## An examination of the impact regulatory news announcements have on firms vested in the cryptocurrency market

Ph.D. Dissertation

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This dissertation is especially dedicated to my immediate family: Dr. Mahboub, Mme Mary, and Paul. I know how happy and proud you are. How could you not be? At heart, you know, this would not be possible without you. Your son and brother is truly blessed.

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### An examination of the impact regulatory news announcements have on firms vested in the cryptocurrency market

#### ABSTRACT

This study examines the market reaction to regulatory news announcements concerning the cryptocurrency domain, which is yet emerging. Recent interest by major investors has drawn regulators' attention to the cryptocurrency industry. It is, therefore, important to understand how their comments and actions impact the market performance of firms that have significant involvement in the cryptocurrency industry. I first examine the short-term cumulative abnormal returns surrounding a relevant news announcement. Following this, I provide evidence regarding the long-term cumulative abnormal return following President Biden's Executive Order on Ensuring Responsible Development of Digital Assets (March 9, 2022). Finally, I assess the differences in idiosyncratic risk in the five-day windows preceding and following a relevant news announcement. I find that, depending on the context, regulatory news announcements related to cryptocurrencies can have either favorable or unfavorable impacts on the market capitalization and risk perception of firms that are highly involved in the cryptocurrency industry. This study contributes to the following literature streams: (1) accounting for intangible assets, (2) financial markets' reaction to news announcements. On a practical level, the findings should be of interest to regulatory bodies and lawmakers, who are interested in better understanding the market impact of their comments and decisions.

#### **Chapter 1: Introduction and Motivation**

Today's financial regulatory environment was shaped by multiple trials, crises, and remediations over past years<sup>1</sup>. Initially, digital assets<sup>2</sup>, including cryptocurrencies, had been considered a niche hobby and therefore, did not require financial guidance or legislation. However, by the mid-2010's this perception began to fade as cryptocurrencies gained awareness, adoption, and legitimacy. The dilemma that confronts regulators is whether current regulations can address the challenges facing those engaged in the digital asset market. Broadly speaking, today's pressing issues include investor protection, deterring money laundering, and combating tax evasion. As the cryptocurrency industry continues to grow and evolve, so too must the regulatory framework. Recent cryptocurrency volatility has reinforced calls for regulatory guidance. The need for a comprehensive cryptocurrency regulatory framework is echoed by many world<sup>3</sup> leaders, including President Biden (Rogers and Livni 2022). Such regulation can impact cryptocurrencies' relation to traditional fiat currencies (Raza, Ahmed, and Aloui 2022).

The efficient market hypothesis (EMH) posits that, at any given moment, asset prices fully reflect all available value-relevant information. A fundamental assumption in the EMH is that the market is comprised of rational participants, who are well-informed. If all individuals are rational

<sup>&</sup>lt;sup>1</sup> Including the market crashes of 1907 – Federal Reserve created, 1929 – Federal deposit insurance, Securities and exchange commission (SEC) established, 1987 – SEC market circuit breakers implemented, 1990's Asian crises – led to increased awareness about interconnected of markets, 2000 Dot Com bubble burst – Sarbanes-Oxley Act of 2002 passed, 2007 subprime mortgage bubble burst – Dodd Frank Act of 2010 passed, and the 2020 COVID-19 pandemic – The CARES Act of 2020 is passed (Reisner 2022).

<sup>&</sup>lt;sup>2</sup> For a detailed definition please see: https://www.pwc.com/us/en/tech-effect/emerging-tech/understandingcryptocurrency-digital-assets.html

<sup>&</sup>lt;sup>3</sup> Including the European Union, United States, China, and India

<sup>-</sup> https://www.centralbank.ie/consumer-hub/consumer-notices/eba-opinion-on-virtual-currencies

<sup>-</sup> https://www.sec.gov/oiea/investor-alerts-bulletins/investoralertsia\_bitcoin.html

<sup>-</sup> https://www.zdnet.com/article/china-reiterates-warning-against-cryptocurrency-use-in-transactions/

<sup>-</sup> https://www.dw.com/en/why-is-the-indian-government-cracking-down-on-cryptocurrency/a-60148889

and well-informed, this implies that no matter the analysis or forecasting method applied, no participant is able to make abnormal returns. In scenarios where the EMH applies, any information leakage renders firm disclosures as well as newspaper articles to have negligible value-relevance. However, there is evidence of pre-announcement drifts (Ball and Brown 1968; Lucca and Moench 2015). Such pre-information drifts are contrary to the EMH (Shleifer 2000). A similar pattern is noted in the post-information period whereby prices drift in the same direction following an event's impact (Cuthbertson and Nitzsche 2005; Kaniel et al. 2012). Nonetheless, Liu, Tsyvinski, and Wu (2021) do not find significant evidence that pre-information drifts exist in the market for cryptocurrencies.

This study examines the impact of two major news announcements that relate to the oversight of the cryptocurrency domain. The first being President Biden's Executive Order on 'Ensuring Responsible Development of Digital Assets' and the second being the SEC's staff accounting bulletin # 121. Clear or absolute restrictions on holding or trading cryptocurrencies are, naturally, expected to have negative impacts on the firms that hold or trade such digital assets. However, such restrictions typically apply to an activity or something that is condemned. Even then, regulators need to consider the benefits versus the costs of their proposal (Sunstein 2002). With regard to the issue at hand, the value and importance of cryptocurrencies has been discussed on multiple occasions by high profile lawmakers, politicians, and business leaders. For example, whilst acknowledging the risks that digital assets pose, Treasury Secretary Janet Yellen has stated that the cryptocurrency advent could "improve the efficiency of the financial system" (Wright 2021). Senator Cynthia Lummis has stated that cryptocurrency (Lummis 2021; Kiernan 2022). In essence, regulation today (and likely that of the future) acknowledges that digital assets are here

to stay, and they can be very beneficial to the economy at large. As such, cryptocurrency regulations aim to achieve the best outcome primarily through guidance, if possible and restrictions, only when they are deemed necessary. Therefore, how investors perceive such regulations is a natural research question that comes to surface.

I examine and provide evidence regarding the risk and stock returns of firms vested in digital currencies as well as the digital technologies that support cryptocurrencies. I am motivated to examine this issue for the following reasons. First, the emergence and success of cryptocurrencies continue to cause debate regarding the role of national and international governing bodies. Although a global phenomenon, as of yet, there is no consensus about how cryptocurrencies should be classified.<sup>4</sup> Second, the regulatory climate regarding cryptocurrencies is likely to impact financial equity (Burghartz 2021). Finally, it is important to examine the value-relevance of news in this context because, when compared with stock market, the legal requirements for periodic disclosure in the cryptocurrency market remain relatively vague. Relatedly, there is evidence of significant inefficiencies in the market for cryptocurrency (Makarov and Schoar 2020; Borri and Shakhnov 2021).

This study provides three major contributions. First, it adds to the literature on intangible asset accounting, where cryptocurrencies are an emerging area of interest. Accounting for any intangible asset can be challenging (Monga 2016). However, the continuous refinement and improvement of the accounting for such assets is necessary given the increasing weight that intangible assets have within firm books (Heitman 2016). Cryptocurrencies pose a unique challenge today in that they do not, clearly, fit into the current laws and regulations set out for

<sup>&</sup>lt;sup>4</sup> For current discussion, see: https://en.wikipedia.org/wiki/Legality\_of\_cryptocurrency\_by\_country\_or\_territory

intangible assets. Indeed, there is an increasing focus on the cryptocurrency regulatory framework (Matsuo 2022). Second, this study contributes to the literature on market reaction to media reporting. This is important to understand in the context of emerging technologies, in general and cryptocurrencies, in particular. Finally, this study provides a practical contribution to regulating bodies and lawmakers, who are interested in gaining a better understanding of the market impact of their comments and decisions regarding the cryptocurrency domain. To the best of my knowledge, this is the first study that examines how the market reacts to such news about digital asset regulation. This study should be of interest to investors, regulators, and media professionals.

The remainder of this paper is organized as follows. Chapter 2 provides background including discussion on the development of cryptocurrencies and their potential as financial assets and exchange media. Chapter 3 reviews the related literature including that on the determinants of cryptocurrency value and how such value could impact firms that are heavily vested in the cryptocurrency domain. Chapter 4 discusses details on the examined events as well as developing and posing the hypotheses. Chapter 5 provides details on the sample and methodology used. Finally, chapter 6 provides the empirical results and concluding comments.

#### **Chapter 2: Background**

This chapter provides background and discusses the literature related to the study's main questions. For the background, I begin by comparing and contrasting the cryptocurrency emergence to that of the internet. They are not mutually exclusive. In fact, growth in internet access has significantly facilitated the acceptance and sustenance of the cryptocurrency market. Second, I provide a timeline on the most prominent cryptocurrencies and their varying characteristics. Finally, I discuss how regulation news could be impactful in the cryptocurrency setting.

#### 2.1 Development of cryptocurrencies

#### 2.1.1 A comparison between the internet and crypto emergence

The continued growth in internet access has led to greater global interconnectedness. This has occurred through increased network capacity (i.e., bandwidth), smart phones, social media, and the internet of things (IOT). It has resulted in a dramatic increase in access to knowledge. This interconnectedness has allowed cloud computing, which has both a centralization and decentralization aspect. In many ways, the blockchain mechanism fits in to this new method of computing, with emphasis on the decentralized aspect of the cloud. The blockchain is accessible anywhere that a person has an internet connection. Indeed, today's cryptocurrency emergence would not be possible if it were not for the internet's growth since the 2000's. While Bitcoin is not the first cryptocurrency to be introduced, it is the first to remain relevant to date.<sup>5</sup>

The concept of an internet enabled digital currency was posed as early as 1999 in a discussion by Milton Friedman (Cawrey 2014; Tapalaga 2021). It could be argued that the growth pattern of cryptocurrencies has parallels with that of the internet in the early 2000's (Akyildirim et al. 2020). In particular, the issue of valuation volatility was raised by a number professionals who considered a large portion of the emerging internet companies to be overvalued or puzzling due to the fact that their share prices generally do not follow traditional fundamentals (Ip 1999). Cryptocurrency critics seem to be even bolder with more amplified claims. For example, some analysts claim that cryptocurrencies have no intrinsic value (Prasad 2021). Furthermore, a growing number of prominent figures in both the financial and regulatory spheres have ominous predictions about the long-term value of the cryptocurrency market. These figures include Jon Cunliffe of the

<sup>&</sup>lt;sup>5</sup> For example: <u>https://www.investopedia.com/terms/b/bmoney.asp</u> and <u>https://www.analyticsinsight.net/history-of-cryptocurrencies-how-everything-started/</u>

Bank of England as well as John Paulson, a portfolio manager in the United States (Partington 2021; Kollmeyer 2021). Surely, those who invest in cryptocurrencies do not perceive their investment as being of 'no value'.

While the parallels between the 2000's internet companies and cryptocurrencies are many, there are two significant differences between the internet firms of the 2000's and the rise of cryptocurrencies today. The first is the significant advances in technology and the second is the fact that cryptocurrencies have no traditional accounting fundamentals. The latter is significant because it implies that cryptocurrencies have no parallel to dividend or earnings announcements. Such announcements are considered primary source news and abnormal market activity on such dates is frequently examined by researchers within the stock market context (e.g. Bomfim 2003).

#### 2.1.2 A timeline and characteristics of cryptocurrencies

The first, notable, cryptocurrency was introduced in the late 1990's with B-money (Dai 1998). However, before any cryptocurrency was introduced to the world, there were many pioneering forces that influenced the domain's trajectory and character. These distinguishing attributes include the blockchain (Chaum 1979) and proof-of-work (Dwork and Naor 1993) mechanisms. In addition, it is important to distinguish between a (monetary) coin<sup>6</sup> and the related network, which can be extended to other domains yet is fundamental to the cryptocurrency's value and operations. This is an area where cryptocurrencies differ when compared to currencies issued by central banks. A currency backed and issued by a central bank, such as the US dollar, can be transferred and verified by a wide array of networks such as credit card companies, banks, or remittance firms, such as Western Union. However, the value of a such currency is exogenous to

<sup>&</sup>lt;sup>6</sup> Coin (token) denotes one unit of a cryptocurrency that does (does not) operate its blockchain (Banerjee et al. 2021)

the value of a particular network that facilitates transfers. This is not the case with cryptocurrencies, where the decentralized financial network (DFN) characteristics significantly impact the coin's value. Within the realm of cryptocurrencies, the proof-of-stake<sup>7</sup>, as opposed to the proof-of-work<sup>8</sup> protocol is a notable point of differentiation that has to do with verification of transactions (Benson and Hussey 2021). The availability of smart contracts is another characteristic that can distinguish one cryptocurrency from the others. Smart contracts are noted as an integral part of Ethereum. While smart contracts may face many hurdles to their adoption such as lack of federal enforcement and the chance of being hacked, they carry the significant advantage of automatic execution (Lipton and Levi 2018). In essence, a significant part of cryptocurrency's value depends on its features and the network it operates in.

Bitcoin, launched in January 2009 by Satoshi Nakamoto<sup>9</sup> (pseudonym), is widely considered the first successful crypto-network (Nakamoto 2008; Haar 2021; de Best 2021a; 2021b; Iwamura, Kitamura, and Matsumoto 2014; Reiff 2021; Rosenberg 2021). It emerged in the shadow of the 2008 financial crisis. As a result of the crisis, with a significant amount of wealth erased, there was, understandably, a mistrust of government financial channels. Bitcoin purported itself as being a store of wealth and, potentially, a medium of exchange. In this sense, Bitcoin has parallels with fiat money. However, Bitcoin has authorization, processing and record keeping features that distinguish it from traditional fiat currencies. The decentralized currency relies on cryptography to authorize legitimate transfers of funds as well as keep a record of all transactions. This system is called 'blockchain'. The blockchain is replicated across all computers that have access to it. Any updates to this system (recording of transactions) occur with consensus when the modifier provides

<sup>&</sup>lt;sup>7</sup> Gives users the opportunity to stake the coins they own for certification purposes

<sup>&</sup>lt;sup>8</sup> Requires certifiers to solve a complex math problem, which requires a high amount of computing power

<sup>&</sup>lt;sup>9</sup> The founder acknowledged the importance of electronic cash, which has traditionally been managed by banks and other financial institutions (such as Master Card and Visa).

'proof-of-work'. While the aforementioned system is great in theory, the consensus could, potentially, be broken if a party works out of sync (offline) and is able to attach a (non-consensus) transaction to the blockchain. This is known as 'forking'<sup>10</sup>. Furthermore, the energy consumption that proof-of-work (mining) requires has stakeholders concerned about the negative environmental impact. In response to environmental concerns, cryptocurrency users and developers are increasingly committed to using green energy and gradually phasing the proof-of-work mechanism out, in favor of the proof-of-stake authenticating system. The application of the two aforementioned systems contrasts, however, the principles have parallels in their security goals. In the proof-of-work system, the user provides evidence of being vested in the system by committing computing power and time. In the proof-of-stake system, the user provides evidence of being vested in the system by owning a significant amount of the digital currency. In both cases, the user is less likely to be a bad actor. Following Bitcoin, a number of notable cryptocurrencies have emerged, namely Litecoin (2011), Ripple (2012), Tether (2014), Stellar (2014), Ethereum (2015), as well as Binance Coin (2017). Ethereum has been using the proof-of-stake method since 2022<sup>11</sup>.

