PREDICTABILITY OF ICO SUCCESS AND RETURNS

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Abstract

Initial coin offerings (ICOs) provide a platform of tokens to the public as a way of crowdfunding, primarily to start-ups in cryptocurrencies. This empirical study is one of the first to analyse the determinants of ICO success and post-ICO returns which in recent years allowed start-ups to raise several billion US dollars. A unique dataset of 432 executed ICOs was compiled from online platforms and other publicly available data sources. ICOs have the potential to deliver a quick return, or alternatively can turn into an unrecoverable loss entailing high risks. This study identifies factors such as investor sentiment, time horizons and correlations with other asset markets that can provide predictability to both the post-ICO returns and the success of the ICO. Overall, this study provides unique and new insights into this novel entrepreneurial practice, perceived by regulators as the "wild west" of fundraising and an ever-increasing source of capital for new technology start-ups.

JEL Classification: G10, G20, G32, L26, M40, O30
Keywords: Initial coin offerings, white paper, blockchain, distributed ledger, smart contract, cryptocurrency, digit tokens.
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Introduction

Traditionally early-stage funding has been supplemented by crowdfunding. Crowdfunding is the practice of funding a project or venture by raising relatively small amounts of money from a large number of people, typically via the internet. Initially, crowdfunding was provided in exchange for rewards or deals on products, and more recently, in exchange for securities or shares in a firm. However, advances in blockchain technology have led to a new form of crowdfunding known as initial coin offerings (ICOs).

ICOs are a relatively new phenomenon but have grown rapidly, now accounting for more start-up funding in blockchain and cryptocurrencies surpassing investments by even venture capitalists. This has become even more prominent in recent times, with more money being raised by ICOs in the first three months of 2018 than the whole of 2017 (CoinDesk, 2018).

However, the financial and accounting industry, regulators, international standard bodies such as FASB and IAS and investors are still seeking to better understand the dynamics and subsequent affects of crypto-currencies and funding mechanisms such as ICO's. Given this setting, this paper provides unique and new insights into this new financing mechanism called ICO's. We pose the following research questions: 1. What factors can predict ICO success (amount of money raised) ? 2. What factors effect post ICO returns? We build upon and expand on previous qualitative studies on ICOs such as Karl & Dell'Erba (2017) and Yadav (2017). Moreover, presently there is limited but growing stream of research that connects institutional theory with entrepreneurship (Bruton et al., 2010). However, applying institutional theory to ICOs presents unique challenges. On one hand, this new theory of entrepreneurship and source of capital has the potential to deliver abnormal returns. On the other hand, the investment can turn sour resulting in a total loss highlighting the risky nature of ICOs. This risky nature of ICOs, novelty, their continuously increasing popularity and the large sums involved merit the need of empirical research in this area.

Due to the uncertainty of success it is vital to investigate and gather as much information as possible about an ICO before deciding to invest. This paper provides a comprehensive analysis of what factors affect the success and profitability of ICO backed start-ups in this new and upcoming industry. In more detail, we analyse what factors or characteristics of these ICOs affect both the amount of money they raise during the ICO and the post-ICO returns.

We find that the "pre-listing" period of the ICO provides significant predictability regarding both the success and returns of the ICO. The proxy we utilise as an ICO investor sentiment and the time until listing also possess significant explanatory power for the returns on the ICOs.

As investor sentiment and "hype" are key drivers of returns in the cryptocurrency market we use a proxy created by icodrops.com, which is widely used by ICO investors in their investment decision process. However, this is unable to predict ICO success, but becomes a strong predictor of post-ICO returns. Our results also show the changing dynamics of the ICO marketplace, with ICO funding and abnormal post-ICO returns becoming more difficult to obtain. There is limited research in this area, with the majority of these being qualitative studies due to the inaccessibility and difficulty in obtaining data on ICOs. Studies such as Kaal and Dell'Erba (2017) and Yadav (2017) analyse ICOs through theoritcal frameworks laying a platform for future studies. Feng, Li, Lu, Wong, & Zhang (2018) and Fisch (2018) identifies the importance of white papers, and in particular their quality, in the success of ICO funding.

Our study takes an alternative view by compiling a unique database of 432 ICO's and conducting an empirical analysis on the more intricate factors that may affect the success of ICOs, and the post-ICO returns. Our results will be of interest to investors in ICO's, entrepreneurs and regulators alike. Section 2 details the ICO mechanism. Section 3 provides the literature review. Section 4 develops the hypotheses. Section 5 provides the research methodology. Section 6 provides empirical results. Section 7 discusses limitations of the study. Section 8 concludes the study.

