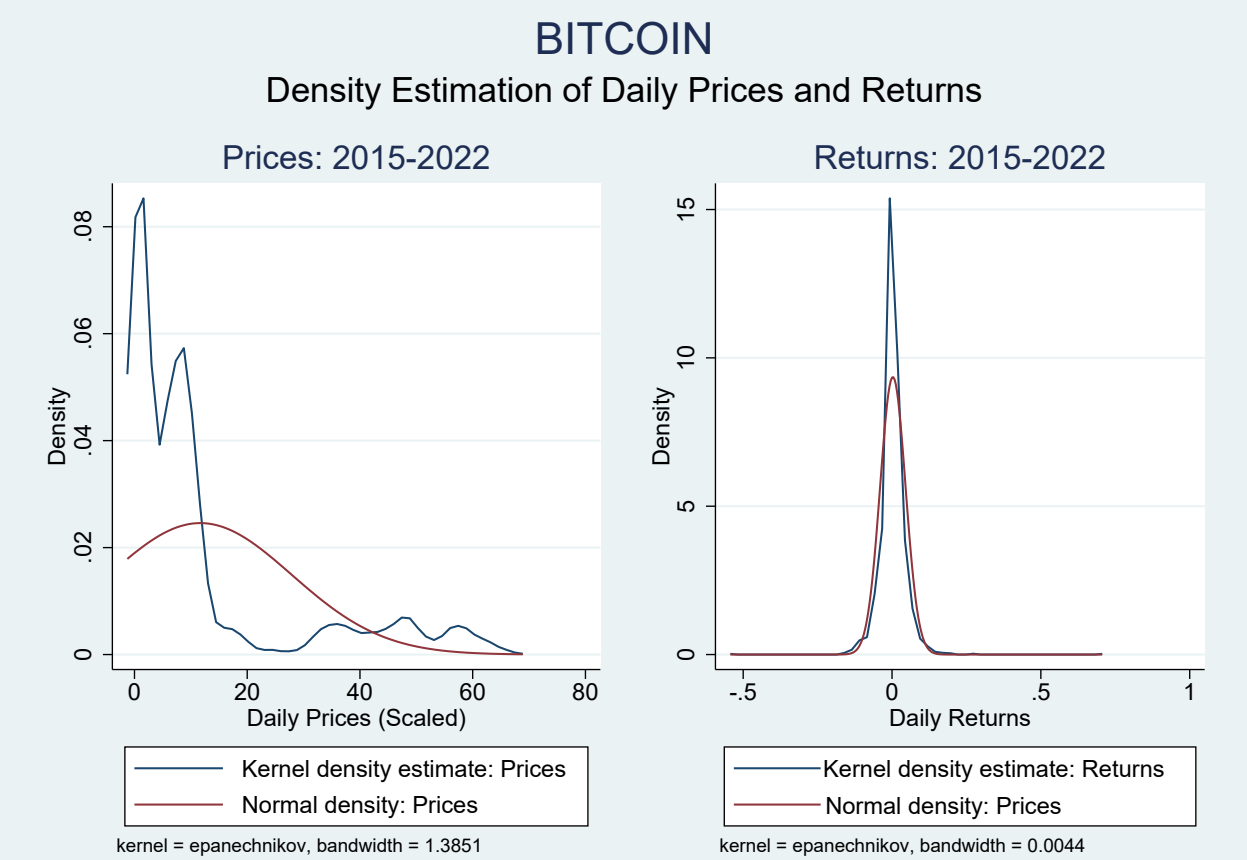

Figure 7B: Bitcoin_Density Estimates:

These figures compare the average returns of S&P500 to Bitcoin. Bitcoin's returns exhibit higher variability when compared to S&P500's returns.