With time, the cryptocurrency market has an expanding trajectory, both in terms of the market capitalization and the number of cryptocurrencies available to investors. The total cryptocurrency reached a market capitalization peak at October 2021, exceeding \$3 trillion (Ossinger 2021). This peak is associated with a change in perception outside of the traditional cryptocurrency base who are either staunch proponents of decentralization or speculators. Multiple companies began to adopt either ownership of digital assets or began to accept such assets as a form of payment. However, shortly following this peak, the market for cryptocurrencies

<sup>&</sup>lt;sup>10</sup>For more detail, see https://www.coinbase.com/learn/crypto-basics/what-is-a-fork

<sup>&</sup>lt;sup>11</sup> For more information on the proof-of-stake see: ethereum.org/en/developers/docs/consensus-mechanisms/pos/

experienced a steep decline in its capitalization. There are, arguably, multiple factors and circumstances that contributed to this steep fall in the market for digital currencies. The Federal Reserve's raising of interest rates drove a negative impact on both the stock and cryptocurrency markets (Duggan and Powell 2022). Indeed, a noted pattern is the strong correlation between cryptocurrency values and that of the stock market for 2022. For example, I conducted a univariate analysis of correlation (December 1, 2021 to January 1, 2023) between bitcoin, ethereum, and Van Guard's whole market exchange-traded fund (VTI). In this analysis, I find that the correlation between the stock market and ethereum is 0.93, while the correlation between the stock market and bitcoin is 0.88 over the same period. The crypto market's price downward spiral was exasperated when, in mid-August 2022, the crypto trading platform FTX received a warning from the Federal Deposit Insurance Corporation (FDIC) regarding exaggerated claims about investor protection. This was followed by an inquiry into the actions that platforms, such as FTX, have taken to address the risk of fraud (Sigalos 2022). The inquiry requested a response by mid-September 2022. At the time, Mr. Bankman-Fried had a net worth of approximately \$17 billion (Lang and Berwick 2022). By November 2022, FTX had filed for Chapter 11 bankruptcy (Sridharan 2022). The FTX crisis was reminiscent of the 2007 bank crash, whereby traditional financial institutions had behaved recklessly and were considered 'too big to fail' at the time. While, thus far, FTX has not been revived by government bailout, the causes of this crisis run parallel to that of the banks 2007. In both cases, the institutions had been engaged in irresponsible lending, which led to their collapse. In contrast to historic (pre-2000's) crises, both the 2007 and FTX cases coincided with significant technological innovation such as the introduction of the Apple iPhone, widespread broadband, and artificial intelligence. These technological advances

have been and remain a necessary component for both digital asset usage as well as trading (e.g. Clifford 2019; David 2022; Williams 2023; Rust 2023).

Indeed, today's crypto market was born out of the rapid technological advances as well as the 2007 financial crisis, after which a large portion of the public considered central regulators to be ineffective at hauling shadow-bankers<sup>12</sup> in place (Turner 2022).

As this field grows, requests for government oversight and guidance are growing in demand from parties that may have dismissed the crypto market when it was in its initial stages.

"Trust in the space is broken right now. While regulation alone will not solve that, clarity across terminology and application of regulation, along with enhancements to risk management capabilities and procedures, is a good starting point." – Matt Blumenfeld, PwC US Web3 & Digital Asset Lead ("PwC Global Crypto Regulation Report" 2022)

In a study on the accounting methods applied by firms that dealt with digital assets, Anderson et al. (2022) find a wide disparity in accounting treatment of digital assets. Had more authoritative guidance been present, it is unlikely that such a disparity in accounting treatment would have been witnessed. While US officials generally ignored the crypto market since the late 1990's, for being too small and marginal, the mid 2010's demonstrated a shift in policy as more firms and individuals began to embrace the market for crypto assets. Currently, regulators have been working to address the unique challenges posed by this emerging asset class.

<sup>&</sup>lt;sup>12</sup>For more detail on shadow-banking please see: <u>https://www.imf.org/external/pubs/ft/fandd/2013/06/pdf/basics.pdf</u>

#### 2.2 Arguments regarding cryptocurrencies as financial assets and exchange media

My review on the investment perspective looks first into cryptocurrencies as commodities. Studies show that there is a growing number of investors who consider cryptocurrencies to be a tool to diversify their portfolio. However, some researchers caution that high volatility renders cryptocurrencies to be ineffective in this regard. Second, I discuss potential arbitrage opportunities in the cryptocurrency market.

#### 2.2.1 Cryptocurrencies as commodities and a hedge

There is an emerging literature that compares the major cryptocurrencies to commodities, which are generally used as a hedge against inflation or volatility. For example, Selmi et al. (2018) posit that bitcoin is as effective as gold for hedging against extreme volatility in the price of oil. Bouri et al. (2020) examine bitcoin's ability to act as a hedge against volatility in stock markets and conclude that bitcoin is able to provide superior protection relative to gold. Bakry et al. (2021) construct diversified portfolios with<sup>13</sup> and without bitcoin. They find that the portfolios containing bitcoin outperformed those that are without bitcoin. Nonetheless, Bakry et al. (2021) posit that while bitcoin is an important component of a diversified portfolio,<sup>14</sup> it is too early to consider the highly volatile<sup>15</sup> digital currency as a reliable hedge, which could replace commodities such as gold. The significant volatility that bitcoin has shown relative to the US dollar renders it, to date, a non-investment-grade asset (Seng and Yew 2017; Borri 2019). This implies that it has, yet, not shown the ability to completely substitute for any asset class. Nonetheless, this has not prevented investors and wealth managers from including cryptocurrencies in their diversified portfolios. In

<sup>&</sup>lt;sup>13</sup> 'With' implies moderate inclusion that does not exceed 15% of total portfolio

<sup>&</sup>lt;sup>14</sup> Due to it being weakly correlated with other investments (Bouri et al. 2018)

<sup>&</sup>lt;sup>15</sup> Bouri, Gupta, and Roubaud (2019) attribute a significant portion of the volatility to the user base, who tend to lack information and congruent perspectives on the cryptocurrency market

fact, there is evidence that a growing number of investors consider their portfolio to be incomplete if it does not allocate a percentage to cryptocurrencies either to hedge against inflation or to boost their rate-of-return (Borri 2019; Mathews 2021).

#### 2.2.2 Arbitrage opportunities

In addition to the aforementioned work examining how cryptocurrencies may perform similarly to selected commodities, a growing literature examines the extent to which arbitrage opportunities exist. Such literature is, of course, centered around investors, as opposed to individuals who would like to use cryptocurrencies for day-to-day transactions. Makarov and Schoar (2020) examine the issue of mispricing across various markets and exchanges; they are motivated to do this because there is significant variation in the regulatory framework between one country and another. Makarov and Schoar (2020) conduct their cross-border study of 34 cryptocurrency exchanges in order to determine the significance of price differences. Indeed, they find a significant spread between the world average price and that of countries with a high level of capital controls, implying segmentation of the global market for cryptocurrency. The Makarov and Schoar (2020) findings are even more significant for the cryptocurrency market than prior results that parallel in stock markets<sup>16</sup> because cryptocurrencies aim to be global. This is as opposed to stocks which are usually traded in one country and thus are considered to be less transferable across borders. Driven by the changes witnessed since the sample period covered in Makarov and Schoar (2020),<sup>17</sup> the efficiency of cryptocurrency markets is subsequently investigated by Borri and Shakhnov (2021b). They too find that there are periods of significant price differences across cryptocurrency markets, which give way to arbitrage opportunities. Both Gandal et al. (2018) as

<sup>&</sup>lt;sup>16</sup> Such as Rosenthal and Young (1990); Froot and Dabora (1999)

<sup>&</sup>lt;sup>17</sup> Although published in 2020, the sample period ends in February 2018

well as Griffin and Shams (2020) document evidence of significant price manipulation in cryptocurrency markets. Such findings can be concerning for the public in general and regulators in particular.

#### **2.3** Development of regulatory actions

#### 2.3.1 How regulation news could be impactful in the cryptocurrency setting

Since the early 1970s, there is an extensive literature examining the impact of news and regulatory announcements on stock prices (e.g. Niederhoffer 1971; Lev 1979; Dyckman and Smith 1979; Beaver, Christie, and Griffin 1980; Gheyara and Boatsman 1980; Ro 1980; Kross 1982; S. Baker et al. 2019). In the initial stages, the results were mixed with the pioneer Niederhoffer (1971) finding New York Times articles having a significant relation with stock market activity, while others found such a relation to be minimal (Schwert 1981; Roll 1988; Mitchell and Mulherin 1994) or no relation at all (Cutler, Poterba, and Summers 1988; Haugen, Talmor, and Torous 1991). Most recently, however, Narayan (2019) finds that news articles discussing stale (already known) issues predict stock prices. Nonetheless, there are significant differences between stock markets and those for cryptocurrencies. These differences imply that theory derived from the realm of stock markets, while helpful, cannot hold perfect standing in the realm of cryptocurrencies.

For example, the existence of accounting fundamentals in stock markets give researchers a standard that can be used to draw conclusions about irrational stock prices, cryptocurrencies have no such metrics. Rather, cryptocurrencies are as valuable as the public perceives them to be. Furthermore, cryptocurrency returns are unique because they are not significantly correlated to other assets or activities (Yermack 2013; Corbet et al. 2018; Baur, Hong, and Lee 2018; Liu and Tsyvinski 2021). Thus, it is necessary to have oversight that ensures that no person is able to manipulate the digital asset market, which could needlessly damage confidence in financial fiduciaries. Maintaining a balance between cryptocurrencies' independence and ensuring ethics within their ecosystem is crucial for users' well-being. As such, well-thought-out regulation for the cryptocurrency market is not only necessary, but also generally desirable for users, miners, governmental entities and the crypto market itself.

"Cryptocurrencies may have been originally created to operate free from control, but the lack of a robust global regulatory framework for digital assets is harmful for the sector, innovation and consumer protection." – Laura Talvitie, PwC UK Senior Manager Digital Assets Regulation ("PwC Global Crypto Regulation Report" 2022)

Regulators and legislators recognize the need for balance whenever they give guidance or propose a law regarding cryptocurrencies. For example, the proposed "Responsible Financial Innovation Act" (Gillibrand and Lummis 2022) has been welcomed by Commodity Futures Trading Commission (CFTC) chair Rostin Behnam, while viewed with caution by SEC chair Gary Gensler (Hamilton 2022; De 2022). In order to ensure the success and future growth of the cryptocurrency industry, any proposed regulation must strike a balance between fostering the domain's growth and protecting the interests of investors and markets at large.

Governmental oversight works to protect investors. The United States, in particular, is working to develop domestic cryptocurrency policy that confronts both internal and overseas threats (Wolff 2022). The recent shift towards transnationalism has meant that the domestic policies of one nation often have an impact beyond its borders. For example, the United States, often negotiates with other nations to achieve compromise in global standard setting (Goldbach 2015). However, the United States welds significant market power in such negotiations and as a result, is more capable of enforcing what suits US interests (Simmons 2001; Drezner 2008). Overall, nations understand the need to cooperate when setting regulations to avoid damage in the international flow of trade (Singer 2007). Nonetheless, when compared to other powerful nations, the US is more likely deviate away from international policies whenever American interests are at stake (Foot and Walter 2013). All in all, if any single regulatory market were to be examined for its global impact, the United States would be a top contender, if not first and foremost.

In essence, the United States leads the global discussion on multiple economic and financial fronts. Shocks that impact the US can produce international repercussions. Since Quarter 4 of 2022, the cryptocurrency platform FTX has been closely monitored. While headquartered in the Bahamas, FTX had significant activity in the US. Similarly, its sister company, Alameda, was headquartered in Hong Kong while a large portion of its activity was in the US. In September 2022, news that FTX was covering losses for Alameda shocked the market and had investors lose trust in the cryptocurrency exchange. Prior to this, investors had trusted FTX as a convenient and secure method to own and trade cryptocurrency. Current equity regulations, that protect fair market trading conditions, would not have allowed such a proximate relation between such companies (Massa, Irrera, and Miller 2022). Subsequent to the scandal, FTX has new leadership. The newly appointed CEO, John J. Ray III, has stated "Never in my career have I seen such a complete failure of corporate controls and such a complete absence of trustworthy financial information as occurred here" (Morrow 2022). While the FTX Trading scandal is the most recent and prominent scandal, it is preceded by similar stories that impacted investors at BlockFi and Coinbase (Newbery 2021; Macheel 2021). The emergence of policy to regulate digital assets is likely a source of assurance in such a volatile and uncertain market, which has been rocked by numerous scandals (Browne 2022).

While refined guidance, peculiar to cryptocurrencies, helps to address points of uncertainty, it comes at the expense of cryptocurrencies' independence and decentralized character. Indeed, a significant portion of cryptocurrencies' appeal has to do with their decentralization and the fact that they are not issued by a governmental entity (Kelleher 2021). Nonetheless, such characteristics have led many regulators to view cryptocurrencies with suspicion. Furthermore, a number of firms and individuals are hesitant to commit to a significant cryptocurrency investment until more regulatory clarity emerges. There is an ongoing discussion by lawmakers regarding the role that each financial oversight agency should play in monitoring cryptocurrency trade. This has manifested in a growing number of proposals by various regulatory agencies regarding possession, usage and accounting for cryptocurrencies (Gensler 2022; Lucking and Aravind 2020; FASB 2022; Dunsmuir 2022; IRS 2022; Zamost and Khorram 2022; Madray and Austin 2018). Furthermore, elected officials, including President Biden, have voiced concern about the lack of clarity and oversight in this domain (Lopez-Kurtz and Mora 2022). Such proposals and subsequent regulations could have a positive impact on cryptocurrency price movements because this emerging industry may be perceived with increased legitimacy, which could be reenforced by additional transparency and disclosure requirements (Deegan 2006; Wiklund, Baker, and Shepherd 2010).

Nonetheless, individuals who seek to avoid government interference are another important demographic that is vested in cryptocurrencies. Such individuals may perceive governmental oversight and clarity as an overreach that dilutes cryptocurrencies' independence. This perceived dilution of character could lessen the appeal that cryptocurrencies hold.

#### **Chapter 3: Literature Review**

In this section I review the literature that is relevant to my topic. The first part (3.1) looks into studies on the valuation of cryptocurrency, while the second part (3.2) examines the literature on cryptocurrencies as an investment product.

#### **3.1** The determinants of cryptocurrency value

The review on the crypto market valuation begins with a demand side discussion. The law of large numbers (via an established network of users) is a major theme. The second sub-section looks into the supply side. Major factors that impact cryptocurrency supply include energy costs, the maturity of the network, as well as the pooling of computing resources. Finally, I review the literature that compares and contrasts crypto and fiat money.

#### 3.1.1 Demand side

Pagnotta and Buraschi (2018) examine the importance of networks in the valuation of cryptocurrencies. They posit that cryptocurrency miners value a higher reward up to certain point before inflation consumes the value of the reward, while the public values the coin more as the network grows. Sockin and Xiong (2020) also examine the relation between cryptocurrency miners and investors; positing that there are multiple equilibria between those who supply and those who demand cryptocurrencies.<sup>18</sup> Cong, Li, and Wang (2020) examine how network growth potential impacts the value of a cryptocurrency. They posit and provide evidence that the cryptocurrency's age plays a dynamic role coupled with the stage of network development. With regard to age, a newly established cryptocurrency has the greatest growth potential and as such, is considered the

<sup>&</sup>lt;sup>18</sup> These points of equilibria are impacted by: 1. user current convenience yield, 2. user optimism about the cryptocurrency's future price, 3. user participation cost, and 4. speculator sentiment.

most valuable to an investor who is concerned with asset value appreciation. Conversely, a person who uses cryptocurrency in lieu of fiat money appreciates a well-developed network with a high level of user adoption because there would more potential transaction counterparties within reach. Biais et al. (2018) model the usefulness of a cryptocurrency relative to fiat money with emphasis on the demand side. This would entail end-users being able to make or process transactions with greater benefits<sup>19</sup> relative to their cost<sup>20</sup>. The supply side impact on the value of cryptocurrencies is also discussed in the literature. For example, Liu and Tsyvinski (2021) posit that network size has a positive impact on the value of a cryptocurrency, however, they do not document production factors as having a significant impact on changes in cryptocurrency value.