2. ICO Mechanisms

ICOs are the cryptocurrency version of crowdfunding and are a part of the crypto-world that is most likely to persevere due wider usage. It is one of the simplest and most efficient methods for companies and individuals to fund their projects, and for mostly regular retail investors to invest in projects in which they observe to have value and potential. An ICO is an event that usually extends over a period of one week or more and in which any member of the public is able to purchase newly issued tokens in exchange for cryptocurrencies such as Bitcoin (BTC) or Ethereum (ETH).

Tokens are cryptocurrencies, for which all records and transaction data are protected by cryptographic methods. Entrepreneurs issue tokens to raise capital to help develop their own online platform or ecosystem. Within their ecosystem, all transactions require the use of their unique token. After the ICO, and once the platform has gone through sufficient development to be approved for listing, tokens are listed on cryptocurrency exchanges. This provides liquidity to the token-holders who bought the token during the ICO, and provides a potential signal of favourable prospects for the ICO.

The timeline of an ICO can be explained as follows; (Li, J., & Mann, W., 2018)

1. ICO stage:

- The entrepreneur sets the number of tokens for sale, the minimum price that each token will be issued at, the share of tokens the entrepreneur will retain, and whether the ICO is made contingent on whether a specific quantity of tokens are purchased ex-ante.
- The entrepreneur offers the tokens in an auction where investors can decide whether to invest or not.
- If the total purchases exceed the minimum threshold and raises enough money to continue the development of their digital platform (note they do not have to hit the

maximum threshold), the venture proceeds. If it does not raise enough money, the project may be discontinued.

2. Market stage:

- If the entrepreneur is successful in developing their coin to a stage where it is acceptable to list, they launch the platform in the market with tokens being the only accepted medium of exchange on it. (This is dependent on whether the exchange approves the listing of the coin through a voting process).
- Buyers trade tokens at a new market-determined exchange rate.
- Payoffs and profits are released to stakeholders.

Buyers have interest in buying tokens at an ICO based on the possibility of the token increasing in value post-ICO, when the token is listed on a cryptocurrency exchange. The ICO will only be listed on a cryptocurrency exchange if the ICO project is successful in setting up the digital currency and finding an exchange for the coin to be listed on. A cryptocurrency exchange is an online platform in which you can exchange one cryptocurrency for another, or a cryptocurrency for fiat currency. This is very similar to how a stock exchange or currency exchange traditionally works, depending on the type of exchange. Fiat to crypto exchanges provide investors with an entry point into the market by providing a platform to trade their local fiat[1] currency for cryptocurrency; centralised exchanges are different, as they act as middlemen to facilitate trades, allow market access to new investors; decentralised exchanges are where the exchange operates by matching the users buy and sell orders; peer to peer exchanges are where buyers and sellers are matched, much like how TradeMe is operated. To become listed on a cryptocurrency exchange, the entrepreneur must submit an application and be approved. The criteria and process itself varies widely between each exchange. For example, a cryptocurrency

[1] Fiat currency is "legal tender" backed by a central government.

exchange known as “Poloniex” bases their application decisions on how unique each project is and whether their current community would be interested in trading the token; whereas, more developed and bigger exchanges like “Bittrex” are more stringent in their choice of tokens being listed. Their criteria involve the regulatory compliance surrounding the individual ICO and how the underlying team handles the platform. The exchanges allow initial buyers to sell their holdings, and new buyers to enter the market at will; the buyer of these tokens has no guarantee that the project will be developed, and if the project is not developed the current holders of tokens lose all the capital invested. More importantly, there is also no current regulatory protection around the possibility of an ICO being a scam. A report by an ICO advisory firm known as Statis Group found that more than 80% of ICOs conducted in 2017 were identified as scams. (Alexandre, 2018).

Another key aspect of ICOs is the process by which investors invest and information publicly observable by these investors to base their investment decisions. Their investment decisions are largely based on the “whitepaper” for each ICO. Almost every ICO has a whitepaper, which contains vital information regarding the project including the purpose, structure, mission, benefits, team members, roadmap and future plans. Based on this information investors make a decision regarding whether to invest or not. Hence, this is the ICOs’ chance to impress and attract investors. Sources such as icodrops.com attempt to summarise key details from the whitepaper, and provide expert reviews of the token. This source is utilised in the empirical analysis section. There are also online forums where investors discuss investment opportunities within cryptocurrency groups, such as Github, twitter and reddit.

More information is disclosed to the investor once the ICO has started raising funds, for example as shown by DAICO the Abyss’ ICO dashboard in Figure 1. This provides investors

with information such as; what cryptocurrencies are accepted as payment, live tracker of the progress of the ICO, soft cap and hard cap, and if applicable the set end date of the ICO.

