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Hedge Fund Investment in Initial Coin Offerings (ICOs)

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HEDGE FUND INVESTMENT IN INITIAL COIN OFFERINGS (ICOs)

by

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ABSTRACT

Initial Coin Offerings (ICOs) came into worldwide attention in 2018, when over $11.6 billion flowed through them. The CME Group launched Bitcoin futures contracts in December 2017, giving large funds their first regulated exposure to digital assets. As digital assets move towards the mainstream of finance, institutional investors have followed. This study comparatively analyzes Hedge Fund investment in digital assets against that of other institutional investment firm types (Private Equity and Venture Capital) by analyzing their crypto holdings and rebuilding an equally weighted portfolio for each fund. Under these conditions, the study succeeds in finding significant differences between hedge fund results in the sample and those of private equity/venture capital firms.

Specifically, this study shows through the composite portfolios built that digital asset investments made by hedge funds generate a much higher return than that of private equity and venture capital firms. Average hedge fund investments have much higher trading volumes and market capitalizations than those made by private equity and venture capital firms, suggesting that PE and VC firms are taking higher risks by investing in new and little-known crypto projects. The results of this study signal that the hedge fund business model is much better suited for the high-risk, high-volatility cryptocurrency market than strategies employed by venture capital and private equity firms.

DEDICATION

For my mom, Barb, who has given me the opportunity to reach every goal I have ever had for myself. For my dad, Dan, who taught me how to hold myself accountable. For my twin brother, Trevor, who is my longest-tenured fan and supporter. I love you all.

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INTRODUCTION

An Initial Coin Offering (ICO, also referred to as a "token sale") is a method of venture fundraising that uses cryptocurrencies or other digital tokens. In an ICO, a specified quantity of cryptocurrency "tokens" or "coins" are sold to investors in exchange for legal currency or other popular cryptocurrencies such as Bitcoin or Ethereum. These tokens are marketed as either future functional units of, an equity stake in the company or project, or a key allowing the user to access some special utility brought by the venture. The tokens are only issued if the venture reaches a set funding goal during the specified ICO time.

ICOs have quickly garnered a reputation as a vehicle for scam artists and other securities law violators and have been heralded as unsafe and improper by many investors, mainly due to the unregulated and pseudonymous nature of their transactions and a pattern of exit scams.[1] Despite the controversy surrounding them, ICO interest continues to grow among institutional investors. This paper examines the dynamics of institutional investment in cryptocurrency markets and compares the largest types of firms – hedge funds, private equity firms, and venture capitalists.

Since the Chicago Mercantile Exchange launched Bitcoin futures in December 2017, investors have continued to use the cryptocurrency market as a tool for diversification and yield. Bitcoin futures saw their largest trading volume yet in May 2019, at 13,600 contracts traded daily.[2] Additionally, inflows to the Grayscale Bitcoin Investment Trust reached $171.7 million in

[1] Fewer than half of all ICOs survive four months after the initial offering, and almost 50% of all 2017 ICOs had failed by February 2018 (bitcoin.com). See https://www.bloomberg.com/news/articles/2018-07-09/half-of-icos-die-within-four-months-after-token-sales-finalized and https://news.bitcoin.com/46-last-years-icos-failed-already/

[2] See https://www.coindesk.com/may-was-best-month-for-cme-bitcoin-futures-volume-since-2017

Q3 2019, with 84% of funds coming from institutions "dominated by hedge funds."[3]

Many hedge funds have already added digital assets to their portfolios. Hedge funds are investment firms that receive greater flexibility than traditional investors, with the ability to access large short positions, high leverage, and dynamically changing risk exposures. There are over 20,000 hedge funds currently in operation, with over $3 trillion invested in the global market. As these investors have innovating since the 1940s, it is no surprise that they are one of the largest investor classes in digital tokens and ICOs. While some institutional firms treat cryptocurrencies as commodities due to their volatility, others take large funding proportions of Initial Coin Offerings in a strategy like venture capital or private equity investing.

Hedge funds are a particularly important frontier of finance due to their ability to use complex and almost unconstrained strategies involving short sales, leverage, and derivatives. Examining the implications of cryptocurrency adoption in this space could reveal strategies or patterns that may become popularized or commercialized to provide accessibility for retail investors later in the way that ETFs brought index mutual funds to the public. With over $3 trillion of assets under management as of Q3 2019[4], hedge funds are undeniably influential across all landscapes of global finance.

Concurrent with the emergence of thousands of digital tokens from ICOs, a completely new style of firm has also sprung up in recent years – the Crypto Fund. These investment firms usually adopt a hedge fund model except making investments only in digital assets or companies

[3] Grayscale is a digital asset investing firm and subsidiary of Digital Currency Group. Their Bitcoin Investment Trust (symbol: GBTC) was the first publicly quoted security to be solely invested in and derive its value from Bitcoin. It is the largest Bitcoin-backed security in markets and is only available to accredited investors. See their Q3 2019 report https://grayscale.co/insights/grayscale-q3-2019-digital-asset-investment-report/

[4] See https://www.barclayhedge.com/solutions/assets-under-management/hedge-fund-assets-under-management/

involved with them. This means many of these firms are left within a legal gray area where they may not be obligated by the same regulations as a traditional hedge fund.

Since many of the coins invested in are venture projects, the relationship between the firms launching ICOs and the institutional investors backing their projects is particularly interesting and peculiar. Involvement of the investment firm can vary widely, with some funds helping the firms they invest in and others simply treating the tokens as a commodity. Research has yet to examine the strategies that institutional investment firms posit in the booming ICO industry, or which performs greatest.

The objective of this project is to examine the dynamics between the projects launched via ICO and the different types of institutional firms that invest in them. Using coin price records from *coingecko.com* and investment information from *cryptofundlist.com* complemented by other sites, we study if there are distinct differences in the investment relationship with digital token projects between firms distinguished as Hedge Funds, Private Equity firms, and Venture Capitalists. The results of investments by the firms will be examined in the form of return on ICO price, which may support already existing work on the investment skill of hedge fund managers. This research is especially timely due to the increased attention garnered by digital currencies as part of an investment portfolio, especially with institutions entering the fray. This research contributes to the rising catalogue of research on digital asset investment by providing exploratory research on the variances in investment strategy undertaken by institutional investors and the results seen by them. Research on the relationship between ICO firms and institutional investment on each other gives details on a part of the industry that has been underreported on in the past and may give those who are interested in regulation a better idea of how the space is

operating currently.

To begin the study, Section I provides a perspective background on cryptocurrency, the hedge fund industry, and crypto funds. Section II summarizes relevant literature from the fields. Section III then details the data and methodology of the project, and Section IV concludes.

I. CRYPTOCURRENCY, HEDGE FUNDS, AND THE EMERGENT CRYPTO FUND: A BACKGROUND

To understand an Initial Coin Offering, one must first understand the blockchain technology that most digital tokens are built on. First described by Nakamoto (2008), blockchain is a public, digitized ledger whose entries are time stamped and then confirmed by a decentralized system of peers. [5] When a transaction is created in the Bitcoin blockchain network, it is signed with a digital signature which verifies the sender's unique private identification key. After this, the transaction is broadcasted to all users on the network then reviewed and verified by network participants referred to as miners. After the miners confirm a consensus for every transaction, verified transactions are grouped into a block, which is appended directly onto the network's immutable ledger. This process leaves very little possibility for fraud because each node in the network stores their own record of the ledger and compares it with the network's record to reach a network-wide consensus. In some cases, tokens are required to use a system for its designed purpose. The most prevalent use of this design is that of Ethereum, which powers decentralized applications (dApps) through its blockchain infrastructure. In this case, projects built on the Ethereum platform require Ether such as a car requires gas and investors are asked to fund in Ether rather than dollars to continue operations and growth. This is not the only instance of tokens being necessary to access a product – smaller firms have issued tokens allowing holders to engage in a social network, or to access parts of electronic content otherwise unavailable.

In addition to the consensus model that blockchain networks are built on, most digital

[5] The Bitcoin white paper was published under the pseudonym *Satoshi Nakamoto*. Some believe it to be a group of individuals. See Nakamoto, Satoshi. Bitcoin: A Peer-to-Peer Electronic Cash System, 2008.

tokens have "smart contracts" built into them.[6] The smart contract is one of the most powerful aspects of blockchain technology because it enables processes that currently rely on intermediaries to be done away with.