#### 3.1.2 Supply side

Cong, He, and Li (2021) draw a parallel between the risk sharing provided by mutual funds<sup>21</sup> and mining pools<sup>22</sup> for cryptocurrencies. Nonetheless, they posit and provide evidence that the growth of a cryptocurrency network is associated with significantly higher energy consumption as well as higher transaction fees charged to miners. These factors dissuade efficiency and lead to relatively less mining activity (Cong, He, and Li 2021). This, supply-side, conclusion is important because it runs parallel to the, demand-side, position of Cong, Li, and Wang (2020): a cryptocurrency that is relatively less-matured has a higher potential for growth and is ceteris paribus more attractive to investors. Biais et al. (2019) also discuss mining pools and find that such resource pooling can cause inefficiencies, which lead to mistrust and overconsumption of energy. While most cryptocurrency mining issues relate exclusively to digital

<sup>&</sup>lt;sup>19</sup> The following are potential benefits: 1. privacy 2. preservation of wealth during fiat money devaluation 3. transcending capital controls, 4. less fees when compared to credit cards or bank transfers.

<sup>&</sup>lt;sup>20</sup> These costs include: 1. risk of significant price volatility, 2. security risks, 3. limited acceptance by merchants.

<sup>&</sup>lt;sup>21</sup>Competition and risk sharing within the mutual fund setting is discussed in Berk and Green (2004)

<sup>&</sup>lt;sup>22</sup> Mining pools group people to join their computing power and skills to receive a joint reward (Shawdagor 2021)

assets, other resources<sup>23</sup> and monetary units have supply-side concerns of their own. An emerging literature attempts to model the value of digital currencies with-regard-to traditional assets. Such discourse is well warranted as the total cryptocurrency market capitalization as of October 2021 is over \$3 trillion, which equates to approximately 15% of M1 in the US (Ossinger 2021).<sup>24</sup> This is especially significant given the quantitative-easing surge that occurred in response to COVID-19 (Kaul 2020).

#### 3.1.3 Cryptocurrency versus fiat money

When compared to fiat money, cryptocurrencies have numerous advantages including the universal<sup>25</sup> nature they carry and the ability to send funds anywhere in the world without permission from a central authority, as is the case with the Society for Worldwide Interbank Financial Telecommunication (SWIFT). Another advantage is the division-flexibility that digital currencies carry. While the US dollar can only be divided to a hundredth (one cent), a bitcoin can be transacted at 0.00000001 (commonly referred to as a Satoshi).<sup>26</sup> Nonetheless is it important to note that major national currencies, such as the US dollar, are used as a widespread means of exchange. As such, they hold a significant numeraire advantage over cryptocurrencies. This advantage manifests itself with concerns about the volatility of bitcoin relative to the US dollar and therefore, causes bitcoin-accepting merchants to continuously reference their price to the local fiat currency. This can stall or block adoption and ironically cannot be overcome without network growth. Athey et al. (2016) model the price of bitcoin relative to fiat money as a function of: technology, user base, and speculative investors.<sup>27</sup> Jermann (2018) models the value of bitcoin and

<sup>&</sup>lt;sup>23</sup> Such as gold, silver, or oil.

<sup>&</sup>lt;sup>24</sup> For Federal Reserve data on M1 please see: https://tradingeconomics.com/united-states/money-supply-m1

<sup>&</sup>lt;sup>25</sup> As opposed to national currencies that are only accepted in limited geographic areas

<sup>&</sup>lt;sup>26</sup> Source: <u>https://www.europeanbusinessreview.com/top-5-advantages-of-bitcoin-over-fiat-currency/</u>

<sup>&</sup>lt;sup>27</sup> Investors hold the majority of bitcoin supply and as a result, cause price increases relative to fiat money

ethereum as a function of volume-per-transaction<sup>28</sup>, coin-velocity<sup>29</sup> as well as expected adoption/supply<sup>30</sup>; he finds that majority of price variation is explained by variations in transaction volume. Schilling and Uhlig (2019) model the relation between the value of bitcoin and that of the US dollar. They distinguish between dollar supply, which could increase or decrease depending on central bank policy and bitcoin supply, which can only increase due to mining activity. Schilling and Uhlig (2019) posit that the rewards given to bitcoin miners cause no real deflation in the realm of bitcoin, rather the fact that such rewards are taxed implies that they cause a parallel decrease in the public supply of US dollars. While cryptocurrencies are usually compared to fiat money, some comparisons are also made with commodities. For example, Selgin (2015) classifies bitcoin as being a 'synthetic commodity money', which carries shared attributes from both the world of commodities (is scarce in supply) and that of fiat money (can be used for day-to-day commerce).

#### 3.2 The relation between cryptocurrencies/blockchain technology and firm value

The cryptocurrency domain is relatively novel and has a great growth potential. Nonetheless, a significant amount of uncertainty surrounds such assets. Naturally, such attributes extend to the firms that have significant investments in either cryptocurrencies or the supporting technology (mining equipment).

With regard to firm value, a company that has significant investments in the cryptocurrency domain can benefit from increased potential capital appreciation. As such, it could have a positive impact on firm value as investors may appreciate this. Further, investments in the cryptocurrency domain can allow firms to diversify their activities and asset portfolios. This is beneficial whenever

<sup>&</sup>lt;sup>28</sup> Volume-per-transaction is defined as the amount of units used per transaction

<sup>&</sup>lt;sup>29</sup> Coin-velocity is a function of the following: 1. Expected coin value (negative relation), 2. The ratio of all

transaction value relative to the total amount of money being circulated within a given time period (positive relation) <sup>30</sup> Expected adoption/supply are two forces that can either cause deflation or inflation

the firm's traditional activities are underperforming. Finally, cryptocurrency investments can increase a firm's value via additional revenue streams, either from mining, verifying, or selling cryptocurrency at a profit.

While the aforementioned discussion on firm value illustrates a positive impact as a result of a firm being vested in the cryptocurrency domain, the impact on firm risk is less desirable. For example, cryptocurrencies are known to be highly volatile in value. Current US accounting standards require firms to recognize cryptocurrency losses upon impairment analyses indicating the need. However, gains are only recognized upon sale. This can be problematic for firms that have otherwise performed well over a given accounting period. Compliance with legal requirements is tantamount, if not more important relative, to a firm's long-term economic performance. In this regard, firms with significant cryptocurrency investments incur compliance costs and face the risk of enforcement actions if they violate either local or national rules regarding cryptocurrencies. In addition to the regulatory risk, cryptocurrency miners, in particular, face the risk of their technology becoming out of date. This can be detrimental in a highly competitive and interconnected landscape where multiple players vie and (at times) cooperate for the forefront. Finally, as with all technology, there is an elevated security risk associated with firms that are vested in the cryptocurrency domain. In particular, at least \$3.5 billion worth of cryptocurrencies have been transferred via hacks of large firms or exchanges (George 2022).

Prior literature provides evidence of both equity markets impacting cryptocurrency indices as well as cryptocurrency indices impacting equity markets (e.g. Kostika and Laopodis 2020; Sami and Abdallah 2021; 2022; Yuyama et al. 2023). Therefore, firms that are vested in cryptocurrencies or mining technologies (hereafter referred to as CMT firms) are expected to have some correlation between their value and cryptocurrency indices. However, Xu, Bouri, and Cepni (2022) provide

25

evidence that, while correlated, valuation jumps are more frequent in the cryptocurrencies, themselves, relative to stock performance CMT firms. In their study, firms that provide or own supporting technology experienced a stronger impact as a result of the cryptocurrency indices valuation jumps. Yen and Wang (2021) find negative value relevance of cryptocurrency disclosures, while the converse is true with regard to disclosures of supporting technology. Nonetheless, while supporting technology is helpful to the cryptocurrency domain, it is yet an industry that faces ethical hurdles in the public perception. For example, firms that are active miners of cryptocurrencies have a performance that is significantly negative relative to the performance of electricity providing firms (Halaburda and Yermack 2023).

#### **Chapter 4: Hypothesis development**

This study examines the market impact of the SEC staff bulletin 121 and President Biden's executive order on responsible development of digital assets. These events are impressive within the, yet, developing domain of cryptocurrencies. The SEC staff bulletin 121 sparked a discussion that, while at times controversial, allowed investors to know the SEC staff interpretations on unclear cryptocurrency subject matter. The executive order by President Biden is the first by any US President dedicated to cryptocurrencies. It is, indeed, an acknowledgement by his office that such digital assets have an established position in today's economy.

#### 4.1 Details on examined news announcements

# Key Event 1: President Biden Executive Order on Ensuring Responsible Development of Digital Assets:

President Biden issued an Executive Order relating to crypto assets on March 9, 2022. In particular, the order aims to promote responsible innovation in the digital asset domain. Such an

aim requires prudence because on the one hand strict regulations promote responsible behavior while such constraints hinder innovation. Therefore, it is important to protect investors while leaving room for the domain to develop. President Biden directs various US agencies, including the SEC, CFTC, and Treasury Department, to recommend regulations for the digital asset domain. Combating illicit activities, such as ransom demands, money laundering, and terror financing, is a priority on the agenda. Building upon this point, President Biden hopes to capitalize on the benefits of digital assets, such as wider financial inclusion, innovation, and standardization<sup>31</sup>. While not engrained legislative law, the aforementioned event is an Executive Order by President Biden that has set momentum, potentially continued by a succeeding president. To this point, there are recent examples where policies have been built upon by succeeding administrations (e.g. Labott 2021; Bader 2022). Therefore, this event is considered to be significant relative to preliminary comments or drafts. Indeed, if these efforts are pursued by Biden and subsequent presidents, they could have a significant impact on the cryptocurrency market.

The action taken by Mr. Biden is considered to be a major development due to the prominence of the executive branch giving digital assets such recognition. The order discusses the market capitalization trajectory that digital assets have taken, at least from November 2016 to November 2021, wherein the market for digital assets grew from nearly \$14 billion to at least \$3 trillion (Biden 2022). While creating a central bank digital currency (CBDC) is not explicitly mentioned in the Executive Order, by asking various federal agencies to assess the risks and benefits of a CBDC, President Biden sets the framework for a potential CBDC in the future, which would enjoy the backing of the US government (Nelson and Macgillivray 2022).

<sup>&</sup>lt;sup>31</sup> For instance, akin to the benefits provided by eXtensible Business Reporting Language (XBRL). International cooperation is needed in this regard.

Beyond a CBDC, most of today's cryptocurrencies are outside governmental control. The United States has been assessing where particular cryptocurrency facets fit into current laws and regulations. However, an October 2022 report by the Financial Stability Oversight Council indicates that the growth in market capitalization and engagement in digital assets can pose a risk to financial systems<sup>32</sup>. These risks need to be countered with appropriate regulation that suits well both the scale and character of the digital assets (Livni 2022). Such regulation would confront crime as well as climate issues that relate to digital assets. By issuing the aforementioned Executive Order, President Biden is working to ensure that the United States remains at the forefront of digital and financial innovation. In addition, it aims to protect investors, global financial stability, and national security. The Executive Order outlined President Biden's policy with regard to a US CBDC, including lowering the cost of international fund transfers in the US dollar, which would, in turn, boost US and international economic growth while maintaining the central position of the United States in the international financial system (Biden 2022). Importantly, the Executive Order asks the relevant agencies (Federal Trade Commission, Consumer Financial Protection Bureau, SEC, and Commodity Futures Trading Commission, among others) to assess the extent to which protectionary measures under their jurisdiction can be applied to counter the risks that are associated with the emergence of digital assets. In certain cases there may be overlap, in which an agency disputes the others' role (DeWaal 2022).

The relevant risks that various digital assets pose are discussed. In particular, the President requests that the relevant agencies review each of the various types of digital assets to assess the risks of each type and how such risks can be addressed, through supervision, regulation adjustment, or new legislation. Chief among these risks, the financing of illicit activities that includes, but is

<sup>&</sup>lt;sup>32</sup> Please see https://home.treasury.gov/system/files/261/FSOC-Digital-Assets-Report-2022.pdf

not limited to, money laundering, terrorism, and corruption. Therefore, the Biden administration considers it vital to implement controls to assist in anti-money laundering and combating the financing of terrorism. Further, this administration recognizes that such controls require international cooperation as well as integration of relevant rules and regulations. The United States is in a prime position to coordinate such international efforts because of the credibility of the US dollar. To this end, stable coins (cryptocurrencies pegged to the US dollar) have posed a significant risk to investors (Browne 2022). This is especially true following the terraUSD coin collapse (Genç and Sandor 2022). While stable coins are absent in President Biden's order, the discussion about a US central bank digital currency addresses such concerns implicitly.

This Executive Order is important for financial markets to have a sense of security that legal authorities preside over digital currency, which is currently a novel and somewhat unchartered domain. While the United States has rigorous financial market regulation, there are areas within the realm of digital assets that remain unclear. By issuing this Executive Order, President Biden is advancing the momentum for global consensus with regard to cryptocurrencies. In turn, he is protecting the United State's competitive position amongst nations that are embracing digital assets. Specifically, the Executive Order directs the relevant agencies to examine the potential digital US dollar. While such a currency form is deemed unnecessary today, it is important that the US is prepared for when CBDCs emerge (Condon and Torres 2022; Shumba 2022).

There were a series of events that led up to President Biden's Executive Order, beginning May 20, 2021, with the US Treasury announcing that it intends to target tax evaders in anticipation of recovering \$700 billion. Until August 2021, the noteworthy, related events are exclusively preliminary steps or comments. However, on August 5, 2021, the initial proposal by the US

Treasury is included in the \$1 trillion bipartisan infrastructure bill (Ackerman and Kiernan 2021). An attempt to modify this section failed on August 9, 2021 (Stein 2021). Following this, on October 1, 2021, the Biden administration began to consider imposing 'bank-like' regulations on the digital assets domain (Ackerman and Andriotis 2021). In addition, on October 15, 2021, the US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions (Tokar 2021). The Executive Order was issued on March 9, 2022, however, the news was made public at least one day earlier (Newmyer 2022a). Following the order's issuance, on May 18, 2022, Brian Shroder, the head of Binance US, commented on the TerraUSD stablecoin collapse, which had occurred a week prior between May 7 and May 12. In Mr. Shroder's opinion, the aforementioned collapse of Terra USD would accelerate President Biden's push to regulate so called stablecoins to ensure that such coins have a reliable and consistent relationship with the US dollar (Osipovich 2022). Approximately two months subsequently, on July 19, 2022, the United States disrupted a plot by North Korean hackers to collect ransom payments from hospitals. This included the recovery of \$500,000 in cryptocurrency ransom payments. This contrasts with the typical pressing of charges. Such a, proactive and strategic, move by the Biden administration aims to thwart malicious activity from a novel angle (Volz 2022). The following day, on July 20, 2022, it was announced that US lawmakers had made significant progress toward agreeing on the appropriate regulations concerning stablecoins. This is considered the first major step towards a stricter environment for this domain (Ackerman and Kiernan 2022).

[Insert Appendix A Table 1 here]

#### Key Event 2: SEC Staff Accounting Bulletin No. 121:

On March 24, 2022, the SEC staff accounting bulletin number 121 (SAB 121) was released. According to SEC Acting Chief Accountant Paul Munter, the bulletin, which views digital assets as securities from a legal perspective, targets custodians that have a fiduciary responsibility to their clients (Ho 2022). This is in contrast to the accounting treatment, under FASB Topic 350 (Intangibles), used by digital asset owners. While not standard setting or rule making, the bulletin set forth the SEC's staff position with regard to the correct accounting treatment of crypto-assets as well as practices that should be in place to protect investors (Ho 2022). These practices include the issuer disclosing the following (Muir 2022):

- 1. A general description on how they safeguard crypto-assets under their custody on behalf of their clients,
- 2. A description of each significant digital asset they own on behalf of a client and how they protect themselves and their client regarding the risks associated with owning such an asset,
- 3. The relevant fair market value assessments in accordance with FASB Accounting Standards Codification 820,
- 4. The department or personnel accounting for and holding the cryptographic keys that relate to the clients' digital assets,
- 5. Significant contingencies that are associated with custodianship of digital assets on behalf of their clients.