Figure 1: DAICO The Abyss' ICO Dashboard

The hard cap of an ICO is the maximum amount of funds that it aims to raise. While, the soft cap is the amount raised at which the ICO can be considered a success. Figure 1 also shows that currently the ICO has raised $9,413,961 currently, being the equivalent of 14,919 unit of Ethereum (ETH) or 126,992 units of Binance Coin (BNB). Majority of ICOs do not accept fiat as a form of payment, so investors who are investing with USD, for example, will first have to use a cryptocurrency exchange, to exchange their fiat for a cryptocurrency accepted by the initial coin offering.

In addition, a comparison can be made between ICO and Initial Public Offerings (IPOs). ICOs provide the platform for any investor to invest any amount they wish, whereas IPOs are centred towards institutional and professional investors who are willing to invest larger sums. As mentioned previously, an ICO is coined as the wild west of fundraising, whereas IPOs follow strict regulations and require a large amount of paperwork and disclosure requirements. When investing in an ICO there are difficulties determining what laws and regulations apply

to each ICO, due to each country having their own unique laws regarding ICOs. Moreover, increased scandals, media attention and popularity of ICO's result in a wave of changes in ICO regulation in many countries. The objective of such regulation is to make ICOs more legally compliant and predictable, which will in turn increase investor protection and security.

As mentioned previously there are many major risks associated with ICOs, due in large part to the lack of regulation and security surrounding them. This is highlighted by the SEC Chairman Jay Clayton who, stated, "The behaviour we see in this is pretty bad. We have got guys with bags of cash headed to the border [from fraudulent ICOs]. That is not our securities market." He also suggests that ICOs should be treated similarly by US regulators as firms selling traditional stocks (Asia Times, 2018). Recently cryptocurrency scammers escaped with more than $2 million of investor funds after carrying out an apparent fake initial coin offering called "Giza." Moreover, because many ICOs are conducted via Ethereum transactions (where Ethereum is used to purchase the tokens) on the blockchain, the transactions themselves can be tracked but the person behind them remains anonymous. (CNBC, 2018)

ICO Regulation

Different countries have also adopted varying approaches to the regulation of cryptocurrencies. Due to being a novel financing concept regulators worldwide has not yet reached a general consensus regarding legal rules of ICOs. While ICOs are banned in South Korea and China since September 2017, they are largely encouraged in Singapore, Switzerland, Malta and Estonia. For example, China justifies completely banning the cryptocurrency marketplace for investor protection and financial risk prevention. This is not pertinent just for ICOs, as the Chinese ban covers all cryptocurrency-related commercial activities and events. This also highlights the differing approaches each country is taking regarding regulating the cryptocurrency market place, and how regulation is changing rapidly to help protect investors.

Interestingly, in New Zealand there has been no decision on whether, or how, cryptocurrencies will be regulated.

The Monetary Authority of Singapore has issued a guide to ICOs in November 2017. Switzerland has designated a canton as a "Crypto Valley" and Malta has established regulatory framework to attract foreign investors in crypto and blockchain technologies as a whole.

However, the U.S. Securities and Exchange Commission (SEC) and the Ontario Securities Commission in Canada issued a series of warnings against ICOs. The SEC maintains a website to inform investors about ICO scams. Moreover, the SEC filed a complaint against Centra Tech for false representation. Centra raised approximately $32 million between July 2017 and October 2017 using an ICO. Their white paper states the purpose of Centra Debit Card, Smart and Insured Wallet as a financial system that would allow holders of various hard-to-spend cryptocurrencies to easily convert their crypto assets into U.S. dollars. Enabling users to spend these cryptocurrencies in real time via a Visa or MasterCard backed "Centra Card." The SEC alleges among other things that Centra claimed false partnerships with Visa, Mastercard, Bancorp and an insurance company in their promotional materials.

3. Literature Review

3.1 ICO Mechanisms

Rohr and Wright (2017) argue that traditional asset pricing theories such as the efficient market theory and present value can provide guidance towards pricing true value of a token, typically providing a lower-bound. They conclude the price of these tokens can only be explained by investors being "irrational", as in behavioural finance, and driving up the price of these tokens in the post-ICO marketplace. Catalini and Gans (2018) explores how entrepreneurs can use ICOs to fund venture start-up costs. They show that the ICO mechanism allows entrepreneurs to generate buyer competition for the token, which, in turn, reveals consumer value without the

entrepreneurs having to know the consumer willingness to pay. Furthermore, by revealing key aspects of consumer demand, crypto-tokens may increase entrepreneurial returns beyond what can be achieved through traditional equity financing. Li and Mann (2018) presented a model that rationalises the use of ICOs for launching an internal medium of exchange. They add two dynamics to their model, one being whether the ICO solves a coordination failure inherent in many other current ICO platforms, and secondly whether it harnesses the opinion of investors by aggregating dispersed information about platform quality. They find that the theoretical quality of the platform that the ICO is initially located on may affect the success of the ICO. However, data on the actual quality of the platform the ICO is located on, and historically what platform each ICO was located on, is presently unobtainable.