Bitcoin (BTC), the largest and most well-known blockchain cryptocurrency, was first mined in January 2009. While the modern invention of blockchain technology by Bitcoin's creator Satoshi Nakamoto started all digital currencies, the history of recorded thought surrounding decentralized currencies is much older.[7] The first Bitcoin exchange, Mt. Gox, launched in 2010 to facilitate Bitcoin trade, and Bitcoin's first major competitor, Litecoin (LTC), was launched in 2011.

As the ICO enables the democratization of digital public capital, it is important to recognize the different sorts of interest that an ICO firm may generate and how it could affect them. Some issuers are bound to strike brilliance with disruptive technologies, many others will likely be left in the middle, having ICO'd to capitalize on a popular investing trend, or simply for capital alone because they could not find funding elsewhere. At this stage, an institutional firm offering capital and guidance could be a saving grace – but a large firm looking only for a trading profit could bring large troubles.

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[6] A smart contract was defined by computer scientist Nick Szabo (1994) as "a computerized transaction protocol that executes terms of a contract. The general objects of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions […], and minimize the need for trusted intermediaries."

[7] Decentralized currencies were first discussed online in the late 1980's by a group of digital privacy and cryptography activists who called themselves the 'Cypherpunks' - some of the early proposals for decentralized currencies that this group created were later referenced in Satoshi Nakamoto's Bitcoin White Paper. See https://goodbit101.com/learn/history

What is a Digital Token?

Of the over 5,000 projects to issue an ICO, the tokens issued can be generally grouped into three classifications.[8] Utility Tokens, sometimes called Platform Tokens or crypto-commodities, are intended to provide the holder digital access to an application or service – examples include SALT (a lending platform), and Augur (a prediction market). Asset Tokens, also referred to as Security Tokens, represent real assets and are analogous in function to the regulated securities available in markets today. Payment Tokens are pure cryptocurrencies – digital store of value, medium of exchange, and unit of account without further function or link to a development project or network. A popular sub classification of Payment Tokens is Privacy Tokens, which use advanced cryptographic methods and special blockchain protocols to make transactions entirely anonymous. In contrast, Bitcoin is a payment token which creates pseudonymous transactions using each user's identification key, and Ethereum uses utility tokens.[9]

Currently, the United States Security and Exchange Commission only recognizes two classifications of cryptocurrency – utility tokens (as commodities) and security tokens (as securities). The standard methodology for token classification in the U.S. is the Howey Test, derived from a famous 1946 Supreme Court case.[10] This official classification is only done by regulators on a case-by-case basis. Under the test, a security is derived from an investment

[8] The first ICO on record was held by Mastercoin in July of 2013, raising 5,000 BTC for a total value of approximately $500,000 at the time. Ethereum, the second largest blockchain network, raised funds with an ICO between July and August 2014, raising 3,700 BTC ($2.3 million at the time of ICO) in its first 12 hours. Bitcoin did not ICO, as there is no central authority behind it; BTC are created by the network software to reward miners.
[9] The largest difference between the Bitcoin and Ethereum blockchain networks is that possessing Ether (Ethereum's native currency) allows the user to run and build applications on a decentralized network run by the computing power of the miners, while Bitcoin uses its miners only to transfer digital information in the form of payments.
[10] See SEC Release No. 81207, "Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO" https://www.sec.gov/litigation/investreport/34-81207.pdf

contract, and transaction is classified as an investment contract (which in this case, means a security token) if it:

1. Is an investment of money; and
2. Is an investment in a common enterprise; and
3. Has an expectation of profit from the efforts of the promoter or a third party.

Many summarize this down to whether investors are investing in the coin for speculative purposes, since that would result in the profits being dependent only on the issuing firm. The industry considers this method of classification fundamentally improper, since many hybrid tokens may have elements that resemble a Utility or Security token (or even be created solely as so) but enable investors to make a capital profit because of the market dynamics surrounding the token or firm itself.

William Mougayar, a prolific crypto researcher and theorist, proposed a three-part framework for the value of a token based on its characteristics and uses in 2017.[11] It is comprised of the roles, features, and purposes of tokens. A token can possess any number of Mougayar's seven *roles*, each with its own purpose and specific features. These roles include: granting the holder *rights* to something such as a product or a vote, acting as a method of value exchange or a toll to get onto the blockchain network, providing function on a given platform, being used as a currency, or entitling the holder to some part of future earnings.

One of the first comprehensive reports on blockchain that caught public attention was done in 2015 by investment banking and asset management firm Needham & Company, titled

[11] See https://medium.com/@wmougayar/tokenomics-a-business-guide-to-token-usage-utility-and-value-b19242053416

"The Blockchain Report: Welcome to the Internet of Value."[12] The report details blockchain and its advantages, applications, and growth drivers/slash hurdles before discussing important digital currencies and their relative markets. Most importantly, the report posits that "In the same way that the internet enabled permissionless innovation for all things regarding information exchange, so too do public blockchains enable permissionless innovation for all things regarding value exchange." The amount raised by blockchain firms annually has grown from the under $500 million reported at that time to over $1.3 billion in the first half of 2019.[13]

While there is a large amount of risk involved in ICO investing, the rewards are tantalizing for investors –the average token purchased in 2017 returned an incredible 12.8x on initial dollar investment. An EY study on the ICO class of 2017 reported that after a year 86% of top ICOs from 2017 were below their listing price, and 30% of them had lost virtually all value.[14] Unfortunately, due to the tremendous volatility of the market as a whole it is hard to tell whether these findings are due to market conditions or the quality of the ICOs themselves. "The [ICO] market is beginning to mature" according to ICOBench.[15] With many more capped ICOs, as well as an average ICO period of almost double that of 2017, market dynamics show that investors are becoming more diligent with their capital, and firms issuing ICOs are working to give investors accurate information regarding valuations. Approximately $11.6 billion was raised by more than 2,500 ICOs in 2018[16]. This shows a 250% growth rate from the 718 ICOs recorded on

[12] See https://www.weusecoins.com/assets/pdf/library/The%20Blockchain%20Report%20-%20Needham%20(Huge%20report).pdf
[13] See Circle Research, "2Q19 Crypto Retrospective" http://research.circle.com/wp-content/uploads/2019/07/2Q19-crypto-retrospective.pdf
[14] See Ernst & Young, "Initial Coin Offerings (ICOs) The Class of 2017 – one year later", October 19, 2018 https://www.ey.com/Publication/vwLUAssets/ey-study-ico-research/$FILE/ey-study-ico-research.pdf
[15] See ICOBench "ICO Market Analysis 2018" report https://icobench.com/reports/ICO_Market_Analysis_2018.pdf
[16] See 15

the site in 2017. Since its start in 2010 at a market capitalization of $0, the cryptocurrency market has grown to an enormous $430 billion in just nine years.

The largest challenges for cryptocurrency adoption continue to be a lack of trust from the public as well as a lack of need.[17] Driving factors for adoption include Web 3.0 and the decentralized internet, open banking across the world, and crypto's ability to function as a scarce store of value against macroeconomic and political risk.

In certain jurisdictions, using an ICO as the source of a startup's capital may allow ventures to avoid certain regulatory compliances and skip over more traditional funding methods such as venture capitalists, banks, or stock exchanges. Unfortunately, the use of ICOs for funding projects may be not be allowed by existing regulations in some jurisdictions (depending on the nature of the project) or may be banned altogether under other regulatory systems including China, South Korea, Vietnam, India, Pakistan, and many other Asian and African countries. Regulation has hardly been improved or standardized across the globe in the past years, with very few countries issuing clear-cut laws or guidelines for cryptocurrency investing or ownership.

On Hedge Fund History and Structure

In contrast, the hedge fund industry has been well-defined and seen maintained regulation since the middle of the 1900's.[18] This industry of quasi-private investment has been a hallmark of finance since its inception, but in recent years there has been competition imposed by more

[17] Detailed analysis is presented in Blockchain, "2019 Cryptoasset Investment Thesis." See https://blog.blockchain.com/2019/06/25/introducing-our-crypto-investment-thesis/

[18] For a comprehensive summary of hedge funds as an alternative investment, see (Chambers, Black, and Lacey 2018), p20-47.

passive investing strategies such as index funds, ETFs, and robo-advisors; hedge fund returns as well as inflows have seen better days.