SAB 121 applies to financial reports prepared under US Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS). Digital assets pose many risks including those that are technological, legal, or regulatory in nature ("SEC Staff Accounting Bulletin No. 121" 2022). The bulletin, which recommends additional disclosures by investment intermediaries, is timely and necessary due to the novel and unique nature of this intangible asset class. However, the SEC Commissioner, Hester Peirce, has voiced criticism of the process as being "scattershot and inefficient" (Peirce 2022). In particular, Commissioner Peirce has expressed frustration regarding the lack of consultation, of relevant parties, prior to the issuance SAB 121. Furthermore, others have argued that such guidance should exclude banks and traditional financial institutions for the following two reasons: first, such guidance could hinder innovation within institutions that have, over the course of time, been pioneers of monumental breakthroughs within the realm of financial technology and second, a plethora of mandated safeguards already exist to ensure the wellbeing of such institutions and their clients (Zhang, Zambrowicz, and McDowell 2022).

While imperfect, the SEC staff bulletin 121 is in demand and necessary for investors and digital asset custodians who seek clarity on pressing accounting matters. SEC Acting Chief Accountant, Paul Munter, has commented on the bulletin and stated that while it is not an SEC rule, it fits well with past SEC staff bulletins that have provided the public with the SEC's position on applying GAAP in an emerging and unchartered area (Ho 2022).

The SEC continues to be a leading force in the protection of investors and market integrity. In the cryptocurrency domain, specifically, there is growing concern that the space could be used to commit fraud or facilitate illicit activity. Initial coin offerings (ICO) are an area where the SEC feels authority to act. This is due to the overlap between such crypto coins and stock offerings. In the eyes of the SEC, ICOs must be properly registered. To this end, there have been multiple instances where the SEC has pursued and enforced the relevant regulations. In addition to this, the SEC remains central with regard to the dialogue on guidance in the digital asset space.

From December 2017 to March 2022, at least 10 news articles from either the Wall Street Journal or Washington Post have discussed either the SEC or its leadership voicing their opinions on digital asset issues. On December 11, 2017, the SEC Chair, Jay Clayton, cautioned investors regarding the rush to cryptocurrencies, which the commission does not regulate (Michaels 2017). On February 6, 2018, both the SEC and CFTC top officials (Jay Clayton and J. Christopher Giancarlo, respectively) considered the legal authority they had over digital assets to be insufficient (Fung 2018a). A month later, on March 7, 2018, the SEC warned cryptocurrency exchanges that they need to comply with disclosure requirements regarding the exchange's policy for listing a token as well as the policy for prioritizing clients' orders (Michaels 2018a). On June 14, 2018, the SEC Corporation Finance Director, William Hinman, stated that he believed that bitcoin and ether do not meet the criteria to be classified as securities (Fung 2018b). This effectively means that the SEC does not have jurisdiction over the two decentralized currencies, which are not used to fund any particular firm (Michaels 2018b). Approximately one year subsequently on June 19, 2019, SEC chair, Jay Clayton, addressed the demand for guidance on start-ups raising funds with digital tokens. He warned such firms that they need to follow SEC rules for these transactions (Michaels and Osipovich 2019). Subsequently, in mid-November 2019, it was noted that a significant portion of the relevant startup firms had missed their disclosure deadline (Michaels 2019). In late 2020, the SEC took a startup, Ripple, to court over violation of security laws. The outcome is likely to establish a precedent for future such cases (Vigna 2021). During a Senate Hearing on September 14, 2021, SEC chairman Gary Gensler argued that the majority of digital assets meet the standard to be classified as securities and therefore, should register with the SEC (Newmyer 2021). In the same Senate Hearing, Mr. Gensler reminded the audience that investors are seeking guidance and would appreciate additional disclosures from firms that deal with digital assets (Kiernan 2021).

Following SEC Staff Accounting Bulletin No. 121, on July 21, 2022, Coinbase directors were charged with insider trading (in a manner akin to firm equity trading) in large part due to the SEC's input that the Coinbase tokens meet the criteria to be classified as securities (Newmyer 2022b).

[Insert Appendix A Table 2 here]

#### 4.2 Hypotheses

In this study, I examine the impact that regulation related news announcements have on firms that are vested<sup>33</sup> in the cryptocurrency domain. To begin, I consider firms that have invested in cryptocurrencies. In many cases, such an investment can occur as a store of value, method to diversify against risk or even an instrument of speculation. Furthermore, I look at firms that have been engaged in the provision of technology required for cryptocurrencies to operate. Firms that focus on crypto mining<sup>34</sup> are of particular interest. Recent developments in technological protocols include multiple cryptocurrencies' (such as Ethereum) move from the proof-of-work to proof-of-stake mining safeguard. Nonetheless, within this subject, there remain multiple areas of concern.<sup>35</sup> When considering such varied concerns, financial regulation can have quite a broad scope and motivation.

The recent emergence of cryptocurrencies, while fluctuating in pace, has not relented overall. Such movements can have positive impacts on accounting and financial reporting. In

<sup>&</sup>lt;sup>33</sup> Vested firms have a financial statement line item either indicating an investment in cryptocurrency or the supporting mining technology

<sup>&</sup>lt;sup>34</sup> More detail, refer to: https://www.investopedia.com/tech/how-does-bitcoin-mining-work/

<sup>&</sup>lt;sup>35</sup> Including: https://cointelegraph.com/learn/five-major-challenges-in-the-blockchain-industry

particular, digitization is associated with reduced information asymmetry between firms' and investors via less earnings management and higher accruals quality (Fang, Yu, and Xu 2022). Furthermore, it is not uncommon for investors to demand that their diversified portfolios contain at least some cryptocurrencies. This trajectory has led to much guidance being published by the Big 4 accounting firms<sup>36</sup>. However, while helpful, such guidance does not stem from legal authority.

On the one hand, additional guidance has been demanded by market participants, financial reporters, as well as auditors. Such guidance could help firms to be more efficient for the following reasons. Due to the emerging nature of cryptocurrencies and the related technologies, this domain has 'blackbox' characteristics. Furthermore, the energy consumption associated with such operations is regularly under the limelight (e.g. Kamiya 2019; Huestis 2023). Without regulation, the flaws of such technologies may be slow to remediate and therefore, harm trust in businesses that rely on the digital technologies (Caldarelli 2020). In general, investors have reason to consider this area to be inherently risky. Under more rigorous guidance, a firm would know what its disclosure obligations are and less likely to clash with authorities on CMT issues. Investors would sense less risk from CMT firms because legal guidance or rules stem from official authorities, as opposed to accounting firms. In addition, such legal guidance could aid auditors who may consider CMT to be unfamiliar and therefore, risky (Vincent and Wilkins 2020; Pimentel et al. 2021).

On the other hand, however, it is possible that market participants perceive additional oversight as being governmental overreach, which constrains a firm's ability to improve its operations. Over regulating is regularly cited as a hurdle confronting businesses (e.g. Feulner

<sup>&</sup>lt;sup>36</sup> The Big 4 being, PricewaterhouseCoopers (PwC), Ernst & Young (EY), Deloitte, and KPMG.

2012). At a minimum, new guidance adds compliance costs and a level of uncertainty to firms and auditors, who would need time adjust. If this is the case, investors and portfolio managers would be cautious regarding investments in CMT firms. Therefore, such firms would be negatively impacted.

A growing number of studies examine the impact of firms' disclosure of involvement in CMT, which are, yet, an emerging market (Stratopoulos, Wang, and Ye 2022). In such an environment, investors distinguish between what they consider to be a credible investment relative to that which is not perceived to fit a firm's character (Chen, Cheng, and Luo 2023; Ali et al. 2023). In this context, the role of media is significant to supplement mandatory disclosures. For example, Eshghi, Shahriari, and Stivers (2021) find that significant stock returns only occur when the firm's filing is coupled with a media release that is in agreement with the mandatory filing. To discern the informational value of news articles (on average announcing 93 days prior) relative to 8-Ks, Autore, Clarke, and Jiang (2021) conducted separate analyses on the two dates for each of 29 firms. They find a significantly stronger share price reaction for the news article announcement date relative to 8-Ks conveying that information about digital technology implementation. Further, Coulter (2022) finds news articles containing relevant discourse as having a significant impact on the Bitcoin market. Such results speak to the importance of news articles, even in situations where mandated financial reports are available to the investing public.

Since at least 2014, major firms, such as Overstock.com, have either been accepting or investing in cryptocurrencies.<sup>37</sup> While this can be applauded as innovative and adaptive policy, it also carries risk, which includes non-compliance and accounting losses due to the volatile nature

<sup>&</sup>lt;sup>37</sup>For more detail, please refer to: https://investors.overstock.com/news-releases/news-release-details/overstockcom-first-online-retailer-accept-bitcoin
of the cryptocurrency market. For example, there have been multiple SEC enforcements against parties that do not comply with regulations. These enforcements are unfortunate and may stem from the following reasons. First, there is a perception that cryptocurrencies belong to an 'unchartered territory', where governmental agencies play a (relatively) diminished role in comparison to tech savvy firms who should impact the cryptocurrency market direction. Second, the lack of cryptocurrency specific rules and regulations has led many of the firms vested in cryptocurrency to take heed of advice from 'horizontal' sources, such as cryptocurrency investors or large accounting firms. While such advice can be of high quality and (at some point) actually impact the official regulation, conflicting points may overwhelm decision makers. Finally, the cryptocurrency market is attractive to multiple parties. Without specific guidance and regulation, it is especially attractive to speculators and bad actors who enjoy risky behavior. All in all, guidance or regulation from officials could alleviate the problems associated with the aforementioned points.

Governing bodies often provide a haven of assurance to investors. A supportive regulatory environment allows cryptocurrencies to be integrated into the financial system. Such integration would reduce the number of financial crimes that are facilitated by cryptocurrencies (Trozze et al. 2022). It could also stabilize the market, which is currently characterized by volatility (Fidrmuc, Kapounek, and Junge 2020; Zhang et al. 2020). Such volatility has hindered adoption and caused serious dips in market capitalization (Chiu and Koeppl 2022). Overall, integrative regulations can reduce the perceived risk, which is commonly associated with the cryptocurrency market. Based on the aforementioned discussion, I pose the following directional hypotheses in alternate form.

Hypothesis 1a: CMT regulatory events lead to a decrease in the perceived risk of firms vested in cryptocurrencies.

# Hypothesis 1b: CMT regulatory events lead to a decrease in the perceived risk of firms vested in cryptocurrency enabling technology.

Regulation that provides clarity to stakeholders reduces the amount of uncertainty that each party confronts when approaching a potential investment. This includes firms' and shareholders', resource allocation, among other stakeholders. More specifically, clarity in the form of regulations assures firms that the cryptocurrency domain has an authoritative umbrella being formed. In this scenario, firms are more likely to enter or expand their presence within the cryptocurrency domain. The additional clarity could allow firms to do so with less legal risk and fewer related costs. Likewise, investors would have a greater degree of confidence with regard to firms that are significantly involved in the cryptocurrency domain (Li, Pincus, and Rego 2008). A lowered cost of equity financing is a primary way that investors channel their confidence in high-quality stable firms (Porta et al. 1997). Based on the aforementioned discussion, the following hypotheses are posed in alternate form.

Hypothesis 1c: CMT regulatory events lead to an increase in the market capitalization of firms vested in cryptocurrencies.

Hypothesis 1d: CMT regulatory events lead to an increase in the market capitalization of firms vested in cryptocurrency enabling technology.

While regulation is necessary to protect against moral hazards, it cannot be perfect and therefore, may be disproportionate relative to an issue at hand (Polinsky and Shavell 1979). Information asymmetry is at the center of such a Pareto-optimality where the benefits must come at some cost (Harris and Raviv 1979; Christensen, Nikolaev, and Wittenberg-Moerman 2016). In the case of cryptocurrency regulations, the regulatory authority may not have, ex-ante, complete

information about the market conditions; furthermore, the market participants, ex-post, may not be informed of their compliance obligations. The lack of information from either end is burdensome and costly. Nonetheless, transparency and flexibility can greatly alleviate concerns and therefore, the economic costs borne (Holmström 1979; Laffont and Tirole 1986). A vital question at hand regards the public perception of cryptocurrency related regulation.

Regulatory events that concern cryptocurrencies, may be unwelcomed and have negative connotations if investors perceive them as a blow against the strengths of cryptocurrencies and therefore, a dilution of their identity (e.g. Randewich 2013; Wolf 2021). This identity is characterized by decentralization, anonymity, accessibility as well as no affiliation with governmental authorities. In addition, cryptocurrency specific regulations could be considered a step towards a central bank digital currency (CBDC), which would compete with the current cryptocurrencies. As the name implies, a CBDC would be managed by the Federal Reserve. Anonymity would be very unlikely in this scenario. Finally, accessibility could be negatively impacted in terms of who would be eligible to partake in such a system. If such a perception dominates, it is expected that investors would approach the domain with greater caution and therefore, invest less in firms that are actively engaged in the cryptocurrency market. If so, the market would have a greater proportion of risky investors, who enjoy speculation. Based on the aforementioned discussion, I pose the following directional hypotheses in alternate form.

Hypothesis 2a: CMT regulatory events lead to an increase in the perceived risk of firms vested in cryptocurrencies.

Hypothesis 2b: CMT regulatory events lead to an increase in the perceived risk of firms vested in cryptocurrency enabling technology.

Indeed, there are multiple domains, including cryptocurrencies, that are naturally risky. Such risk is generally rewarded with a greater return to investors (Sharpe 1964; Fama and MacBeth 1973). Nonetheless, it is important to distinguish between sudden external risk shocks, relative to the risk that is inherently associated with a particular domain or activity. An inherent risk is factored in before and during a firm conducting its activities, while a sudden shock must be accommodated in an ad hoc manner. This could include changes in strategies and allocation of resources. More specifically, in response to the elevated risk posed by novel regulation, CMT firms may become less or totally disassociated with cryptocurrencies. It is expected that, in this scenario, such firms become less innovative and have fewer growth prospects. Therefore, investor confidence in these firms could decrease and such firms experience a decrease in their market capitalization (e.g. Hall 1999; Toivanen, Stoneman, and Bosworth 2002; Coad and Rao 2006).

# Hypothesis 2c: CMT regulatory events lead to a decrease in the market capitalization of firms vested in cryptocurrencies.

# Hypothesis 2d: CMT regulatory events lead to a decrease in the market capitalization of firms vested in cryptocurrency enabling technology.

While mining technology is fundamental to the operation and success of cryptocurrencies, such technology exists in its own right. The firms that provide crypto mining services or technology are able to apply their tacit knowledge in other areas. The experience they gain from one application can build upon what is required for another development. Therefore, it is important to stratify among firms that signal investments in cryptocurrency, the supporting technology, or both.

Dyer, Roulstone, and Van Buskirk (2022) find that similarity in disclosure choices can predict stock co-movement among firms. This implies that investors value the information dissemination choices of a firm when they make investment decisions. Kakinuma (2022) distinguishes between direct and indirect investment announcements and provides evidence that firms' cryptocurrency investments give way to positive abnormal returns. However, the result is stronger when there is a direct cryptocurrency investment, as opposed to using a proxy. Nonetheless, Yen and Wang (2021) find that while disclosures about either technological or cryptocurrency involvement have value relevance, they behave in opposite manners. Whereas the technological involvement has positive value relevance, that regarding bitcoin has a negative impact. The aforementioned results give way to a research question. Namely, are cryptocurrencies investments valued, primarily, for their technology?

Research Question: In response to CMT regulatory events, do firm value and risk measures differ between cryptocurrency and supporting technological investments?