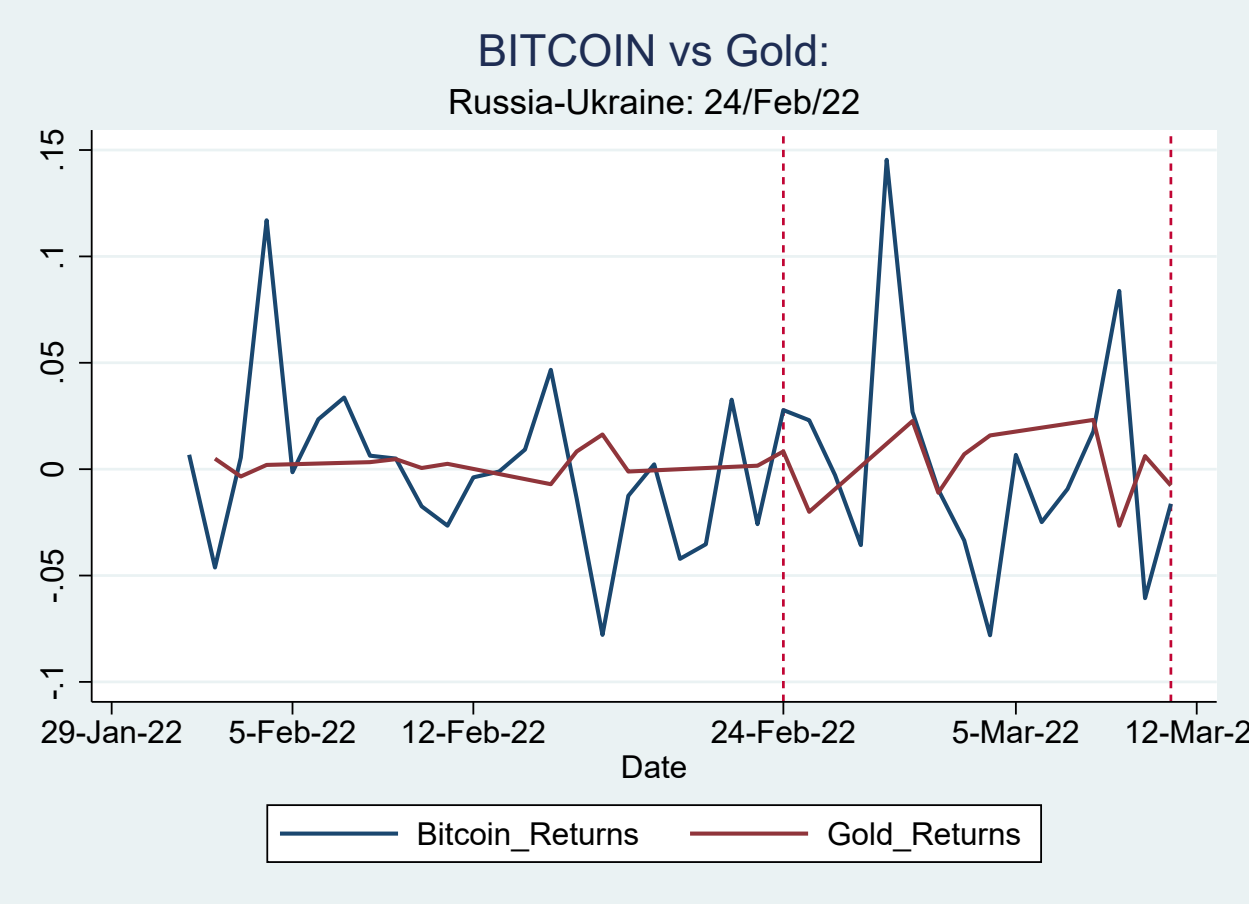

Figure 7C: Russian-Ukrainian Conflict:

This figure compare the average returns of Gold to Bitcoin around the onset of the Russian-Ukrainian conflict. Bitcoin exhibits relatively higher average returns but also higher volaitilty relative to gold.