Hedge funds can be modeled in several structures. The traditional fund structure is a private placement vehicle, which is not publicly available and has restrictions on the marketing it can do and the investors it can serve, as imposed by consumer protection regulations. Those who buy in must be an "accredited investor" or "qualified purchaser," many times needing to adhere to a certain minimum investment size or have a large enough net worth. The liquid alternative investment structure has gained in popularity. This allows a structure like that of an open-ended mutual fund or exchange traded vehicle that can implement many hedge fund strategies, although they may see limitation on leverage, net market position, or degree of illiquid investments due to their public availability.

The investment vehicle most like the hedge fund is the mutual fund, albeit the differences are quite significant. Using their specially allowed leverage, long and short positions, and accessing more illiquid assets, hedge funds are supremely dynamic in trading strategy and are unmatched in this facet by any other regulated investment vehicle. Academic literature has investigated how hedge funds characteristics differ from mutual funds and other asset classes for years, with the general conclusion that hedge funds are able to achieve higher performance using greater levels of risk. Research suggests this outperformance is likely due to the lax regulations imposed on their trading style allowing them superior and dynamic asset allocation strategies, as well as the better managerial incentives (Agarwal, Boyson, and Naik 2009; Eling and Faust 2010).

Hedge fund managers are compensated using a unique fee structure, composed typically of a

management fee that is charged annually regardless of performance and an incentive fee based on a fixed percentage of annual profit. These fees are usually between 1-2% of assets under management and 10-20% of annual profits, respectively. Incentive fees are often charged only if returns net of management fees exceed a predetermined hurdle rate that is often set to a market risk-free rate; most funds also use a high-water mark to determine when incentive fees are charged to ensure that investors do not pay fees on the same profit twice.[19]

Incentive fee contracts are asymmetric and the fund manager receives all the benefit, having no greater financial obligation in the presence of losses or gains, and while some believe it is an appropriate common practice in the industry because it attracts top fund managers and incentivizes their best work, concerns have been raised about the agency problems it may generate in regard to incentivizing risky trading behavior and volatile strategies. A proposed solution to these agency issues is the investment of personal capital by fund managers, which reduces the asymmetry of risk (Chambers, Black, and Lacey 2018).

Due to the strategic flexibility and generally limited regulatory oversight of hedge funds, it makes sense that portfolio managers who possess a sensation-seeking nature would likely be drawn to the industry to increase their liberty in trading behavior.[20] Along with the asymmetrical fee structure, sensation-seeking fund managers may also be additionally incentivized to take substantial risks for illegitimate or purely personal reasons, increasing risk for investors. Cryptocurrencies, providing a highly volatile and liquid new market for investment, could indeed have large appeal to fund managers with a propensity to chase intense experiences.

19 In other words, if a funds NAV falls from $800M to $750M in one period then increases to $810M in the next, investors are only charged investment fees on the portion of that profit that is over the high-water mark of $800M.
20 (Brown et al. 2018) present a detailed analysis of how sensation-seeking behavior by hedge fund manager's affects their fund's performance.

Different hedge funds use a variety of strategies to attain investor return – of the most popular are futures funds, event-driven funds, relative-value funds, and equity funds. Futures funds maintain highly liquid long/short positions throughout equity, fixed income, currency, and commodity markets using derivatives, enabling them to do well even in volatile or crisis markets. Event-driven funds trade in specific companies anticipated to undergo composition changes such as mergers, spinoffs, and destressed debt situations. Relative-value funds focus on relationships in prices of related or similar securities. Both event-driven and relative-value funds perform best in stable environments and can suffer in crisis markets. Equity funds maintain long positions in undervalued stocks and short positions in overvalued stocks, using fundamental or quantitative strategies to pick their positions. They perform best when the equity market is rising.

The first cryptocurrency hedge fund, MetaStable, was launched in September 2014 with backing from Andreessen Horowitz, Sequoia Capital, Union Square Ventures, Founder's Fund, and Bessemer Venture Partners. This showed the first large institutional interest in the cryptocurrency markets and inspired many others to launch more crypto funds subsequently. In July 2019, Prime Factor Capital Limited was the first crypto hedge fund to receive approval from the UK Financial Conduct authority, recognizing it as a full-scope alternative investment fund manager.[21] The true number of crypto hedge funds is unknown and hard to measure due to the lack of uniform reporting regulations across countries, but recent estimates range from between 150 to around 220 and even as high as 400+. These funds manage somewhere between $1 billion

[21] See https://www.bloomberg.com/news/articles/2019-07-02/u-k-regulators-approve-a-crypto-hedge-fund-for-first-time.

and $40 billion in assets according to the same estimates.[22]

According to the substantial report on crypto funds in 2019 done by PWC, only 36% of funds use leveraged trading, and 74% use short positions, although when long-only funds are excluded, over 80% of funds use short positions. 44% of funds use 'discretionary' strategies such as long/short, relative-value, and event-driven; 37% use 'quantitative' strategies which include market-making, arbitrage and low latency trading (these strategies need high liquidity, limiting them to the most popular cryptocurrencies); the remaining 19% of funds studied by PwC were classified as 'fundamental' funds, tending to invest in early stage projects on longer investment horizons and to use the longest lock-up periods of all crypto funds.[23]

[22] Estimates provided are from crypto fund reports by PriceWaterhouseCooper, Morgan Stanley, and Autonomous Research. See https://www.pwc.com/gx/en/financial-services/fintech/assets/pwc-elwood-2019-annual-crypto-hedge-fund-report.pdf, https://cointelegraph.com/news/biggest-crypto-hedge-funds-and-what-they-tell-about-the-market, and https://next.autonomous.com/cryptofundlist, respectively.
[23] *Id.*

II. LITERATURE REVIEW

Initial Coin Offerings and Digital Assets

Initial Coin Offerings are a relatively new subject, being that the first digital currency (Bitcoin) was first created in 2009 and token sales have been around for less than 10 years. Academic literature about ICOs as well as that on the cryptocurrency market in general has proliferated along with the market itself in the past several years. Much of this prior research is concentrated in several areas.

Several recent papers have studied the determinants of ICO success, both empirically and theoretically. Amsden and Schweizer (2019) examine success determinants by first developing a theoretical framework in which venture uncertainty, venture quality, and investor opportunity set are signals for ICO success. Uncertainty is determined using variables such as source code being open, length of white papers, and percentage of tokens distributed, and quality is proxied by team characteristics such as number of employees and advisors and well-connected CEO's. Investor opportunity set is less well defined and considers a potential investor's transaction and opportunity costs when considering investing in an ICO. Their empirical findings reflect that ICO success is negatively correlated with uncertainty, and positively correlated with quality, pre-ICO hard caps, and issuing firms retaining a portion of tokens. They also introduce the "trust triangle framework" to explain how investors and firms agree on a valuation for the tokens using signaling, showing that there was little framework to filter out scammers, providing a possible explanation for the rampant ICO scams. Adhami, Giudici, and Martinazzi (2017) take a more empirical approach to researching success determinants and their findings are concurrent with those of Amsden and Schweizer (2019) as they found that publicly available source code and

token presales (pre-ICO hard caps) are correlated with success, although their sample is quite small at only 253 ICOs.

Boreiko and Sahdev (2018) examine several proxies for ICO success and find weak correlation between them and ICOs' long-term (six-month post-ICO) returns. They do, however, find a correlation with the performance of Ether, yet that may be because they could have had a large proportion of sample ICOs based on the Ethereum blockchain network. The rest of their findings concur with other works in that successful ICOs are self-compliant with anticipated regulations and work to reduce the asymmetric information problem through quality signaling.

Other theoretical works have examined models for token value in a variety of ways. Catalini and Gans (2018) build a game theory model in which tokens receive value solely from investor demand and buyer competition, thus informing the entrepreneur about the derived value of their product. In this model, funds raised are maximized by encouraging investors to save the tokens. Hunter and Kerr (2019) also use a theoretical framework to examine the fundamental value of "Non-Fiat Anonymous Digital Payment Methods" (N-FADs) in which demand for any 'money' is modeled into three parts: transactions demand, precautionary demand, and speculative demand. By adapting the fundamental quantity theory of money, they propose that 'the monetary authority' (i.e. governments) are incentivized to limit growth in N-FAD transactions, as they will lose control over inflation in fiat prices as the economy switches to an N-FAD. Multiple papers discuss the feasibility and advantages of using ICOs to build peer-to-peer platforms and encourage their adoption (Li and Mann 2018; Michael and Wei 2018).