#### **Chapter 5: Research Design**

#### 5.1 Sample

The sample firms for this study are derived from the array of publicly traded companies that carry investments in either cryptocurrency, the supporting technology, or both.<sup>38</sup> I begin with 35 firms. However, firms that are not traded in the United States or are over-the-counter stocks are removed. This leaves 20 firms in the sample. A detailed listing of such firms can be found in Table 1 of Appendix C. The majority of the firms are based in North America (11 in the United States and four in Canada). Furthermore, the majority of the firms are cryptocurrency miners (nine firms), while seven firms are holders of cryptocurrencies, and four firms are engaged in both owning cryptocurrencies and mining services.

Applying the Fama and French (1993) 3 factor model, I use WRDS Beta Suite to get daily excess returns and idiosyncratic volatility over an estimation window of two years (504 trading days) prior to the observation. The Fama and French (1993) factors are essential to consider for the following reasons. First, by measuring firms' sensitivity to market movements, the market factor captures the exposure that firms have to systematic risks. This is important because the correlation strength between cryptocurrencies and market wide movements is still debated (Zhang 2023). Second, the size factor captures any risk premium that is associated with investment in emerging firms. This is highly relevant in the context of the sample firms because they are of a wide range with regard to their market capitalization. Finally, the value factor gives a picture of a

<sup>&</sup>lt;sup>38</sup> Coingecko.com tracks firms that hold crypto assets. A further online search retrieved 14 firms that conduct crypto mining activities.

firm's performance relative to the overall market. My sample spans the period of January 1, 2021, to December 31, 2022. There is a total of 7,587 firm-day observations derived from 20 firms.

#### [Insert Appendix C Table 1 here]

#### 5.2 Model

To empirically test the predictions outlined in the previous chapter, I conduct an event study that centers on the date of the news announcement.<sup>39</sup> I examine firms' returns over the three (-1,+1) and five (-2,+2) day windows surrounding the news announcement date. Furthermore, I pay special attention to President Biden's Executive Order on Ensuring Responsible Development of Digital Assets (March 9, 2022). I calculate the cumulative abnormal returns from March 9, 2022 to December 31, 2022.

The Fama and French (1993) three-factor model is described in equation 1, where E(Ri) represents the expected return, *Rf* the risk free rate of return, *MKTF* the market factor, *SMB* the size factor, and *HML* the value factor.

$$E(Ri) - Rf = \alpha + \beta_1 * MKTF + \beta_2 * SMB + \beta_3 * HML + error$$
(1)

The variables from the aforementioned model allow for calculation of expected changes in firm value and share price volatility. In particular, the model allows for a metric to compare against when assessing abnormal returns and volatility surrounding a relevant news event.

I pose two hypotheses in alternate form and a related research question that is examined simultaneously. For each of my hypotheses, I have four sections, A and B relate to firm risk while

<sup>&</sup>lt;sup>39</sup> A complete listing of such events can be found in Appendix A

sections C and D relate to market capitalization. The following model is used to calculate the cumulative abnormal returns.

$$CARi = \sum ARi$$
 (2)

With regard to firm specific risk measurement (idiosyncratic return volatility), I use the WRDS Beta Suite to compute a daily estimate based on a two-year window. I then use this estimate for each news announcement date ('t') to compare it against the figures for both the five-days prior and subsequent to date 't'.

#### **Chapter 6: Empirical results and analyses**

This chapter outlines and discusses the summary statistics and empirical results based on the methodology of the previous chapter. Appendix C contains the tables that are discussed in this chapter's subsections. To begin, Table 2 shows the descriptive statistics for the whole sample, as well as for the two (holding and mining) categories of sample firms. In Table 3, I discuss the cumulative abnormal returns over the three (-1,+1) and five (-2,+2) days surrounding the regulatory news announcements. In Table 4, I outline the long term cumulative abnormal returns following March 9, 2022, when President Biden's executive order was in place for the first time. Finally, Table 5 presents the idiosyncratic volatility on the news announcement days, in comparison with five days before and after each date.

#### 6.1 Descriptive statistics

In 2021, the sample firms have a total asset average of \$5.75 billion. The following year witnessed significant growth in total assets for the sample firms. At March 31, 2022, the sample firms' total asset average was at \$6.76 billion and reached a peak of \$13.21 billion by September 30, 2022. When examining, the two categories that comprise the aforementioned sample, it is noted

that the mining firms have a significantly smaller total asset figure (a maximum of \$438 million on June 30, 2022), while holding firms have a significantly higher total asset figure (a minimum of \$13 billion). This is logical, considering that mining firms are less diversified in comparison to the firms that are engaged in the cryptocurrency market only by holding.<sup>40</sup> The same figure differential is seen with regard to the sample's revenue figures. However, there is an interesting discrepancy in the growth revenue over the sample period. Holding firms experience an overall growth in revenue throughout the sample period, while the mining firms only experience reliable revenue growth in 2021 and experience a significant drop in Quarter 1 of 2022 (from \$71 million on December 31, 2021 to \$43 million on March 31, 2022). Net income figures are positive for holding firms for all quarters except Q2 2022 (-\$33 million). Mining firms experienced negative net income throughout 2022. Finally, research and development (R&D) intensity, a scaled measure (R&D divided by revenue), shows a significant discrepancy between the holding and mining firms. In particular, the mining firms have 72% less R&D intensity relative to the sample as a whole, while their holding counterparts have 147% more R&D intensity relative to the sample as a whole.

[Insert Appendix C Table 2 here]

<sup>&</sup>lt;sup>40</sup> For example, Tesla (holder of cryptocurrency) is engaged in provision of satellite internet, space exploration and car manufacturing.

# 6.2.1 H1a and H1b: The favorable impact that regulatory news announcements related to cryptocurrencies have on risk levels for firms engaged in the cryptocurrency industry.

Hypothesis 1 (a and b) predicts that regulatory news announcements related to cryptocurrencies decrease the risk levels associated with the firms engaged in the cryptocurrency industry. Table 5 provides the details on idiosyncratic return volatility. On March 8, 2022, President Biden issued an Executive Order on Ensuring Responsible Development of Digital Assets. The idiosyncratic risk associated with the sample is between 0.0624 and 0.0625 for March 8, 2022, as well as the five preceding dates. However, a declining trend is noted for the five days subsequent to the executive order signing. This behavior is paralleled in the sub-sample comprised of firms that only mine cryptocurrencies. No significant differences are noted in the holder or dual activity firms. SEC Staff Accounting Bulletin # 121 exhibits risk level impacts similar to those of the aforementioned event. Specifically, the idiosyncratic volatility had an average of 0.0615 in the five days prior to March 24, 2022. However, the sample's idiosyncratic risk dropped to 0.0604 on the event date and continued to trend downwards over the subsequent five days. This pattern is paralleled in the subsample comprised of firms that only mine cryptocurrency. Hypothesis 1 (a and b) is supported by behavior surrounding the major news announcements on March 9, 2022 and March 24, 2022 from the Biden administration and the SEC, respectively.

[Insert Appendix C Table 3 here]

# 6.2.2 H1c and H1d: The favorable impact that regulatory news announcements related to cryptocurrencies have on market capitalization for firms engaged in the cryptocurrency industry.

Hypothesis 1 (c and d) predicts that regulatory news announcements related to cryptocurrencies increase the market capitalization of firms engaged in the cryptocurrency industry. Table 3 provides the results on CAR. On a whole sample level, this is the case for multiple news announcements. An interesting pattern is noted with regard to discussions on stablecoins, which have posed significant risks to investors (Browne 2022). Stablecoins purport to be a digital currency associated with a fiat currency, such as the US dollar. However, the peg is often unsustainable, as seen with terraUSD (Genc and Sandor 2022). With regard to results, there is a positive CAR for either the three or five day windows surrounding each of the three news announcements discussing the regulation of stablecoins. More specifically, on October 1, 2021, multiple news sources, including the Wall Street Journal, announced that the "Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins". This announcement is associated with a positive CAR for the five-day window surrounding October 1, 2021. This is true in both the whole sample  $(0.074^{**})$  and the sub-sample of firms that only mine cryptocurrency  $(0.110^{**})$ . A potential explanation for this behavior is that mining firms are more likely to be impacted by changes in demand for stablecoins, as firms only engaged in holding generally opt for traditional cryptocurrencies, that are not pegged or supported by other currencies. On May 18, 2022, the head of the US branch of Binance stated that recent events may accelerate the Biden administration's effort to regulate stablecoins. This announcement is associated with a positive CAR (0.075\*\*\*) in the three-day window surrounding May 18, 2022. This result is generally in line with that of the news release of October 1, 2021. In fact, it is even stronger, indicating a credibility

factor at play; considering that Binance is the world's largest cryptocurrency exchange and the firm's leadership is at an intimate proximity to the industry (Wilson and Lang 2023). Following this, on July 20, 2022, the Wall Street Journal published an article titled "Lawmakers Near Deal on Tougher Rules for Stablecoins". The CAR surrounding this news parallels the two previous news announcements concerning the regulation of stablecoins. In particular, the five-day window surrounding July 20, 2022 has a CAR of 0.059\*\*.

On August 5, 2021, the Washington Post published an article titled "Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill". It entailed the debate about the blockage that had occurred as lawmakers disagreed about increased federal regulation of the cryptocurrency industry. At the date of publication, the article indicates that the current version of the bill would be deferred and the subsequent passage would accommodate concerns the cryptocurrency industry had. The results (0.100\*\* and 0.122\*\*\* over the three- and five-day windows, respectively) indicate that investors noted and factored this positive news in their decisions.

On October 15, 2021, the US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions. The aforementioned announcement relates to helping the digital asset domain comply with rules that apply to the market at large. This announcement is associated with a positive CAR for the three- and five-day windows surrounding the announcement (0.075\*\* and 0.103\*\*\*). The aforementioned result is paralleled in both the miner and dual activity sub-samples. However, the result is insignificant in the holder sub-sample. It is possible that this news did not significantly impact the holder sub-sample because they are not the main audience for these guidelines,

as holding firms are more likely to be active in other sectors beyond cryptocurrency. As such, they may already understand their compliance obligations prior to these guidelines.

On March 9, 2022, President Biden signed an Executive Order on 'Ensuring Responsible Development of Digital Assets'. Surprisingly, this date is associated with a significant CAR only within the dual activity sub-sample (0.038\*\* and 0.035\*\* for the three- and five-day windows, respectively).

Finally, the SEC Staff Accounting Bulletin #121 was made public on March 24, 2022. This provided the market with much needed and demanded guidance. It was received positively by investors, with a CAR of 0.034\*\* and 0.095\*\*\* in the three- and five day (respective) windows surrounding March 24, 2022. Hypothesis 1 (c and d) is supported, especially in areas by the US Treasury, the SEC, and leadership of cryptocurrency brokers. There is also strong and consistent support for H1 (c and d) in the area of stablecoin regulation.

[Insert Appendix C Table 4 here]

# 6.2.3 H2a and H2b: The unfavorable impact that regulatory news announcements related to cryptocurrencies have on risk levels for firms engaged in the cryptocurrency industry.

Hypothesis 2 (a and b) predicts that regulatory news announcements related to cryptocurrencies increase the risk levels associated with the firms engaged in the cryptocurrency industry. Table 5 provides the details on idiosyncratic return volatility. On May 18, 2022, the head of the US branch of Binance stated that recent events may accelerate the Biden administration's effort to regulate stablecoins. This event is associated with an increase in the idiosyncratic volatility for the five days subsequent to the comments

becoming public. More specifically, the idiosyncratic volatility was on a downward trend (from 0.0590 to 0.0588) in the five days preceding the news of the comments. However, the figure jumped to 0.0594 on May 19, 2022. A similar pattern is noted for the days surrounding Commissioner Hester M. Peirce responding to SAB #121 on March 31, 2022. For both aforementioned events, the patterns are paralleled in the subset of firms that only engage in mining cryptocurrencies. H2 (a and b) is partially supported.

[Insert Appendix C Table 5 here]

# 6.2.4 H2c and H2d: The unfavorable impact that regulatory news announcements related to cryptocurrencies have on market capitalization for firms engaged in the cryptocurrency industry.

Hypothesis 2 (c and d) predicts that regulatory news announcements related to cryptocurrencies decrease the market capitalization of firms engaged in the cryptocurrency industry. On a whole sample level, the following regulatory news announcements had negative cumulative abnormal returns (CAR) in the short-term event window surrounding date 't'. 1. On May 20, 2021, Washington Post: "Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion". As tabulated in Table 3A, this announcement is associated with a negative CAR of -0.080\*\* in the three-day window surrounding the news date. This result is only paralleled in the sub-sample of firms that are engaged in both holding and mining cryptocurrency. 2. On March 31, 2022, SEC Commissioner Hester M. Peirce gave her response to SAB #121. The response was, in many respects, critical of SAB #121 (Peirce 2022). The CAR for the five-day window surrounding the press-release loads significantly negative (-0.080\*\*\*).

It is important to consider potential explanations as to why the aforementioned news announcements are associated with significantly negative CARs. The first news

announcement is from the US Treasury regarding confronting tax cheats. Such an announcement potentially signals that cryptocurrency anonymity may be targeted. While facing multiple hurdles, by being posed by the US Treasury, the announcement is stemming from a broad authority over financial institutions. This broad authority regularly coordinates with other regulatory bodies, such as the SEC and US Federal Reserve. The second news announcement relates to the SEC, which had recently (on March 24, 2022) provided much needed and demanded guidance on cryptocurrency related topics. The guidance provided by the SEC Staff Bulletin #121 on March 24, 2022 is associated with a significantly positive CAR surrounding the date. Therefore, given the criticism from within SEC, the significantly negative CAR surrounding March 31, 2022 is not surprising. In general, Hypothesis 2 (c and d) is supported in situations where a prominent regulatory body, such as the US Treasury or SEC, is critical of the cryptocurrency industry's direction or its status quo. The March 9, 2022 Executive Order by President Biden is associated with a long-term (measured until December 31, 2022) negative impact on the sample's CAR (-1.30\*\*\*).

#### 6.3 Conclusion

To the best of my knowledge, this is the first study that has examined how the market reacts to such news about cryptocurrency regulation. It should be of interest to investors, regulators, and media professionals.

The cryptocurrency industry is yet emerging and is currently attracting the attention of major investors. The market for this digital asset has long been compared to the 'Wild West'. However, thanks to greater attention by regulators, this perception is beginning to change (Van

Boom 2022). Therefore, it is important to understand how regulations impact the firms that are highly vested in this industry.

In this study, I examined the impact of regulatory news announcements on both the cumulative abnormal returns and idiosyncratic volatility of firms that are significantly involved in the cryptocurrency market. I found that, depending on the context, regulatory news announcements related to cryptocurrencies can have either favorable or unfavorable impacts on the market capitalization and risk perception of firms that are highly involved in the cryptocurrency industry.

This study has provided three major contributions. First, it has expanded the literature on accounting for intangible assets; specifically examining the emerging field of cryptocurrencies. Accounting for any intangible asset is a challenging task (Monga 2016). However, given the growing weight that cryptocurrencies hold on firms' financial statements, the continued improvement of such accounting practices is crucial to the relevance of accounting data (Heitman 2016). Cryptocurrencies pose a unique challenge in that they do not exactly fit in the current regulatory framework that oversees the accounting for intangible assets. Therefore, there is a growing focus on the creation of an accounting framework tailored to the character of cryptocurrencies (Matsuo 2022). Second, this study has contributed to the literature on financial markets' reaction to media reports. This is vital to understand in the context of emerging technology, especially with regard to cryptocurrencies. Third, this study also has provided a notable practical contribution to regulatory bodies and lawmakers, who should be interested in better understanding how their comments and decisions impact investors' behavior regarding the industries in question.