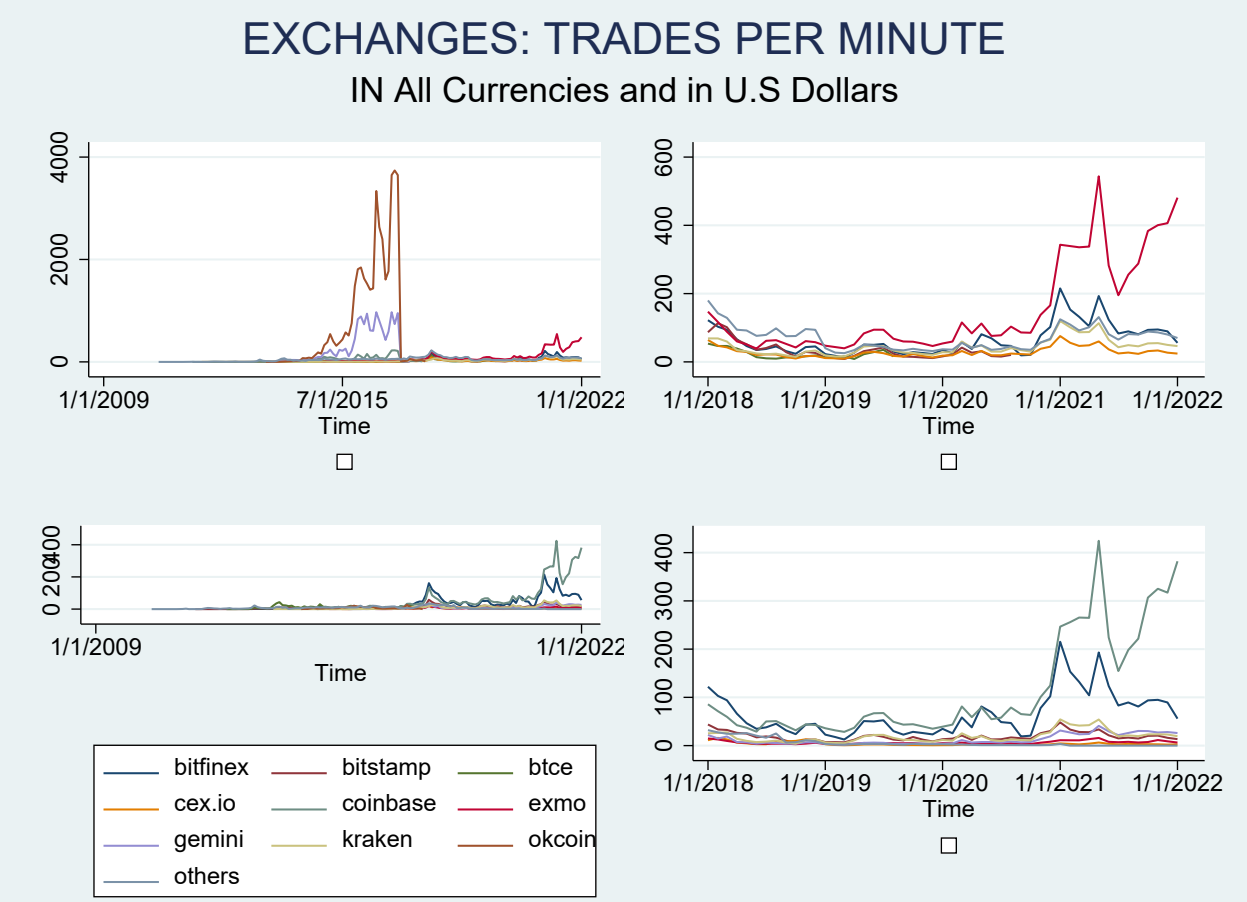

Figure 7: ***Exchanges: Trade per Minute:***

These figures show that average trades per minute have been increasing across all exchanges, reflecting growing interest in Bitcoin.