Potential ICO market outcomes have been explained through a moral hazard framework and by considering the effect of behavioral biases. Momtaz (2019) posits that the lack of actors in the

market to verify signals from firms issuing ICOs provides incentive to fool investors about ICO quality. After examining over 1,000 ICO whitepapers, it was concluded that issuers do "systematically exaggerate information disclosed," and that biasing quality signals to investors results in more funds raised in a shorter period. After secondary trading happens, the market learns of the exaggeration and the token will depreciate, potentially leading the platform to failure. Stanley (2019) finds the correlations of ICO return-on-investment with six variables modeling behavioral heuristics, concluding that the easier understanding of an ICO whitepaper leads to increased investment. Combining this with a baseline model, a new hybrid model improved performance by 33.6%, showing that traditional fundamental analysis is not suitable for digital tokens – issuers and investors must consider this when doing analysis.

Luther (2016) examines the future of digital payments by analyzing the obstacles to Bitcoin from incumbent monies and alt-coins. In that both regulators of incumbent monies and new digital tokens have motivation to derail Bitcoin, whether by regulation or offering solutions to Bitcoin's problems, respectively, he concludes that even though digital payments will continue to become more prevalent and widely used, Bitcoin and other digital tokens will likely be no more than niche currencies except "in countries with especially weak currencies," or "in the unlikely event of hyperinflation or government support or both."

Empirical research on digital token returns and other market characteristics has been done using several methods. Benedetti and Kostovetsky (2018) use a broad sample of ICO data (2,390 ICOs), along with crypto market data and ICO Twitter account information to research digital token returns. They find evidence supporting a pattern of ICO underpricing, although it has improved over time and with the prevalence of pre-ICO sales. Momtaz (2018) examines ICOs on

the first day of trading. First day returns are found to be positive and significant, once again correlated with the quality of management, platform vision (visionary projects are less likely to succeed), and ICO profile as proxies for project quality. He also analyzes the sensitivity of the ICO market to large-scale "adverse industry events," using China's regulatory ban and Facebook's ban of ICO advertising as examples, finding that the market is very vulnerable to broad shocks causing volatility. His findings on ICO underpricing are consistent with those by Benedetti and Kostovetsky (2018).

Correlation and principal component analyses have been used to research daily crypto returns (Liew et al. 2019), finding that data in the period of February 2017 to February 2018 differs in variation component structure from periods including years prior, potentially suggesting that the increase of retail investors in crypto markets during the Bitcoin boom of 2017 added a new component. Results also found that Bitcoin has hidden beta-in-the-tails risk similar to hedge funds, and that rolling volatility and correlation among the crypto market are two of the most useful data types in regression analysis. Lee, Guo, and Wang (2018) examine cryptocurrencies as a new asset class and research its ability to act as a portfolio diversifier. Using the CRIX cryptocurrency index, they conclude that, due to its low correlation with traditional asset classes and relatively high daily return, "cryptocurrency as an asset class is a good diversifier in a traditional portfolio."

On another hand, a large portion of existing literature on digital tokens analyzes the regulatory and theoretical framework surrounding classification of tokens, the legal structures governing tokens and funds, and best practices for the industry moving forward. This has included examination of ICO White Papers (Zetzsche et al. 2017; Cohney et al. 2019), the

Howey Test as a classification mechanism (Rohr and Wright 2017), and comparative analysis between the regulatory systems concerning cryptocurrencies in different parts of the world (Hacker and Thomale 2018; Chohan 2017; Kaal and Dell'Erba 2018; Kaal 2018; Di Maio and Vianelli 2018). Most papers that analyze token classification generate new frameworks that are more like the three-class system of described in the introduction than the simple commodity-or-security system that is currently used by the United States.

Many of these papers come to the same conclusions – that the current framework is not proper, and often, that regulators need to adjust their stance. The main risks and concerns that arise in regard to ICOs are: the lack of reliable information available to investors (information asymmetry), oversubscription due to hard caps, a lack of gatekeepers and regulators, ineffective and inconvenient classification of tokens, and insufficient consumer protections in the forms of control over the issuing firm, preemptive rights against dilution, liquidity preference in bankruptcy, or mandatory disclosures from issuing firms. General conclusions and proposed solutions include regulators mandating better reporting from ICO firms, increased gatekeepers and verification, and regulations tailored specifically to each token or type of token on a case-by-case basis.

Determinants of Skill in Hedge Fund Managers

Academic literature on hedge funds is well developed and diversified, dating back to the mid-20th century. Literature especially relevant to this study involves the identification and examination of hedge fund trading skill. If hedge funds are the most skilled investors in the market, then their investment in ICOs could signal that either digital assets as an excellent investment opportunity or that particular ICO firms/applications of blockchain technology have

the potential to disrupt their industry with change.

Research using statistical methods to examine manager skill has found that the best hedge funds have returns that are statistically significant and could not be achieved randomly (Kosowski, Naik, and Teo 2011), but also that the skill of fund managers must be conditioned relative to the macroeconomic context of the time period examined and the fund's strategy (Avramov et al. 2011).[24]

Performance persistence is another possible sign of manager skill, as an especially skilled manager should, in theory, be consistently perform near the top relative to others. Studies examining this have suggested that performance persists over horizon periods of two to four quarters (Ter Horst and Verbeek 2004) and annually (Kosowski, Naik, and Teo 2011). In a model of fund performance as that of both equity market and fund style index performance, persistence was found even in a horizon of 3 years (Jagannathan, Malakhov, and Novikov 2011), with top performers accounting for a majority of the persistence and higher past performance of funds indicating higher future performance both relatively and absolutely.

Other studies have used fund holdings, Sharpe ratios, and covariance analyses to analyze manager skill in stock picking and market timing. For a large part, examination of fund holdings reached conclusions agreeing that managers of the funds researched have skill, whether that be managers of merger arbitrage funds (Cao et al. 2014), those who strategically apply for confidential treatment of certain holdings (Agarwal et al. 2012), or those in the top 10% of a cross-sectional return distribution (Jame 2012). Significant evidence of successful market timing

[24] Some fund portfolios using directional and security selection strategies such as long/short, equity, value based are especially sensitive to market conditions.

has been found at both fund-category and individual fund levels (Chen 2011; Aragon and Spencer Martin 2012), although there is research that suggests stock picking is much more important (Park 2012).

For the purposes of this study, significant research has been done regarding hedge fund manager skill. We will hereon assume that there is certainly a portion of hedge funds that are led by the especially skilled managers, and that their investment in initial coin offerings are primarily based on legitimate analysis of the underlying markets or firms, not pure speculation.

Crypto Hedge Funds

There is very limited empirical research (none was found) in respect to hedge funds' investment in digital assets. Instead, most of the literature comes from a regulatory or descriptive approach. (Di Maio and Vianelli 2018) examine the regulatory treatment of hedge funds in Europe and specifically Malta that invest in cryptocurrencies, detailing the regulatory framework to set up a fund and run it legally under the new Maltese Virtual Financial Assets Act (VFAA). The paper then assesses risks/regulations associated with cryptocurrencies and how they specifically affect an investment fund – including investment risk profile, liquidity, and custody.

Lin and Nestarcova (2019) analyze emerging models in venture capital crypto, finding that ICO issuers benefit from community engagement, lower transaction costs, avoiding possible dilution from stage-based fundraising, and the ability to gain market exposure while engaging early adopters; while venture capital firms still have advantages in reduced information asymmetry and the ability to add non-financial value. Hybrid venture models are discussed, and solutions are proposed such as including contractual protections, improving ICO quality signaling, creating insurance for investors, improving custodian solutions and using escrow

accounts. Mokhtarian and Lindgren (2018) provide the most comprehensive analysis of the crypto hedge fund, detailing the state of crypto regulations including SEC governance and the Howey Test, as well as the non-regulation of "virtual currencies" (digital tokens considered commodities). They then examine the current state of regulations on hedge funds, from the Securities and Exchange Acts to the Investment Advisers and Investment Company Acts, regulation by the Commodities Futures Trading Commission (CFTC), and taxation statutes and exemptions. The paper then attempts to apply these regulations to a crypto fund, finding that because they invest in commodity tokens, most crypto funds face much less regulation and have greater flexibility than traditional hedge funds. It then analyzes "four key areas of advantages and risks" – solicitation of investors, custodianship of client assets, tax treatment, and disclosure obligations – before proposing some best practices for crypto funds to follow for a smooth future.