While this study has provided noteworthy evidence regarding the market impact of regulatory news announcements, the following limitations exist. First, the sample size (20 firms)

is smaller than that of most studies in this domain. Second, given the rapid developments in this area, the results of this study may not hold over future timeframes. Third, it is possible that other value relevant events drive results. This is a particular concern for large firms, which conduct a variety of business activities and have multiple segments. It is my hope that future researchers are able to conduct further analyses on this topic with a larger set of firms and over a longer sample period.

# Appendix A: News Events examined

Event	Date
Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion	May 20, 2021
U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill	August 5, 2021
The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins	October 1, 2021
US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions	October 15, 2021
President Biden Executive Order on Ensuring Responsible Development of Digital Assets	March 9, 2022
The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the Biden administration's efforts to regulate stablecoins	May 18, 2022
U.S. News: Lawmakers Move Closer to a Deal On Tougher Rules for Stablecoins	July 20, 2022

# Table 1 - President Biden Executive Order on Digital Assets

# Table 2 - SEC Staff Accounting Bulletin No. 121

Event	Date
Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	September 14, 2021
SEC Staff Accounting Bulletin No. 121	March 24, 2022
Commissioner Hester M. Peirce responds to SAB #121	March 31, 2022

#	Variable	Definition
1	Rf	Risk free rate of return
2	MKTF	Market Factor: (E(Rm) - Rf)
3	SMB	Size factor
4	HML	Value factor
5	E(Ri)	Expected return
6	AR	Abnormal return
7	CAR	Cumulative abnormal return

# Appendix B: Variable definitions

# **Appendix C: Tables**

# Table 1: Sample Description

		Coverage Period					
#	Company	Holder or Miner	Obs.	Begin	End	Country	
1	MicroStrategy Inc.	Holder	503	01-04-21	12-30-22	United States	
2	Tesla	Holder	503	01-04-21	12-30-22	United States	
3	Square Inc.	Holder	503	01-04-21	12-30-22	United States	
4	Marathon Patent Group	Both	503	01-04-21	12-30-22	United States	
5	Hut 8 Mining Corp	Both	265	12-13-21	12-30-22	Canada	
6	Coinbase	Holder	308	10-12-21	12-30-22	United States	
7	Riot Blockchain, Inc.	Both	503	01-04-21	12-30-22	United States	
8	Argo Blockchain PLC	Holder	195	03-24-22	12-30-22	United Kingdom	
9	Hive Blockchain	Both	253	12-30-21	12-30-22	Canada	
10	Metromile	Holder	316	04-27-21	07-27-22	United States	
11	Mogo Inc.	Holder	503	01-04-21	12-30-22	Canada	
12	Bitfarms	Miner	261	12-17-21	12-30-22	Canada	
13	Bit Digital	Miner	503	01-04-21	12-30-22	United Kingdom	
14	Canaan Creative	Miner	503	01-04-21	12-30-22	Singapore	
15	CleanSpark Inc	Miner	503	01-04-21	12-30-22	United States	
16	Greenidge Generation Hldg	Miner	201	03-16-22	12-30-22	United States	
17	Ebang International Holdings Inc	Miner	503	01-04-21	12-30-22	China	
18	Ikonics corporation/TeraWulf, Inc.	Miner	264	12-14-21	12-30-22	United States	
19	Iris Energy	Miner	156	05-19-22	12-30-22	Australia	
20	Cipher Mining	Miner	338	08-30-21	12-30-22	United States	

Total

7,587

# Table 2: Descriptive Statistics (Averages)

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Total assets (millions)	5,331.33	6,096.77	5,499.65	6,049.67	6,761.91	11,856.90	13,209.58	11,797.34
Revenue (millions)	929.57	1,024.31	1,034.82	1,403.96	1,296.29	1,269.82	1,500.90	1,670.97
Net income (millions)	63.76	135.70	108.06	156.67	107.15	-56.41	134.98	74.61
Operating margin	-0.53	0.00	-0.19	-3.85	-3.22	-1.64	-1.77	-1.27
R&D intensity	0.07	0.04	0.05	0.04	0.06	0.07	0.08	0.10

# Table 2A: Whole sample (20 firms)

#### Table 2B: Firms that only mine cryptocurrency (Nine firms)

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Total assets (millions)	139.26	230.51	284.61	393.81	440.93	437.70	414.94	382.34
Diff. from whole sample	-97%	-96%	-95%	-93%	-93%	-96%	-97%	-97%
Revenue (millions)	19.01	32.65	39.13	70.68	42.59	48.29	25.97	22.06
Diff. from whole sample	-98%	-97%	-96%	-95%	-97%	-96%	-98%	-99%
Net income (millions)	2.42	3.60	6.04	5.55	-55.43	-18.73	-18.87	-51.19
Diff. from whole sample	-96%	-97%	-94%	-96%	-152%	-67%	-114%	-169%
Operating margin	-0.30	0.10	-0.38	-9.81	-7.35	-2.78	-3.08	-1.95
Diff. from whole sample	-43%	2023%	98%	155%	128%	69%	74%	53%
R&D intensity	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.06
Diff. from whole sample	-62%	-67%	-73%	-82%	-85%	-89%	-79%	-43%

### Table 2C: Firms that only hold cryptocurrency (Seven firms)

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Total assets (millions)	12,937.31	14,687.92	13,463.48	14,569.31	17,255.49	34,354.27	43,512.54	34,361.52
Diff. from whole sample	143%	141%	145%	141%	155%	190%	229%	191%
Revenue (millions)	2,486.63	2,721.41	2,730.31	3,501.36	3,437.12	3,716.52	4,450.58	4,962.06
Diff. from whole sample	168%	166%	164%	149%	165%	193%	197%	197%
Net income (millions)	151.22	372.03	281.23	419.21	357.47	-32.66	537.12	415.77
Diff. from whole sample	137%	174%	160%	168%	234%	-42%	298%	457%
Operating margin	-0.53	-0.35	-0.04	-0.17	-0.38	-0.88	-0.19	-0.42
Diff. from whole sample	0%	-7515%	-79%	-96%	-88%	-46%	-89%	-67%
R&D intensity	0.15	0.09	0.11	0.10	0.16	0.20	0.22	0.22
Diff. from whole sample	128%	134%	140%	139%	155%	185%	172%	124%

#### Table 2D: Firms that both hold and mine cryptocurrency (Four firms)

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Total assets (millions)	412.46	542.87	689.28	1,038.04	1,040.13	949.26	920.18	781.07
Diff. from whole sample	-92%	-91%	-87%	-83%	-85%	-92%	-93%	-93%
Revenue (millions)	25.83	37.70	59.08	66.73	57.26	42.83	26.24	32.16
Diff. from whole sample	-97%	-96%	-94%	-95%	-96%	-97%	-98%	-98%
Net income (millions)	33.37	-13.67	9.06	-38.29	-5.73	-167.40	-59.97	-185.54
Diff. from whole sample	-48%	-110%	-92%	-124%	-105%	197%	-144%	-349%
Operating margin	-0.99	0.44	-0.08	0.13	0.09	-0.52	-1.54	-1.19
Diff. from whole sample	87%	9106%	-58%	-103%	-103%	-68%	-13%	-6%
R&D intensity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diff. from whole sample	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%

#### Table 3: Short-term cumulative abnormal returns

#### Table 3A: Full sample (20 firms) short-term cumulative abnormal returns

News announcement	Date	CAR (-1,+1)		CAR (-2,+2)	
Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion	20-May-21	-0.080	**	-0.037	
		(0.021)		(0.314)	
U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill	05-Aug-21	0.100	**	0.122	***
		(0.041)		(0.009)	
The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins	01-Oct-21	0.026		0.074	**
		(0.235)		(0.019)	
US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions	15-Oct-21	0.075	**	0.103	***
		(0.016)		(0.002)	
President Biden Executive Order on Ensuring Responsible Development of Digital Assets	09-Mar-22	0.030		0.036	
		(0.111)		(0.265)	
The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the Biden administration's efforts to regulate stablecoins	18-May-22	0.075	***	-0.007	
		(0.0001)		(0.599)	
U.S. News: Lawmakers Move Closer to a Deal On Tougher Rules for Stablecoins	20-Jul-22	0.019		0.059	**
		(0.148)		(0.022)	

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News announcement	Date	CAR (-1,+1)	CAR (-2,+2)	
Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	14-Sep-21	0.011	-0.025	
		(0.109)	(0.145)	
SEC Staff Accounting Bulletin No. 121	24-Mar-22	0.034	** 0.095	***
		(0.024)	(0.0001)	
Commissioner Hester M. Peirce responds to SAB #121	31-Mar-22	-0.027	-0.080	***
		(0.157)	(0.0005)	

#### Table 3A (cont.): Full sample (20 firms) short-term cumulative abnormal returns

# Table 3B: Holding (7) firms short-term cumulative abnormal returns

News announcement	Date	CAR (-1,+1)	CAR (-2,+2)	
Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion	20-May-21	-0.014	0.027	
		(0.630)	(0.413)	
U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill	05-Aug-21	0.038	0.051	
		(0.384)	(0.259)	
The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins	01-Oct-21	0.010	0.015	
		(0.689)	(0.716)	
US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions	15-Oct-21	0.032	0.035	
		(0.340)	(0.296)	
President Biden Executive Order on Ensuring Responsible Development of Digital Assets	09-Mar-22	0.011	0.001	
		(0.515)	(0.903)	
The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the Biden administration's efforts to regulate stablecoins	18-May-22	0.101	*** 0.030	
		(0.001)	(0.207)	
U.S. News: Lawmakers Move Closer to a Deal On Tougher Rules for Stablecoins	20-Jul-22	0.021	0.076	*
		(0.326)	(0.099)	

News announcement	Date	CAR (-1,+1)	CAR (-2,+2)	2
Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	14-Sep-21	0.013	-0.001	-
		(0.306)	(0.931)	)
SEC Staff Accounting Bulletin No. 121	24-Mar-22	0.036	0.093	} **
		(0.342)	(0.028)	)
Commissioner Hester M. Peirce responds to SAB #121	31-Mar-22	-0.032	** -0.036	ō *
		(0.028)	(0.098)	)

#### Table 3B (cont.): Holding (7) firms short-term cumulative abnormal returns

#### Table 3C: Mining (9) firms short-term cumulative abnormal returns CAR CAR **News announcement** Date (-1,+1)(-2,+2)Treasury targets tax cheats, cryptocurrency in proposal it -0.129 \* 20-May-21 -0.122 hopes will bring in \$700 billion (0.123)(0.085)U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down 05-Aug-21 0.136 0.164 \* infrastructure bill (0.181)(0.077)The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that 01-Oct-21 0.019 0.110 \*\* issue stablecoins (0.635)(0.046)US Treasury Department issued guidelines for digital asset 0.139 \*\* 15-Oct-21 0.093 firms on how to best comply with US sanctions (0.131)(0.013)President Biden Executive Order on Ensuring Responsible 09-Mar-22 0.042 0.066 **Development of Digital Assets** (0.359)(0.420)The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the 0.064 \*\* 18-May-22 -0.021 Biden administration's efforts to regulate stablecoins (0.033)(0.230)U.S. News: Lawmakers Move Closer to a Deal On Tougher 20-Jul-22 0.004 0.002 **Rules for Stablecoins** (0.847)(0.932)

News announcement	Date	CAR (-1,+1)	CAR (-2,+2)	
Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	14-Sep-21	-0.002	-0.040	
		(0.604)	(0.274)	
SEC Staff Accounting Bulletin No. 121	24-Mar-22	0.034	* 0.095	***
		(0.068)	(0.0001)	
Commissioner Hester M. Peirce responds to SAB #121	31-Mar-22	-0.016	-0.079	*
		(0.721)	(0.058)	

# Table 3C (cont.): Mining (9) firms short-term cumulative abnormal returns

# Table 3D: Dual activity (4) firms (Holding & Mining) short-term cumulative abnormal returns

News announcement	Date	CAR (-1,+1)		CAR (-2,+2)	
Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion	20-May-21	-0.121	**	0.016	
		(0.040)		(0.504)	
U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill	05-Aug-21	0.149		0.174	
		(0.254)		(0.208)	
The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins	01-Oct-21	0.085		0.110	
		(0.278)		(0.287)	
US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions	15-Oct-21	0.145	**	0.196	
		(0.024)		(0.138)	
President Biden Executive Order on Ensuring Responsible Development of Digital Assets	09-Mar-22	0.038	**	0.035	**
		(0.019)		(0.036)	
The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the Biden administration's efforts to regulate stablecoins	18-May-22	0.051	*	-0.040	
		(0.060)		(0.236)	
U.S. News: Lawmakers Move Closer to a Deal On Tougher Rules for Stablecoins	20-Jul-22	0.051		0.155	*
		(0.138)		(0.085)	

News announcement	Date	CAR (-1,+1)		CAR (-2,+2)	
Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	14-Sep-21	0.045	*	-0.039	***
		(0.092)		(0.001)	
SEC Staff Accounting Bulletin No. 121	24-Mar-22	0.031	**	0.097	**
		(0.027)		(0.018)	
Commissioner Hester M. Peirce responds to SAB #121	31-Mar-22	-0.042	**	-0.161	***
		(0.019)		(0.001)	

#### Table 3D (cont.): Dual activity (4) firms (Holding & Mining) short-term cumulative abnormal returns

### Table 4: Long term effect of Biden's March 9, 2022 Executive Order

#### Table 4A: Full sample

Period	CAR
March 9, 2022 to December 31, 2022	-1.300***
	(0.0001)

### **Table 4B: Holding firms**

Period	CAR
March 9, 2022 to December 31, 2022	-0.751**
	(0.0114)

### **Table 4C: Mining firms**

Period	CAR
March 9, 2022 to December 31, 2022	-1.692***
	(0.0001)

# Table 4D: Dual activity firms (engaged in holding and mining)

Period	CAR
March 9, 2022 to December 31, 2022	-1.376***
	(0.0006)

 Table 5: Idiosyncratic return volatility

Obs #	News announcement	Date (t)	I_VOL
1	Treasury targets tax cheats, cryptocurrency in proposal it hopes will bring in \$700 billion	20-May-21	0.0729
2	U.S. News: Senator Signals Compromise on Cryptocurrency Tax: Cryptocurrency brawl bogs down infrastructure bill	05-Aug-21	0.0674
3	The Biden administration is considering ways to impose bank-like regulation on the cryptocurrency companies that issue stablecoins	01-Oct-21	0.0668
4	US Treasury Department issued guidelines for digital asset firms on how to best comply with US sanctions	15-Oct-21	0.0648
5	President Biden Executive Order on Ensuring Responsible Development of Digital Assets	09-Mar-22	0.0624
6	The head of crypto exchange Binance.US said last week's crash of the cryptocurrency TerraUSD could accelerate the Biden administration's efforts to regulate stablecoins	18-May-22	0.0588
7	U.S. News: Lawmakers Move Closer to a Deal On Tougher Rules for Stablecoins	20-Jul-22	0.0584

# Table 5 (cont.): Idiosyncratic return volatility

Obs #		News announcement	Date (t)	I_VOL
	8	Gary Gensler sharpens criticism of cryptocurrency in Senate hearing	14-Sep-21	0.0667
	9	SEC Staff Accounting Bulletin No. 121	24-Mar-22	0.0604
-	10	Commissioner Hester M. Peirce responds to SAB #121	31-Mar-22	0.0601