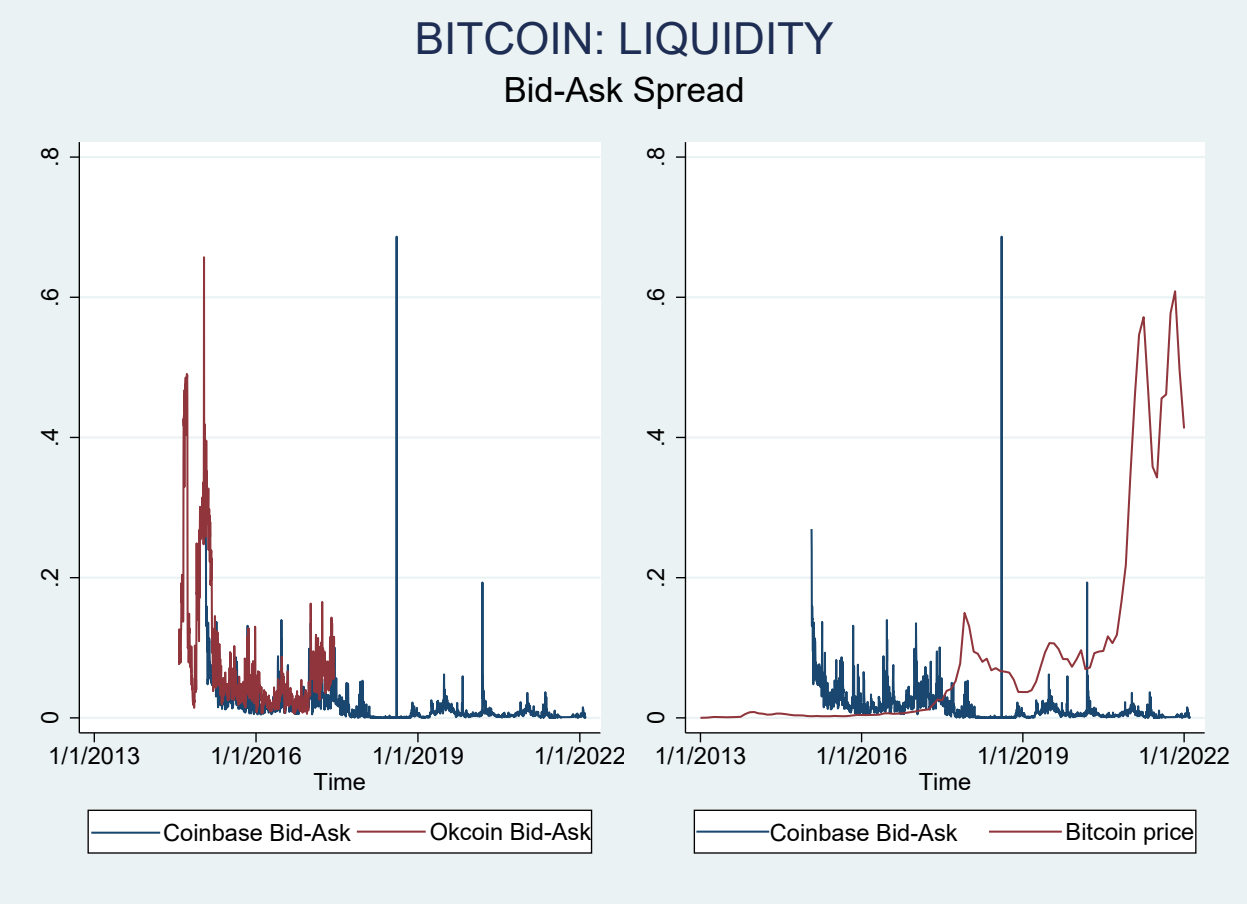

Figure 8: ***Bitcoin: Liquidity***

These figures shows that the average Bid-Ask spread has been on the decline, reflecting growing demand and interest in Bitcoin.