Current research on the landscape surrounding cryptocurrency and digital assets provides a varied level of understanding – the confusing and uncertain regulatory framework has been fleshed out and inspected many times over, as has token value through a range of approaches. The descriptive analysis of these funds will shed light onto the possible results that come from different methods of investment in the new digital space. The around-the-clock operation and volatility of cryptocurrency markets make them primed with opportunity for hedge fund trading styles, while the disruptive capabilities of blockchain technology present interesting

Empirical analysis on the market continues to better the understanding of how crypto markets compare to that of traditional assets, especially as the market grows older and data more plentiful. Current research does not, however, explore the crypto fund and institutional

investment any farther than that of regulatory examination and simple statistics from industry reports, leaving an important gap in knowledge that this study aims to fill. By examining the relationship between institutional investors and initial coin offerings, this paper will enhance knowledge of the subject for industry participants on both sides, providing valuable insight on how the two have affected each other thus far and a potential look into the future of investing in the digital space.

III.DATA & METHODOLOGY

Data Sources and Variables

The data to be used for analysis consists of two parts: information on the funds who invest in ICOs, and data on the ICOs invested in. Records of 811 Crypto funds were collected by hand from Crypto Fund List (www.cryptofundlist.com). Approximately half of these funds (426) consider themselves hedge funds, while 355 are considered venture capital funds, 24 as private equity funds, and six uncategorized. Information collected includes fund strategies, their investments, location, founding date, assets under management, online information such as the fund's website, social media pages (LinkedIn, Crunchbase, Facebook, Twitter), and contact e-mail address/phone number.

Table 1 provides summary statistics on the funds in our sample regarding their fund type, strategy, and the number of investments per fund for all funds in the sample as well as for the hedge funds specifically. It can be seen that the hedge funds in our sample have a more compact distribution around a slightly lower number of investments, likely due to private equity funds entering in a large number of very early-stage investments, while hedge funds are more interested in projects closer to completion. Both sets of funds show skewness to the right. Figure 1 and 2 show the location of the funds in our sample in respect to the United States and globally, and Figure 5 presents the distribution of hedge fund strategies in the dataset.

TABLE 1

Investor Summary Statistics

Panel A: Investors by Fund Type		Panel B: Count of Investments Per Fund		Panel C: Count of Investments Per Hedge Fund	
N/A	6	Mean	5.87	Mean	5.07
Private Equity	24	Median	4.00	Median	3.00
Venture Capital	425	25 Percentile	2.00	25 Percentile	1.00
Hedge Fund	355	75 Percentile	8.00	75 Percentile	7.00
Total	810	Standard Deviation	5.50	Standard Deviation	5.26
		Minimum	1.00	Minimum	1.00
		Maximum	24.00	Maximum	22.00
		Sum	3366.00	Sum	1110.00
		Count	553.00	Count	207.00

This table reports summary statistics on the digital asset holdings of investment firms originally collected from Crypto Fund List (www.cryptofundlist.com). The data compiled for the sample is not necessarily exhaustive of all digital investments made by each of these funds, but it is concurrent with reported investments and comprehensive for the purposes of this study.

Data on 482 ICO projects was also collected from Crypto Fund List (CFL), with data on their coin/token name, category, investors, location, website, social media pages, and contact e-mail addresses. ICO data was primarily collected from ICOBench (www.icobench.com). The data collected includes: ICO name/description, ICO start and end dates, whether the ICO participated in ICOBench's Know Your Customer (KYC) program, whether the ICO had a pre-registration for investors, and a proprietary rating from ICOBench. The rating

The performance of funds' crypto investments will be measured by aggregating daily price and market data on each currency and rebuilding an equally weighted crypto portfolio for each firm according to the holdings listed on CFL. CoinGecko (www.coingecko.com) will also be used to collect cryptocurrency market data such as daily price, volume, market capitalization, and tokens in circulation. This data was retrieved from *Coingecko.com* through their public API.

This data was supplemented through the reference of a wide number of cryptocurrency exchanges as necessary.

Table 2 provides summary statistics on our sample of coins, finding significant skew to the right both in investor count per coin and all market data. Although 132 of the projects have only one investor, coins with between 2 and 8 investors account for 50.62% of the sample. This further exemplifies the state of cryptocurrency investing where the most developed coins attract a vast majority of attention and investment dollars from participants and smaller coins who are new to the market may have a hard time getting off the ground in any major way. The return offered by coins in the sample is particularly eye-catching due to the fact that while only around 17% of coins sampled were profitable at all, the sample on average returned an astronomical 2,096%, showing that returns seem to follow the same trend as investment. It should be considered whether the increased investment follows the returns or vice versa – unfortunately, that is beyond the scope of our data.

TABLE 2

Coin Summary Statistics

Panel A: Investor Count Per Coin		Panel B: ICOBench Ratings	
Mean	6.61	Mean	3.10
Median	3.00	Median	3.10
25 Percentile	1.00	25 Percentile	2.70
75 Percentile	7.00	75 Percentile	3.60
Standard Deviation	12.03	Standard Deviation	0.72
Minimum	0.00	Minimum	0.90
Maximum	156.00	Maximum	4.50
Sum	3188.00	Sum	518.30
Count	482.00	Count	167.00

Panel C: Market Data					
Return (%)		Avg Volume (Millions)		Avg Market Cap (Millions)	
Mean	-40.54%	Mean	34.56	Mean	242.95
Median	-70.74%	Median	2.70	Median	30.24
Standard Deviation	75.44%	Standard Deviation	91.98	Standard Deviation	525.65
Minimum	-98.69%	Minimum	0.01	Minimum	0.97
Maximum	184.57%	Maximum	385.52	Maximum	1,981.87
Count	189.00	Count	189.00	Count	166.00

This table reports summary statistics for the digital tokens issued by ICO firms in the sample. ICOBench ratings were obtained from www.icobench.com and is comprised of four categories: 'Team,' 'ICO Information,' 'Product Presentation,' and 'Marketing & Social Media.' Coin investor data was obtained from CryptoFundList (www.cryptofundlist.com), and coin market data was obtained from CoinGecko (www.coingecko.com). The data in Panel C was winsorized from 5% to 95% to control for outliers.

Information on 2,353 relevant people at these funds including their name, position, e-mail address and LinkedIn page. Their most common job functions are reported in Table 3.

TABLE 3

Crypto Fund Employees by Job Function

Category	Count	%
Management	1311	65.45%
Investments	213	10.63%
Technology	114	5.69%
Research	105	5.24%
Other	260	12.98%

This table reports the most common job functions of 2,003 crypto fund employees as listed by CryptoFundList (www.cryptofundlist.com).

Bias in Hedge Fund and ICO Databases

Since reporting is voluntary, there is a natural self-selection bias in hedge fund databases. Concerns of backfill bias (the result of hedge funds including data prior to the listing date when listing on a database) have been raised by Bhardwaj, Gorton, and Rouwenhorst (2014) – these will be addressed by rerunning tests after removing return observations that were backfilled prior to the fund's listing date. Since we will be constructing our own dataset, these biases should not disturb any of our results.

There has been slight controversy over the existence of survivorship bias in the CoinMarketCap (CMC) database – Amsden and Schweizer (2019) state the "the website removes all evidence of a crypto-asset once it makes the decision to delist it," while Benedetti and Kostovetsky (2018) refer to CMC as "a survivorship-bias-free dataset that currently includes data from approximately 1600 active and 1100 defunct cryptocurrencies." Coin survivorship bias likely does not apply to this research, as the ICOs to be examined should inherently still be active, but the sheer size of CMC's records (more than double most other ICO aggregators with

data on over 4,800 tokens) gives us reason to believe that the bias is negligible if present at all.

Translation bias may be present in the data from CMC. This is because many early exchanges did not offer USD or any fiat currency trading options, leading to USD prices listed on CMC that result from the BTC/USD rates of other exchanges. The market data collected from CoinGecko should comprehensively supplement any of these biases.

Methodology

Each fund's crypto performance was analyzed by building a composite portfolio of their listed investments. Each investment will be equally weighted – due to the stringency of data on institutional fund portfolios, as well as the pseudonymous nature of digital tokens, we were unable to retrieve explicit data on portfolio construction. Using the data from these portfolios, we will analyze the performance of the Hedge Fund firms against both Private Equity and Venture Capital firms to determine if there is a significant difference in return between them.