Obs #											
	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
]	0.0731	0.0731	0.0731	0.0730	0.0730	0.0729	0.0729	0.0728	0.0728	0.0727	0.0727
2	0.0678	0.0677	0.0677	0.0676	0.0675	0.0674	0.0674	0.0674	0.0675	0.0675	0.0672
	0.0668	0.0668	0.0667	0.0668	0.0668	0.0668	0.0667	0.0668	0.0668	0.0668	0.0669
2	0.0669	0.0672	0.0649	0.0649	0.0648	0.0648	0.0648	0.0648	0.0649	0.0649	0.0649
-	0.0625	0.0625	0.0625	0.0625	0.0624	0.0624	0.0623	0.0623	0.0622	0.0620	0.0618
6	0.0590	0.0590	0.0590	0.0589	0.0588	0.0588	0.0594	0.0594	0.0594	0.0593	0.0593
-	0.0585	0.0585	0.0584	0.0585	0.0585	0.0584	0.0584	0.0584	0.0583	0.0583	0.0582
8	0.0669	0.0668	0.0668	0.0668	0.0668	0.0667	0.0667	0.0668	0.0668	0.0668	0.0668
(	0.0617	0.0615	0.0615	0.0613	0.0613	0.0604	0.0603	0.0603	0.0603	0.0602	0.0601
1(	0.0604	0.0603	0.0603	0.0603	0.0602	0.0601	0.0603	0.0602	0.0601	0.0601	0.0600

 Table 5A: Idiosyncratic return volatility surrounding date 't' - Full sample (20 firms)

# Table 5B: Idiosyncratic return volatility surrounding date 't' - Firms only mining cryptocurrency (9)

Obs #											
	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
	1 0.0889	0.0889	0.0888	0.0886	0.0887	0.0886	0.0885	0.0884	0.0883	0.0883	0.0882
	2 0.0765	0.0765	0.0765	0.0764	0.0763	0.0762	0.0762	0.0762	0.0762	0.0761	0.0755
	3 0.0755	0.0755	0.0755	0.0756	0.0757	0.0757	0.0756	0.0758	0.0757	0.0758	0.0760
	4 0.0760	0.0767	0.0769	0.0768	0.0765	0.0765	0.0765	0.0765	0.0769	0.0768	0.0768
	5 0.0736	0.0737	0.0738	0.0739	0.0737	0.0736	0.0735	0.0735	0.0735	0.0734	0.0718
	6 0.0696	0.0695	0.0696	0.0693	0.0693	0.0692	0.0694	0.0693	0.0693	0.0692	0.0691
	7 0.0677	0.0677	0.0676	0.0677	0.0676	0.0676	0.0675	0.0674	0.0674	0.0674	0.0673
	8 0.0753	0.0753	0.0753	0.0753	0.0752	0.0752	0.0752	0.0753	0.0754	0.0755	0.0754
	9 0.0716	0.0715	0.0715	0.0714	0.0713	0.0713	0.0712	0.0712	0.0712	0.0711	0.0710
1	0 0.0713	0.0712	0.0712	0.0712	0.0711	0.0710	0.0716	0.0715	0.0715	0.0714	0.0713

 Table 5C: Idiosyncratic return volatility surrounding date 't' - Firms only holding cryptocurrency (7)

Obs #											
	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
1	0.0537	0.0536	0.0536	0.0535	0.0535	0.0534	0.0534	0.0533	0.0533	0.0532	0.0532
2	0.0520	0.0519	0.0520	0.0518	0.0517	0.0516	0.0516	0.0516	0.0519	0.0519	0.0519
	0.0508	0.0508	0.0507	0.0507	0.0506	0.0506	0.0506	0.0505	0.0505	0.0505	0.0505
4	0.0505	0.0505	0.0478	0.0477	0.0477	0.0478	0.0478	0.0477	0.0477	0.0478	0.0478
4	0.0471	0.0471	0.0471	0.0471	0.0470	0.0470	0.0470	0.0470	0.0469	0.0466	0.0464
6	0.0450	0.0453	0.0453	0.0453	0.0453	0.0453	0.0453	0.0454	0.0454	0.0454	0.0453
	0.0458	0.0458	0.0455	0.0456	0.0456	0.0455	0.0455	0.0455	0.0452	0.0454	0.0453
8	0.0513	0.0513	0.0512	0.0512	0.0511	0.0511	0.0511	0.0510	0.0510	0.0510	0.0510
Ģ	0.0464	0.0459	0.0459	0.0456	0.0457	0.0456	0.0454	0.0453	0.0453	0.0452	0.0451
10	0.0456	0.0454	0.0453	0.0453	0.0452	0.0451	0.0450	0.0450	0.0449	0.0449	0.0448

Table 5D: Idiosyncratic return volatility surrounding date 't' - Firms both mining & holding (4)

Obs #												
		t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
	1	0.0824	0.0825	0.0825	0.0825	0.0825	0.0825	0.0825	0.0826	0.0826	0.0826	0.0826
	2	0.0809	0.0807	0.0807	0.0807	0.0807	0.0806	0.0807	0.0807	0.0807	0.0807	0.0807
	3	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0806	0.0806	0.0806	0.0806
	4	0.0806	0.0807	0.0807	0.0807	0.0807	0.0808	0.0809	0.0809	0.0809	0.0807	0.0807
	5	0.0660	0.0661	0.0659	0.0659	0.0658	0.0657	0.0657	0.0655	0.0654	0.0653	0.0651
	6	0.0623	0.0621	0.0618	0.0617	0.0617	0.0617	0.0616	0.0615	0.0615	0.0614	0.0615
	7	0.0601	0.0601	0.0600	0.0604	0.0605	0.0605	0.0605	0.0604	0.0605	0.0605	0.0603
	8	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805	0.0805
	9	0.0651	0.0650	0.0648	0.0647	0.0646	0.0646	0.0645	0.0645	0.0646	0.0646	0.0645
	10	0.0646	0.0645	0.0645	0.0646	0.0646	0.0645	0.0644	0.0643	0.0642	0.0641	0.0640

#### Appendix D: Report on US based firms vested in the cryptocurrency domain

# 1. MicroStrategy Inc. – Holder of cryptocurrency – Based in the United States *Firm Overview:*

The firm, MicroStrategy Inc., was founded in 1989 and has two primary strategies. The first is to develop and grow their enterprise analytics software division. The second strategy pursued is the acquisition and retaining of bitcoin. The firm states that bitcoin is acquired when the cash and short-term investment accounts are greater than the requirements for working capital. The firm considers the bitcoin investments as having a long-term horizon and there is no intention to engage in regular trading of cryptocurrencies.

#### Investment and Accounting Thesis:

In 2021, the firm introduced a formal strategy to acquire and hold bitcoin. This strategy includes educating investors about the bitcoin market as well as issuing debt or equity securities in order raise capital to be used to acquire bitcoin in the future. In the future, the firm intends provide the market with cryptocurrency technology and services, among other offerings.

The firm perceives the aforementioned strategy bitcoin to be attractive for the following reasons: 1. Cryptocurrencies can serve as a store of value, 2. Given independent monetary policy, bitcoin can serve as a hedge against inflation, 3. A public open-source protocol supports bitcoin. Furthermore, the limited supply of bitcoin extends opportunities for value appreciation. Finally, MicroStrategy Inc. considers bitcoin investment to be complementary to the firm's initial focus, analytics software and services. Nonetheless, MicroStrategy Inc. cautions investors that its financial statements may not fully reflect the 'potential variability in earnings'. The documented price fluctuations of bitcoin indicate that investors should anticipate future impairments on such

investments. The firm performs an impairment analysis each quarter. It compares the carrying value to that of the lowest quoted exchange at the time. If the bitcoin's carrying value is greater than the quoted market price, the firm records the difference as an impairment.

Within the firm's report, there is a section titled 'Bitcoin acquisition strategy'. It entails a timeline of the bitcoin acquisition, starting from September 2020. The initial purchase was of 70,469 bitcoin at a price of \$15,964 per bitcoin. As of December 31, 2020, the firm recorded an approximately \$71 million on the aforementioned cryptocurrency. The impairment represented 17.5% of the firm's operating expenses for the year.

During the first quarter of 2021, the firm acquired 20,857 bitcoin for \$1.086 billion, while bearing \$194 million in impairment losses during the same period. As of the reporting date (March 31, 2021) the firm's 91,326 bitcoin had a carrying value of \$1.947 billion. During the second quarter of 2021, the firm acquired 13,759 bitcoin for \$530 million. During this quarter, MicroStrategy Inc. incurred an impairment loss of \$424.8 million on its cryptocurrency holdings. By the end of the aforementioned reporting period, June 30, 2021, the company's 105,085 bitcoin had a carrying value of \$2.051. For quarter 3 of 2021, the firm acquired 8,957 bitcoin for \$419 million. During that quarter, the firm incurred a \$65.2 million loss on impairment in relation to its cryptocurrency. At the end of that quarter, September 30, 2021, the company's bitcoin holdings had a carrying value of \$2.406 billion. As of December 31, 2021, the firm held 124,391 bitcoin, with a carrying value of \$2.850 billion. Going into 2022, the firm incurred \$163.3 million in impairment losses for the bitcoin they held as of December 31, 2021. By March 31, 2022 the firm held 129,218 bitcoin with a carrying value of \$2,895,619 and a Cumulative digital asset impairment loss of \$1,071,410. The second quarter of 2022 proved to be challenging as the firm had a cumulative impairment of \$1,989,248 on its 129,699 bitcoin.

#### Valuation:

Throughout the sample period, the firm has a relatively consistent portion of cryptocurrency owned, relative to the firm's total assets. MicroStrategy Inc. enjoyed an extraordinary Quarter 1 of 2021 (relative to December 30, 2020). However, the quarterly return drops significantly following the outstanding performance of March 31, 2021. The majority of quarterly returns are negative following March 31, 2021.





#### 2. Tesla – Holder of cryptocurrency – Based in the United States

#### Firm overview:

Tesla Inc. was incorporated on July 1, 2003 with a mandate of designing, developing, and selling fully electric vehicles. In the firm's report, the COVID 19 pandemic is discussed

prominently in the Note 1 (Overview). The paragraph includes discussion about the supply chain problems and the costs borne by Tesla Inc.

#### Investment and Accounting Thesis:

A discussion titled 'Digital Assets' states that the firm began acquiring bitcoin during the first quarter of 2021. Tesla Inc. also began to accept bitcoin as payment for their goods during this time. From an accounting perspective, this is significant because the firm was required to record such consideration as 'non-cash' in accordance with Accounting Standards Codification (ASC) 606. The bitcoin price at the time of transaction is recorded as an indefinite-lived intangible asset, in accordance with ASC 350. All bitcoin held by the firm are recorded at cost, less any impairments discovered during inspections following the acquisition. The impairment assessment involves the firm comparing the bitcoin recorded value against the quoted prices on the active cryptocurrency exchanges. In line with the principles of accounting conservatism, the firm applies the principle of lowest of carrying or market value since the prior impairment assessment.

Cryptocurrency impairment losses are recognized in the consolidated statements of operations, within the 'Restructuring and other' account. Following impairment, the new cost basis is not modified upwards. Gains are recorded only in the event of a sale of the digital asset.

During Quarter 1 of 2021, the firm bought and received \$1.50 billion worth of bitcoin. During the same period, Tesla Inc. incurred and recorded \$27 million in cryptocurrency value loss. Via sale of cryptocurrency, the firm also realized \$128 million in gains. As of March 31, 2021, the firm's carrying value of cryptocurrencies held was \$1.33 billion. Nonetheless, the fair market value of those digital assets was \$2.48 billion. By May 2021, Tesla no longer accepted bitcoin as payment from its customers. In the second quarter of 2021, the firm had incurred a cumulative impairment of \$50 million on its cryptocurrency. Nonetheless, it realized a gain of \$128 million through sales of bitcoin in that reporting period. As of September 30, 2021, the firm had recorded a cumulative impairment loss of \$101 million in relation to its bitcoin holdings. The fair market value was \$1.83 billion at that date. No cryptocurrency had been sold in Q3 of 2021. By year-end 2021, the cumulative impairments remained \$101 million, while the fair market value had improved to be \$1.99 billion.

During quarter 1 of 2022, the firm did not record any impairments in relation to its cryptocurrency holdings. The following quarter, ended June 30, 2022, was interesting as Tesla realized a gain of \$64 million on its sale of bitcoin, while also recording an impairment loss of \$170 million on its cryptocurrency holdings.

#### Valuation:

For a given period of time, there seems to be a positive correlation between the firm's returns and the amount of cryptocurrency the firm holds relative to total assets. In particular, on March 31, 2022, the firm reported a decrease in the amount of cryptocurrency held relative to total assets. The firm's return also decreased during this period. As mentioned in the aforementioned section, this sale of cryptocurrency is associated with a \$64 million gain upon sale.

Following Tesla's 10Q for June 30, 2022, the firm had decreases in returns, while the ratio of cryptocurrency held to total assets remained relatively stable.



# 3. Square Inc. – Holder of cryptocurrency – Based in the United States *Firm overview:*

Square Inc., founded in 2009, markets tools that businesses and individuals use to take part in the economy at large. Notably, the firm allows merchants to accept card and electronic payments in exchange for their goods and services. This is aided by the 'Cash App' ecosystem, which allows the firm's clients to accept peer-to-peer payments, including those that are in bitcoin, among other cryptocurrencies. Further, the firm provides such merchants with useful analytics that help in managing inventory, finance, as well as market engagement.

#### Investment and Accounting Thesis:

The 2021 10-K report mentions two months in which cryptocurrency was purchased. The first is October 2020, worth \$50 million and the second is February 2021, worth \$170 million. The firm considers this strategy to be in line with its corporate purpose. Therefore, the firm does not intend to engage in regular trading of cryptocurrency. The firm considers investments in bitcoin to complement their primary mission of providing clients with payment receiving tools. Square Inc. continues to monitor developments in tokenization and the potential demand for cryptocurrency payment systems.

The bitcoin is recorded as an indefinite lived intangible asset. Any decreases in price following the purchase are recorded as impairments. Gains are only realized upon sale of the cryptocurrency. During the coverage period of the report (Quarter 1 2021), the firm recognized \$19.9 million in impairment on their cryptocurrency account. Nonetheless, at March 31, 2021, the total market value of their cryptocurrency was \$472 million (an excess of \$272 million over the firm's carrying value). In quarter 1 of 2021, the firm recognized \$19.86 million of impairment losses in relation to its bitcoin holdings. In quarter 2 of 2021, the impairment was \$45.27 million. Furthermore, as of June 30, 2021, \$6.3 of the company's bitcoin investments were lent to third parties. At that time, the firm's bitcoin holdings had a carrying value of \$281.4 million, which is in excess of the carrying value of \$154.9 million. In quarter 3 of 2021, Square Inc. recognized \$6 million in relation to its bitcoin holdings. Nonetheless, the fair market value of the bitcoin held was \$351.7 million, which is greater than the carrying value of \$149 million. In quarter 4 of 2021, no impairments were recorded in relation to the firm's bitcoin holdings. As of December 31, 2021, the fair market value of the firm's bitcoin holdings is \$371.0 million.

The first quarter of 2022 saw better performance relative to the aforementioned periods, as Square Inc. did not have any impairment on its bitcoin holdings. As of March 31, 2022, the firm's bitcoin holdings have a fair market value of \$365.5 million, while the carrying value remains \$149 million. Quarter 2 of 2022, saw a dip in bitcoin's value. This required the firm to record an impairment of \$36 million. As a result, the bitcoin carrying value is \$113 million as of June 30, 2022.

#### Valuation:

Square Inc. is remarkable with regard to the relation between the amount of cryptocurrency held and firm returns. There is an evidently positive association between the two aforementioned variables. This could be due to the nature of Square's operations, as a large portion focuses on payment processing and cryptocurrency payments have yet, to be accepted by a majority of vendors and payment processors. In essence, this is an area with a high growth potential.



Return, scaled by NASDAO Index

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## 4. Marathon Patent Group – Holder & Miner of cryptocurrency – Based in the United States

#### Firm overview:

Marathon Patent Group, incorporated on February 23, 2010, focuses on mining cryptocurrencies. A significant proportion of their crypto mining technology tools are from the firm 'Bitmain'. By March 31, 2021, Marathon Patent Group has 12,920 mining tools, which provide approximately 1.4 quintillion hashes per second. With a given bitcoin price of \$56,000 at the time, this provides approximately \$5.5 million in monthly revenues.