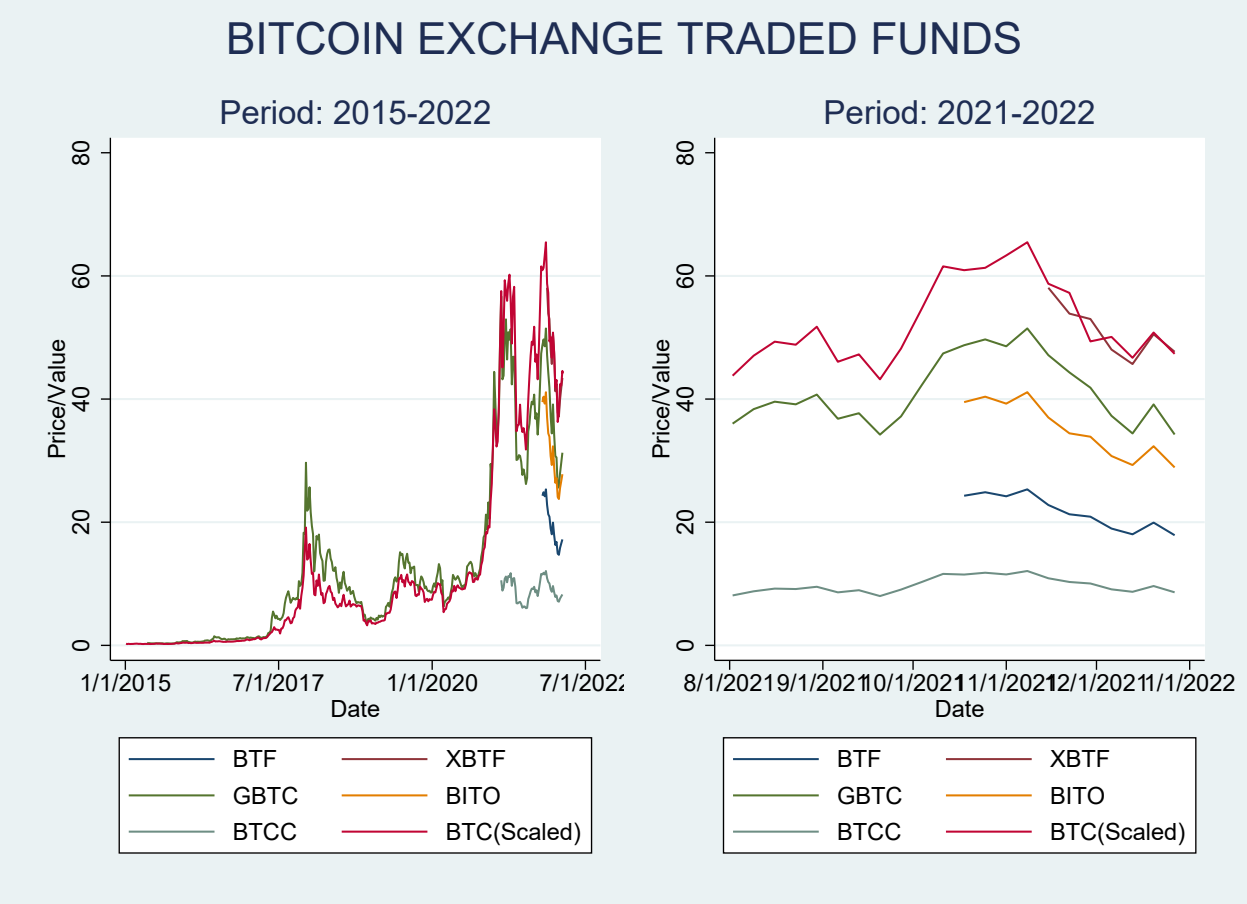

Figure 9: ***Bitcoin: Exchange Traded Funds (ETFs)***

These figures show the time series of Bitcoin ETFs. There is a high correlation between the ETFs and Bitcoin's prices and an increase in the number of ETFs after 2020, reflecting growing demand and interest in Bitcoin as an investable asset.

TABLE 1: Summary Statistics

This table presents the descriptive statistics for the sample..

	Mean	**Std. Dev**	**25th**	**75th**
		BITCOIN		
Bitcoin Price	7115.62	13763.34	105.244	8001
Bitcoin Volume	1.04	1.82	1.46	1.19
Bitcoin Market Capitalization	4.33	6.33	1.45	7.12
Bitcoin Daily Returns	0.003	0.043	-0.013	0.0189
Block Size	388.07	353.68	20.89	746.07
Mining Difficulty	1.85	3.88	0.15	7.86
Time Between Blocks	9.91	2.91	8.87	9.87
Number of Transactions	3.80	0.37	0.20	7.09

TABLE 2: Stablecoins: Correlations Table

This table presents correlations for select stablecoins.

	Tether	USD_Index	BTC	BinanceUSD	USD
Price/Value:					
Tether_Coin	1.0000				
USD_INDEX	0.0886	1.0000			
BTC	-0.1508	-0.4407	1.0000		
Binance_USD	0.9159	0.1300	-0.1980	1.0000	
USD	0.8332	-0.2590	-0.1122	0.8435	1.0000

TABLE 3: Bitcoin Exchange Traded Funds: Correlations Table

This table presents correlations for select stablecoins.

	BTC	BTF	XBTF	GBTC	BITO	BTCC
BTC	1.0000					
BTF	0.9836	1.0000				
XBTF	0.9659	0.9948	1.0000			
GBTC	0.9759	0.9944	0.9923	1.0000		
BITO	0.9830	1.0000	0.9945	0.9944	1.0000	
BTCC	0.9830	0.9996	0.9945	0.9454	0.9995	1.0000