After using the CoinGecko API to download all available market data for every crypto project listed, our dataset consisted of approximately 200 tokens, with observations of volume, market capitalization, and price for each day CoinGecko was able to track them (for most coins this is since ICO). The average for each of these datapoints was calculated so that fund portfolios could be efficiently constructed by simply using the averaged variables corresponding to each token in a fund's portfolio and weighing them equally. Table 4 shows summary statistics for the return, market capitalization, and volume for the portfolios that were built – it is notable that most investments in the sample resulted in a loss (with many declining over 90%).

TABLE 4

Average Composite Portfolio

Panel A: Annual Portfolio Return		Panel B: Portfolio Volume (Millions)		Panel C: Portfolio Market Capitalization (Millions)	
Mean	62.60%	Mean	900.63	Mean	10,115.56
Median	-21.55%	Median	60.45	Median	439.34
Standard Deviation	83.57%	Standard Deviation	1,333.39	Standard Deviation	16,143.05
Minimum	-93.18%	Minimum	0.58	Minimum	2.08
Maximum	150.96%	Maximum	4,216.5	Maximum	53,233.10
Count	431.00	Count	431.00	Count	431.00

This table reports summary statistics on the annual return, average market capitalization, and average daily volume for all composite investment portfolios built for funds in the sample. All coin market data was obtained from CoinGecko (www.coingecko.com) and fund type information as well as portfolio holdings were obtained from CryptoFundList (www.cryptofundlist.com). Fund portfolios were put together by averaging the respective returns of all coins with data available. Data was winsorized from 5% to 95% to control for outliers.

Table 5 sorts the average fund portfolio's return, market capitalization, and volume grouped by fund type, our variable of interest. After winsorizing the data 5% to 95%, it can be seen that hedge funds significantly outperform both private equity and venture capital firms, posting the only positive mean return at 62.60%. The composite portfolios of hedge funds were also the only fund type with a positive median statistic, showing that well over half of the hedge funds in our sample had a profitable portfolio.

TABLE 5

Average Composite Portfolio Sorted by Fund Type

Panel A: Annual Portfolio Return on ICO Investment by Fund Type			
	Hedge Fund	Private Equity	Venture Capital
Mean	62.60%	-30.82%	-30.57%
Median	93.35%	-59.76%	-60.29%
Standard Deviation	71.77%	68.39%	69.00%
Minimum	-93.18%	-93.18%	-93.18%
Maximum	150.96%	128.20%	150.96%
Count	173.00	12.00	246.00
Panel B: Portfolio Market Capitalization (Millions) by Fund Type			
	Hedge Fund	Private Equity	Venture Capital
Mean	21,014.87	1,523.07	2,869.75
Median	18,732.37	27.60	69.34
Standard Deviation	18,773.76	3,666.37	8,313.82
Minimum	2.08	2.08	2.08
Maximum	53,233.10	12,453.24	53,233.10
Count	173.00	12.00	246.00
Panel C: Portfolio Volume (Millions) by Fund Type			
	Hedge Fund	Private Equity	Venture Capital
Mean	1,856.69	236.69	260.67
Median	1,747.54	4.86	10.85
Standard Deviation	1,477.15	512.03	706.11
Minimum	0.58	0.58	0.58
Maximum	4,216.58	1,415.54	4,216.58
Count	173.00	12.00	246.00

This table reports summary statistics on the annual return, average volume, and average market capitalization of equally weighted composite fund portfolios sorted on fund type. All coin market data was obtained from CoinGecko (www.coingecko.com) and fund type information as well as portfolio holdings were obtained from CryptoFundList (www.cryptofundlist.com). Fund portfolios were put together by averaging the respective returns of all coins with data available. Data was winsorized from 5% to 95% to control for outliers.

Hedge fund returns also have the highest standard deviation – much more of this variation appears to be to the upside when compared with private equity and venture capital. This shows that a majority of hedge funds likely have the same successful holdings and the holdings outside

of those major positions are likely the source of volatility in the sample. When examining market capitalization and trading volume, it appears to show that the hedge funds in our sample are more interested in trading the larger, more pronounced coins (likely due to their already developed markets), while both private equity and venture capital firms have much more investments in early-stage ICO projects that are still growing.

Private equity firms have the lowest average return, although the sample size is quite small compared to that of hedge funds and venture capital firms. This is could be attributed to private equity's tendency to enter businesses that are in later stages of funding, usually after operations have stabilized and cash flows can be accurately forecasted.

Table 6 displays the summary statistics of our coin sample when divided into two groups based upon these variables: Panel A and B examine coins with and without hedge fund investment, while Panel C and D examine coins with at least one hedge fund investor whose proportion of investors which are hedge funds is greater/less than the median proportion, which is 16.67% of a coin's investors.

Both sets of data show significant correlation between increased hedge fund investment and increased return. Coins with hedge fund investment have an average return that is around 26% higher than those with no hedge fund investment, although the large amount of failing ICO project means that all averages are negative. In Panels C and D, it is shown that the coins with more hedge fund investors are likely to perform better and have larger overall markets than those with less hedge fund investors.

TABLE 6

Coin Performance and Hedge Fund Investment

Panel A: Coins with no HF Investors					
Annual Return (%)		Avg Volume (Millions)		Avg Market Cap (Millions)	
Mean	-56.62%	Mean	10.83	Mean	90.34
Median	-78.97%	Median	1.07	Median	22.26
Standard Deviation	66.35%	Standard Deviation	47.89	Standard Deviation	338.49
Minimum	-98.69%	Minimum	0.01	Minimum	0.97
Maximum	184.57%	Maximum	385.52	Maximum	1,981.87
Count	75.00	Count	75	Count	63
Panel B: Coins with HF Investors					
Annual Return (%)		Avg Volume (Millions)		Avg Market Cap (Millions)	
Mean	-29.95%	Mean	50.17	Mean	336.29
Median	-63.85%	Median	3.71	Median	50.66
Standard Deviation	79.38%	Standard Deviation	109.33	Standard Deviation	595.10
Minimum	-98.69%	Minimum	0.01	Minimum	0.97
Maximum	184.57%	Maximum	385.52	Maximum	1,981.87
Count	114	Count	114	Count	103
Panel C: Coins with PercentHF < Median (33.33%)					
Annual Return (%)		Avg Volume (Millions)		Avg Market Cap (Millions)	
Mean	-57.83%	Mean	14.24	Mean	88.92
Median	-78.03%	Median	1.44	Median	25.06
Standard Deviation	59.54%	Standard Deviation	56.14	Standard Deviation	298.97
Minimum	-98.69%	Minimum	0.01	Minimum	0.97
Maximum	184.57%	Maximum	385.52	Maximum	1,981.87
Count	103	Count	103	Count	88
Panel D: Coins with PercentHF > Median (33.33%)					
Annual Return (%)		Avg Volume (Millions)		Avg Market Cap (Millions)	
Mean	-19.82%	Mean	58.90	Mean	416.72
Median	-57.24%	Median	3.80	Median	71.91
Standard Deviation	86.82%	Standard Deviation	117.60	Standard Deviation	658.33
Minimum	-98.69%	Minimum	0.01	Minimum	0.97
Maximum	184.57%	Maximum	385.52	Maximum	1,981.87
Count	86	Count	86	Count	78

This table reports summary statistics on the annual return, average volume, and average market capitalization of coins with varying degrees of hedge fund investment. Panels A and B sort the coins into two groups based on having at least one hedge fund investor. Panels C and D then sort the coins into two unrelated groups based on the percentage of their investors which are hedge funds (above or below the median level). All coin market data was obtained from CoinGecko (www.coingecko.com) and coin investor information was obtained from CryptoFundList (www.cryptofundlist.com). Fund portfolios were put together by averaging the respective returns of all coins with data available. Data was winsorized from 5% to 95% to control for outliers.

While this data could be assumed to show that hedge fund investment is meaningful and helps ICO firms/coins fundamentally increase value, a more likely conclusions is that the hedge fund investment model is better suited for a high-risk, high-volatility environment such as digital assets. Proponents of hedge fund manager skill could use this data to add to claims that hedge fund managers simply pick better investments than their counterparts.