In addition to mining cryptocurrency, the firm purchases bitcoin whenever cash and short-term investments exceed the requirements for working capital. Further, the firm may issue debt or equity securities to fund cryptocurrency purchases.

#### Investment and Accounting Thesis:

The firm's report contains a section on government regulation and how it can impact their business. In this section, the firm acknowledges that regulation of cryptocurrency is being considered by the US federal government via its numerous agencies and bodies. In addition, the report discusses the umbrella of regulations that currently impact cryptocurrencies, including anti-fraud measures.

Marathon Patent Group cautions its investors that 'regulations may substantially change in the future'. As such, they inform stakeholders that such changes could fundamentally impact the mining business and elevate risk factors overall. The anonymity of bitcoin is also discussed as a cause of concern because it can be attractive to criminals. From a regulatory perspective, this may require further regulation, including filing reports with Financial Crimes Enforcement Network

("FinCEN") anytime a crypto transaction exceeds \$10,000. The section concludes by discussing the latest developments on the Executive level, with President Biden freezing all rule making proposed by President Trump in January 2021. This is expected to help the Biden administration better understand what components they wish to retain from the Trump administration proposal.

As of December 31, 2020, the firm carried 126 bitcoin, valued at \$2.272 million. Digital currencies are included in the current asset account. While the report mentions the policy for impairments of cryptocurrencies, there is no indication of a write down. During the first quarter of 2021, the firm added \$9.1 million worth of bitcoin. During this accounting period, the firm recognized an impairment of \$662,199 in relation to their cryptocurrency holdings. In quarter 2 of 2021, the firm added \$29.3 million worth of bitcoin to its holdings. A substantive bitcoin value impairment of \$11.079 million is recorded for this accounting period. During quarter 3 of 2021, the firm added \$51.7 million worth of bitcoin, a related impairment of \$6.7 million was recognized in that period. In Q4 of 2021, the firm added \$90 million to its bitcoin holdings, while recognizing an impairment of \$11 million. During the first quarter of 2022, the firm had \$51.87 million in bitcoin additions, with \$19.56 million in impairments recognized for that period. The second quarter of 2022 saw \$24.58 million in bitcoin additions with a significant impairment of \$127.6 million.

#### Valuation:

The data on Marathon Patent Group exhibit interesting behavior for the first half of 2021. A relatively high return is recorded for the first quarter of 2021. However, this does not continue into quarter 2 of 2021. However, the firm shows significant increases in the share of cryptocurrency it owns from March 31, 2021 to September 30, 2021. From March 31, 2022 and onwards, the two aforementioned variables exhibit an inverse relationship.



## 5. Coinbase – Holder of cryptocurrency – Based in the United States *Firm overview:*

The firm, Coinbase, was incorporated in January 2014. The mission is to increase the financial freedom of individuals world-wide. To that end, Coinbase works to build the infrastructure for its users to discover, transact, and engage with digital currencies. The firm is proud to have over 25 blockchain integrations as well as being a market leading brand that is exclusively focused on digital currencies. Nonetheless, the firm acknowledges that disputes with their customers could have a significantly negative impact on its well-being. In particular, these disputes could lead to confrontations with the Consumer Financial Protection Bureau (CFPB) and Federal Trade Commission (FTC).

#### Investment and Accounting Thesis:

In Quarter 1 of 2021, the firm acquired \$553,012,000 worth of cryptocurrencies. Coinbase considers its crypto asset investments to be related to its mission. Therefore, it does not plan to engage in regular trading of cryptocurrency. Further, the firm considers cryptocurrency to be less liquid relative to cash because of the associated volatility. As such, Coinbase may not always be able to get a reasonable dollar amount in exchange for cryptocurrency it sells. Impairment losses on cryptocurrency were considered immaterial for Quarter 1 2021. They were \$0.8 million in total. In the Quarter 2 10-Q, the firm discusses the volatility of the cryptocurrency market over that reporting period. It mentions that such 'exceptionally high levels of volatility' had a significant impact on the firm's performance. In the subsequent quarter, the 2021 Quarter 3 report discusses softer economic conditions in the beginning of the reporting period. During the quarter, crypto trading declined. Nonetheless, Coinbase outperformed the market, with a 41% growth in subscriptions. In the 2021 annual report, Coinbase comments on the extraordinary development the cryptocurrency market witnessed over the year. The firm notes that the crypto market capitalization of \$2.3 trillion is nearly a threefold increase since the same time in 2020, when the market was worth approximately \$800 billion. Further, Bitcoin and Ethereum both reached record prices in 2021. In the Q1 2022 report, there was little discussion about the crypto market prices impacting the firm's business. However, the Q2 report discusses the lowered cryptocurrency prices and how the firm has been impacted as a result. The management assures investors that they do not believe these unfavorable conditions to be persistent.

#### Valuation:

Overall, the data on Coinbase show an inverse between the share of cryptocurrency owned relative to total assets and the firm's quarterly returns. This is especially apparent in the period preceding June 30, 2022.



## 6. Riot Blockchain, Inc. – Holder & Miner of cryptocurrency – Based in the United States

#### Firm overview:

The firm, Riot Blockchain, Inc. was incorporated on July 24, 2000. Today, it is at the forefront of the NASDAQ listed firms. This is in large part due to their ability to adapt to market trends. As such, they have made the strategic decision to focus on mining bitcoin. The tools used

for this purpose are called 'miners'. So far, Bitmain has supplied all such tools to Riot Blockchain Inc. The firm purchased 4,000 model S17-Pro Antminers in December 2019 for \$6.3 million. By December 31, 2020, the firm had a fleet of over 30,000 S19-Pro miners.

The firm's 2021 10K report contains a section discussing how government regulation could impact the business. In the United States, for example, a report entitled "Cryptocurrency: An Enforcement Framework" has identified possible threats associated with growing prevalence of cryptocurrencies. Riot Blockchain, Inc. acknowledges that it is difficult to predict how future regulation would impact their business.

#### Investment and Accounting Thesis:

In 2019, the firm was able to mine \$6,741,000 worth of cryptocurrencies, including bitcoin, litecoin and bitcoin cash. During 2020, this amount was \$11,984,000. The related impairments for the aforementioned periods were \$844,000 and \$989,000, respectively. In the following year, 2021, the firm mined \$184.42 million worth of cryptocurrencies and recognized a related impairment of \$36.5 million. As of December 31, 2021, the firm had a cryptocurrency balance of \$159.5 million. During Quarter 1 of 2022, the firm generated a cryptocurrency mining revenue of \$58 million. This quarter is associated with an impairment of \$26.4 million impairment. In the following quarter, ended June 30, 2022, the nearly doubled its cryptocurrency revenue to \$104 million, with a significant impairment of \$126 million in that accounting period.

#### Valuation:

Between March 31, 2021 and June 30, 2021, the data show a positive association between the level of cryptocurrency ownership and firm quarter returns. More specifically, Riot Blockchain saw the aforementioned variables both decrease during quarter 2 of 2021.



### 7. Metromile – Holder of cryptocurrency – Based in the United States *Firm overview:*

Metromile, incorporated in October 2018, works towards the purpose of aiding clients' mergers, capital exchange, asset acquisition, as well as other elements related to the combination of two or more businesses. The firm has been listed on NASDAQ since September 2020.

#### Investment and Accounting Thesis:

In Quarter 2 of 2021, the firm purchased \$1,000,000 worth of bitcoin. They are accounted for in accordance with ASC 350 as indefinite-lived intangible assets. Impairment analysis occurs at each reporting period. Decreases in the quoted price on the active exchanges would indicate an impairment. Formally, the fair value is determined in accordance with ASC 820 with a level 1 input from the market. If the carrying value exceeds the lowest price on the active exchanges, an impairment is recorded. There is no upward adjustment in the future and gains are only recognized upon sale. There were no digital asset sales in Quarter 2 of 2021. Nonetheless, an impairment, regarding the bitcoin, of \$80,000 was record during that period. In the subsequent period, ended September 30, 2021, the firm recorded an impairment of \$117,000 in relation to its digital asset holdings. No impairments were recorded in the final quarter of 2021, ended December 31. In the first quarter of 2022, the firm underperformed and decided to combine multiple accounts into one financial statement line item. The category 'digital assets' no longer exists on its own.

#### Valuation:

Metromile, which was established during the sample period, has a relatively stable trend for both the share of cryptocurrency owned and the firm's quarterly returns.



Firm Quarter Return, scaled by Crypto-owned/total assets NASDAQ Index

### 8. CleanSpark Inc – Miner of cryptocurrency – Based in the United States *Firm overview:*

CleanSpark Inc., incorporated in October 1987, provides microgrid and software solutions to military, commercial and residential clients. Through ATL Data Centers LLC, the firm mines digital assets, bitcoin in particular.

#### Investment and Accounting Thesis:

The December 31, 2020 report discloses a fleet of bitcoin mining tools with a capacity of 200 quadrillion hashes per second. During that period, the firm had a net income of \$454,753 derived from their digital currency mining business. The firm considers digital currencies to be intangible assets with indefinite useful lives. These assets are assessed for impairment on an annual basis. This is done by comparing the carrying value of the cryptocurrency to that of quoted market prices. Any loss recorded will establish a new cost basis for the asset. There are no reversals of losses permitted. No impairment losses were recorded on digital currencies for 2020.

The 2021 annual report, for the year ended September 30, 2021, states that the mining of bitcoin has become their primary focus and source of revenue. During that accounting period, the firm generated \$38.8 million from its mining activities. However, 2021 was not a good year for the firm as its expenses exceeded its revenue, including a recorded \$6,608,076 in digital asset impairment losses. For the final quarter of 2021, ended December 31, 2021, the firm was profitable, with the revenues (\$41.2 million) exceeding the firm's costs (\$36.8 million). The firm generated a profit of \$3.18 million in the first quarter of 2022. In the subsequent period, ended June 30, 2022, the firm generated a revenue of \$31.1 million. The majority of this is attributed to

its cryptocurrency mining business (\$30.9 million). Nonetheless, the firm had an operating loss of \$14.9 during this period.

#### Valuation:

Between March 31, 2021 and June 30, 2021, CleanSpark exhibited a noticeable decrease in its quarterly return. During this period, the firm increased its share of cryptocurrency owned, relative to total assets. This continued until the year-end 2021. Beginning, June 30, 2021, the two aforementioned variables exhibit positive correlation until the end of the sample period.



### 9. Greenidge Generation Hldg – Miner of cryptocurrency – Based in the United States *Firm overview:*

Greenidge Generation Hldg, incorporated in January 2021, is a bitcoin mining and power generation company. As such, it enjoys vertical integration of its operations. Since June 1, 2021,

the firm has been running a fully carbon neutral bitcoin mining operation. Further, the firm sells the electricity that is generated in excess of its need for mining bitcoin. All the current operations are in the state of New York. However, the firm intends to expand its mining operations to South Carolina.

#### Investment and Accounting Thesis:

Between 2020 and 2021, the firm enjoyed a 321% increase in revenue from bitcoin mining (from \$3.3 million to \$14.1 million). This increase in revenue is attributed to the increase in cryptocurrency value within that one year period (from \$8.7 million to \$42.8 million). Within the first quarter of 2022, the firm recorded a revenue of \$23.2 million in relation to its mining business. As in the year ended December 31, 2021, the firm retained an operating profit. However, a significant increase in interest expenses, led to a bottom-line loss for the quarter ended March 31, 2022.

Cryptocurrencies are considered intangible assets with indefinite useful lives. They are assessed for impairment on an annual basis. Upon determination of impairment, the cost basis is reduced. There are no subsequent reversals of impairments.

#### Valuation:

Greenidge Generation Hldg, which was established during the sample period, exhibits an inverse relation between the share of cryptocurrency held and the firm's quarterly returns.



## 10. Ikonics corporation/TeraWulf, Inc. – Miner of cryptocurrency – Based in the United States

#### Firm overview:

Ikonics corporation, incorporated in December 2002, focuses on the creation and transfer of physical and visual images. The final Ikonics filing with the SEC was an 8-K on December 13, 2021. Since June 2021, the firm merged with Terawulf. Founded in February 2021, Terawulf is an environmentally friendly firm that focuses on cryptocurrency mining. Terawulf's first filing with the SEC (425 Merger Announcement) was on June 25, 2021. Terawulf's 2021 form 10-K indicates that the firm has cryptocurrency mining facilities in Pennsylvania and New York state. As of the firm's 2022 10-K filing, there were no additional mining facilities.

Terawulf is distinguished by its vertical integration, which allows it to typically be ahead of demand for its services. Both of the firm's cryptocurrency mining facilities are located in highly congested areas. As a result, the firm has a strong drive to be energy efficient. Furthermore, the firm considers this to be an opportunity to provide ancillary services to the local electric grid. The firm placed an order with Bitmain to purchase 15,000 S19j Pro miners. These machines will be received in equal shipments in April 2022, May 2022, and June 2022. Another order was placed with Minerva for 30,000 MV7 miners. They are also scheduled to be received in three equal shipments in November 2021, December 2021, and January 2022.

#### Investment and Accounting Thesis:

The Ikonics Corporation financial statements do not contain any explicit mention of cryptocurrency or digital assets. However, a subsequent section "Organization" provides details about the merger between Ikonics and Terawulf's plans to develop, construct, and operate bitcoin mining facilities across the United States by using clean, low cost, and reliable sources of power. The company plans to focus on bitcoin mining and does not have current plans to mine other cryptocurrencies. As of the 2021 10-K, the firm has no intention to convert any mined or stored cryptocurrency into fiat money. Within the "Notes to consolidated financial statements", the firm acknowledges that it has not yet commenced in its mining activities and therefore has relied on proceeds for debt and equity issuance to fund its primary operations.

In the 10-Q for Q1 2022, the firm recorded \$217,000 worth of cryptocurrency revenue, with an impairment of \$5,000. In Q2 of 2022, the firm substantially increased its activity, with \$997,000 worth of bitcoin mining and an impairment of \$558,000. The first sale of digital currency was recorded in Q3 of 2022 (with an associated gain of \$127,000). Revenues increased to \$3.9 million in this period, with a related impairment of \$119,000. In total, the firm had \$15 million

worth of mining revenue for the year 2022, with \$11 million of associated costs. Impairments on cryptocurrencies totaled to \$1.5 million.

#### Valuation:

Throughout the sample period, TeraWulf exhibits an inverse relation between the share of cryptocurrency held and the firm's quarterly returns.



# **11.** Cipher Mining – Miner of cryptocurrency – Based in the United States *Firm overview:*

'Good works' was incorporated in June 2020. On August 25, 2021, the firm merged with Cipher Mining. The merged firm is known as Cipher Mining, which is dedicated to the expansion and strengthening of the bitcoin infrastructure in the United States. The firm cautions investors that the value and volatility of bitcoin could significantly impact the business performance. The environmental footprint of the firm's mining activities is a point that could confront the company. In particular, government regulators may restrict the firm's ability to conduct its operations.

#### Investment and Accounting Thesis:

The 10-Q for the first quarter of 2022 is the first instance that the firm acknowledges cryptocurrencies in its financial statements. In particular, \$195,000 in cryptocurrency were received in exchange for equity in the firm. An impairment of \$4,000 was recognized in the same period. The firm received an additional \$1,131,000 worth of cryptocurrency in the subsequent quarter, with a significant impairment of \$539,000. For the quarter 3 of 2022, the firm received \$3,139,000 worth of cryptocurrency, with an impairment of \$859,000. Finally, in Quarter 4 of 2022, the firm purchased \$4,828,000 worth of bitcoin and mined bitcoin worth \$2,939,000. An impairment of \$1,467,000 was recorded.

The company holds bitcoin from either purchases or mining. Cryptocurrencies are considered intangible assets with indefinite useful lives. These assets are examined for impairment at least on an annual basis.

#### Valuation:

Cipher Mining, which was established during the sample period, exhibits an inverse relation between the share of cryptocurrency held and the firm's quarterly returns.







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