Using the previously calculated time-invariant returns for each coin and fund, linear regressions were used to estimate the effects of hedge fund investment on coin return, as well as the difference in fund return that hedge fund's exhibited against non-hedge fund firms. Three variables were created to help model these effects – two for regressions on coin return, and one for regression on fund return. For coins, *Hfinvested* is an indicator variable taking the value one if a coin has any hedge fund investors and zero if it has none. The second variable, *percentHF,* is simply the percent of a coin's listed investors that are hedge funds. In Model 1 and Model 2, seen below, these are used to model coin return in ordinary least squared regressions with robust standard errors. Regression results in Table 7 are consistent with the information seen in the other tables.

$$Return_{coin} = \alpha + \beta_1 HFinvested \quad (1)$$

$$Return_{coin} = \alpha + \beta_2 PercentHF \quad (2)$$

Model 1 shows an increase to annual return of 0.267% when a coin has at least one hedge fund investor, while Model 2 assigns a 1.161% increase in annual return for each percentage of a

coin's investors which are hedge funds. Both coefficients show significance at the 5% level, with *PercentHF* showing significance at the 1% level. Models 3 and 4 use the same independent variables as 1 and 2, respectively, but instead present the dependent variable as daily coin return. Coefficients are much smaller at 0.00161 for Model 3's *HFinvested* and 0.00472 for Model 4's *PercentHF* but remain statistically significant at the 1% level and consistent with the findings from earlier regressions as well as descriptive statistics. The coins that hedge funds are invested in continue to outperform the rest of the sample – while this may be due to hedge fund investment influencing the market or supplying much needed capital to an ICO firm, it could just as well be that hedge funds have no effect on the coin, but instead the correlation exists because hedge funds continue to invest in the largest and most profitable coins. The data also shows that many of the hedge funds in the sample are invested in the same coins, which could provide an explanation rooted in similar analysis or simply herd mentality by hedge fund managers.

TABLE 7

Coin-Level Return

Coin Return	Model 1 *~HFinvested*	Model 2 *~PercentHF*	Model 3 *~HFinvested (Time Series)*	Model 4 *~PercentHF (Time Series)*
Hfinvested	0.267**		0.00161***	
	(0.111)		(0.0005)	
percentHF		1.161***		0.00472***
		(0.184)		(0.0007)
Constant			-0.0074***	-0.007414***
			(0.0003)	(50.13)
Observations	189	189	133,944	127,574
R-squared	0.03	0.175	0.0003	0.0007
Number of Coins (Time Series)			193	187

Coefficients
Robust Standard Error in Parenthesis

*** p<0.01, ** p<0.05, * p<0.1

This table reports coefficient estimates from regressions on coin return. Models 1 and 2 present the dependent variable as annual coin return, while Models 3 and 4 present the dependent variable as daily coin return. Historical pricing data was obtained from CoinGecko (www.coingecko.com). The independent variables are used to track hedge fund investment in each coin. *HFinvested* is an indicator variable that takes the value of one for coins with at least one hedge fund investor. *PercentHF* is the percentage of listed investors in each coin that are recorded as hedge funds. Both listed investors and their fund type come from CryptoFundList (www.cryptofundlist.com). Data was winsorized from 5% to 95% to control for outliers.

The investors dataset was assigned the variable *HF*, an indicator taking the value one for hedge funds and zero for private equity and venture capital funds. Model 5 below models return at the fund level with the same robust OLS function used in Models 1, and 2. Fund return was calculated by annualizing the holding period returns of each coin listed as a fund's investment in the CryptoFundList database (provided that historical pricing information for the coin was

available from CoinGecko). It was assumed that all funds bought invested in each coin at ICO or earliest date recorded. Findings from Model 5 are consistent with previous tables, with the *HF* indicator variable increasing annual return by 0.932% and being statistically significant at 1%.

TABLE 8

Fund-Level Return

Fund Return	Model 5
HF	0.932***
	(0.069)
Constant	
Observations	431
R-squared	0.299
Number of Funds (Time Series)	

Coefficients
Robust Standard Error in Parenthesis

*** p<0.01, ** p<0.05, * p<0.1

This table reports coefficient estimates from regressions on the return of equally weighted portfolios created from recorded holdings of the funds in our sample. Models 5 presents the dependent variable as annual fund return. Historical pricing data was obtained from CoinGecko (www.coingecko.com), and fund portfolios were put together by averaging the respective returns of all coins with data available. *HF* is an indicator variable that takes the value of one for funds listed as hedge funds. Fund holdings and fund types were obtained from CryptoFundList (www.cryptofundlist.com). Data was winsorized from 5% to 95% to control for outliers.

IV. DISCUSSION AND SUMMARY

This study's attempt to provide empirical analysis on the crypto hedge fund space and the dynamics of institutional investment in ICOs and digital tokens was severely limited by a lack of available data to the extent needed. While hedge funds do occasionally report their holdings, they are not obligated to due to their special treatment under financial law. This created significant problems for our study, most substantially in respect to timing and position sizing. Knowing *when* an investor purchased a given token provides insight not only on price but also on the investing strategy being pursued – for example, it would be likely to see venture capital funds investing much earlier than larger hedge funds due to their business model. Without these dates, it was acceptable to assume that all investments were made at ICO date, but that leads to problems with the oldest coins since many of them (Bitcoin, Litecoin) did not ICO and were launched far before cryptocurrencies had the attention of institutional investors. This limitation was acknowledged from the beginning, but relevant data available was even further lacking than I had worried about.

While unable to directly and empirically identify the large-scale relationships between institutional investment and initial coin offerings originally set upon, this research still contributes meaningfully to the field of hedge fund research by identifying comparative relationships between hedge funds and other institutional investors concerning digital asset investing.

The descriptive statistics listed in this study shine light on the risk taken on by institutional investment firms in the young digital asset space. For venture capital and private equity firms, whose investment models include investing heavily into individual businesses that often young

and being involved at the project level, the risk in this industry is quite high, although appropriate when considering returns. The investment model of hedge funds, however, in some ways seems tailor-made for digital asset investing: these firms are familiar with high volatility and many approach the cryptocurrency markets the same way they approach commodity trading, which seems to be working quite well.

The statistics also point towards hedge fund managers having tangible skill in this market as well, with returns higher much higher than private equity and venture capital firms. While none of the models exhibited in the study were significant on their own, most of the hedge fund-based variables inside of them showed significance at levels of $p = 0.1$ and $p = 0.05$. In the future this research should be revisited with more substantial data to reassess the findings. It would be interesting to see if hedge funds will lose their edge as the market grows into adolescence, and by how much PE and VC firms can increase their returns as the businesses they invest in grow as well.

APPENDIX

TABLES AND FIGURES

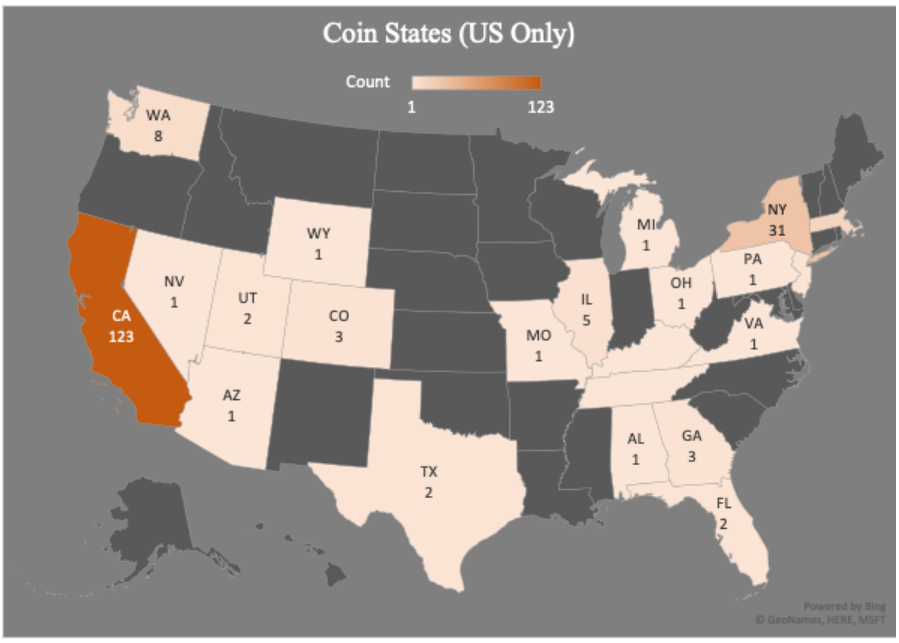

FIGURE 1 *:* ICO Firm Locations (US Only)

This figure exhibits geographic locations of the American ICO firms in our sample. This data was collected from CryptoFundList (www.cryptofundlist.com).

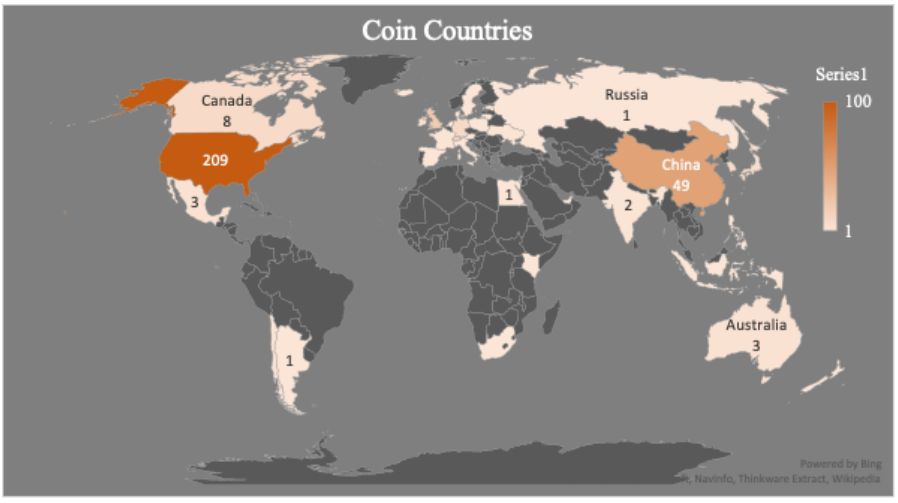

FIGURE 2: ICO Firm Locations

This figure exhibits geographic locations of the all ICO firms in our sample that provided location data. This data was collected from CryptoFundList (www.cryptofundlist.com).

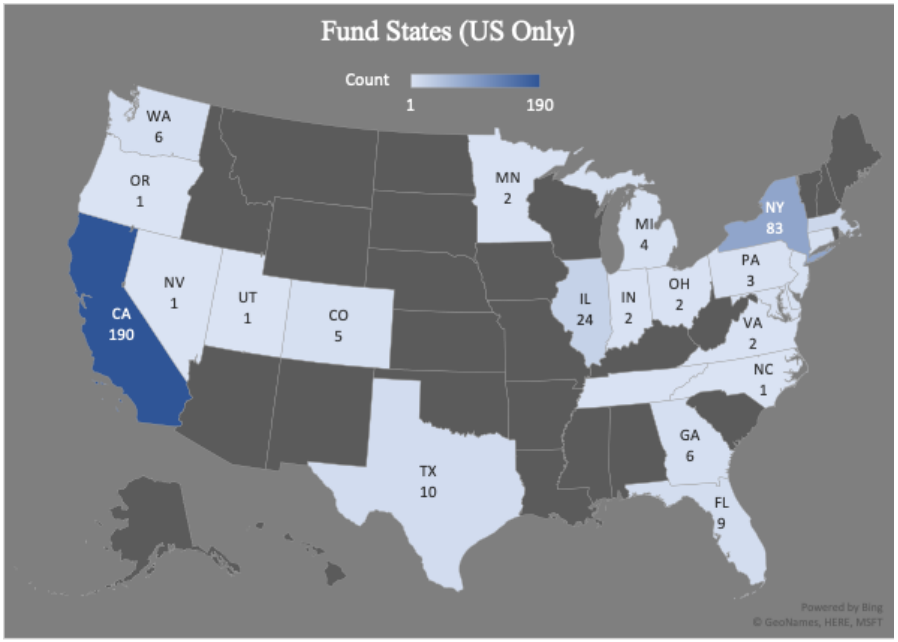

FIGURE 3: Investment Firm Locations (US Only)

This figure exhibits geographic locations of the American investment firms in our sample. This data was collected from CryptoFundList (www.cryptofundlist.com).

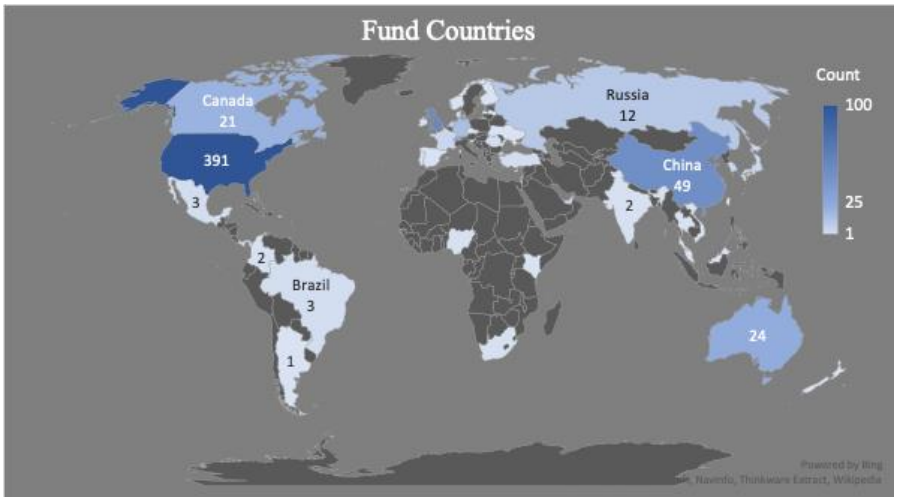

FIGURE 4: Investment Firm Locations

This figure exhibits geographic locations of all investment firms in our sample that provided location data. This data was collected from CryptoFundList (www.cryptofundlist.com).

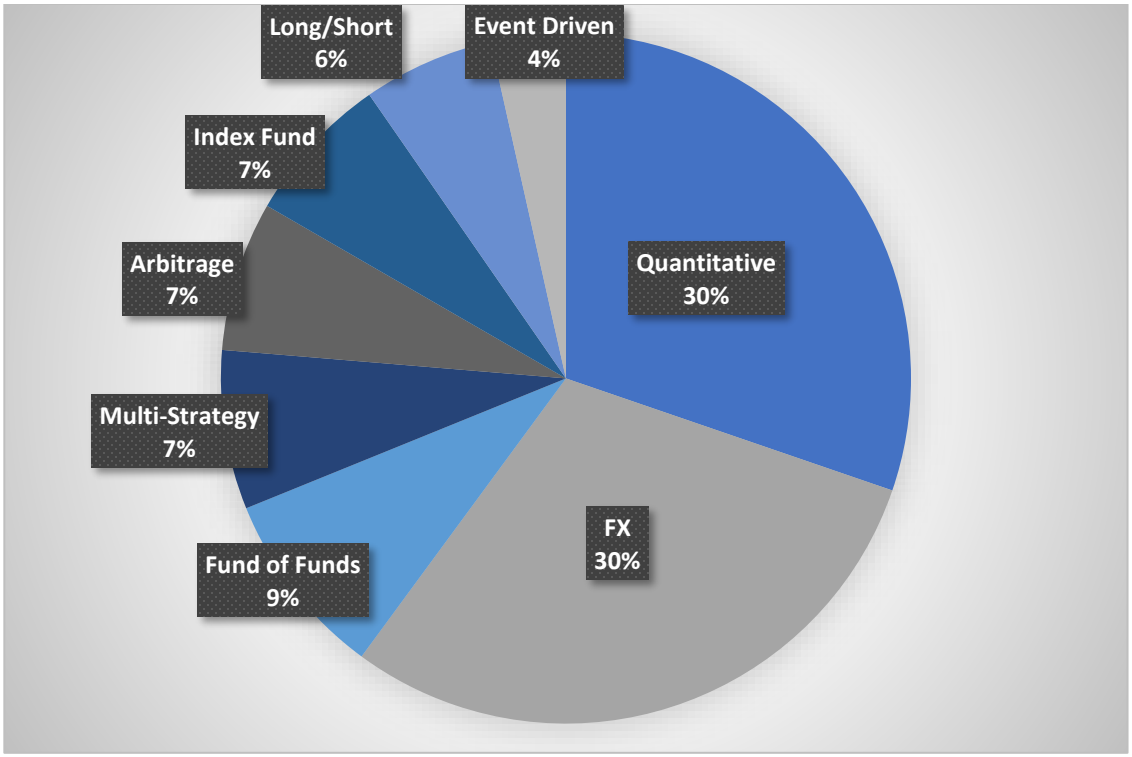

FIGURE 5*:* Hedge Fund Strategies

This chart shows the listed strategies of all investment firms listed as hedge funds in our sample. Fund type and strategy were collected from CryptoFundList (www.cryptofundlist.com).

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