3.2 Importance of the ICOs white paper

The most recent literature in this area by Feng et a., (2018) investigate the disclosure made by entrepreneurs in the ICO white paper and uses them to create a rating for the underlying blockchain mechanism of the ICO. Their findings show that ICO projects based on a blockchain with a higher rating raise more funds over the ICO period. This is consistent with ICO investors using the underlying blockchain technology as an investment signal regarding the quality of the ICO project. Since Feng et al. (2018) is based on the white paper of each ICO, their findings imply that the credibility of this information is important to ensure the long-term existence of ICOs. Fisch (2018) explores the usage and quality of patents and white papers as an investment signal. They find that the patents regarding the code and software of the entrepreneur's platform is not an effective signal for ICO investment. In terms of the white paper, ICOs that can communicate their idea more precisely and technically raise more funds. The reasoning behind this is that technical white papers may constitute a substitute for patents in the context of ICOs. This paper reinforces the importance of white papers to investors and ICO entrepreneurs. Adhami et al., (2018) finds that publicly available source code of the ICO,

presale organisation before the ICO, ICO tokens allowing the customers to access specific services results in more successful ICO's. Their results contradict Feng et al., (2018) and Fisch (2018), by finding that the availability of a white paper is not associated with the probability of success of the ICO. These findings show that there is no general consensus in the literature regarding ICO success.

Our study differs from prior literature by compiling a much larger empirical data set of ICO's. In addition, we consider additional key variables that help determine ICO predictability and success. Our analysis is the first to explore post ICO returns similar to post IPO returns.

3.3 Potential investment signals

Kaal and Dell'Erba (2017) finds that ICOs minimise transaction costs and democratise finance while dis-intermediating banks. This is despite significant negatives such as the potential for scams and multiple corporate governance issues. However, Kaal and Dell'Erba note their research is limited by difficulty in obtaining data on characteristics and prices of ICOs. This led them to undertake qualitative research only, to provide a foundation for future studies. We overcome this limitation by compiling a unique database of 432 ICO's.

Yadav (2017) notes that most investment signals are not based on technical and observable characteristics (e.g.: earnings per share when investing in stocks). They identify new signals such as token liquidity, distribution of token holdings, digital community sentiments and quality of information in white papers as key to making ICO investment decisions. However, they also note limitations with no empirical data to reinforce their theoretical suggestions. Amsden and Schweizer (2018) find that venture uncertainty, measured as the percentage of tokens offered in the ICO, is negatively correlated with coin tradability, while higher venture quality is positively correlated with the success of an ICO. This points to factors such as being connected to better CEOs and larger team size as positive signals towards investing in ICOs.

However, they highlight that not having these variables due to difficulty in data collection which would involve reading each lengthy white paper to determine the team size and the quality of the CEO. They use one of the same databases, coinmarket.com, utilised in our study to compile our final ICO database, which is stated to be a reliable and error-free source of cryptocurrency data according to widespread investor opinion. Momtaz (2018) studies ICO under-pricing using trading data for 302 tokens from August 2015 to April 2018. The author finds average initial day raw and abnormal returns from 6.8% to 8.2%. However, around 39.5% to 45.7% of the ICOs display negative initial day returns. Benedetti and Kostovetsky (2018) analyse ICO under-pricing and post-ICO performance for 416 ICO's up to April 2018. They find an average return of 173% for a 30-day holding period. Howell et al., (2018) find that ICO's that signal their quality, has white papers and credibility has higher liquidity and trading volume for 453 ICO's with at least 90 trading day data. Bourveau et al., (2018) utilize 776 utility based ICOs from April 2014 up to and including February 2018. They find that the disclosure of source code, platform information and high rating increases the likelihood of ICO completion and success respectively. In addition, having a minimum funding target requirement and high percentage of founders with a LinkedIn profile reduces the probability of success.

3.4 Institutional theory and ICOs

By linking ICOs to institutional theory, we observe a more developed institutional environment with overly restrictive regulations that may hinder the establishment of firms (Scott., 1995 and Baumol et al., 2009). ICOs may alleviate this issue by providing an environment with minor or no regulation for the present. For example, Stinchcombe (1965)'s classic institutional theory tends to focus on coalitions, competing values and organisations whereas ICO's provide a more simpler environment for ICO's. However, this simpler organisation environment can be a double edges sword. The success of ICOs relate to

institutional theory where the institutional environment helps determine the process of gaining legitimacy. This is critical for entrepreneurial start-ups to overcome the liabilities of being new (Stinchcombe, 1965) and to increase their chances of success (Ahlstrom & Bruton, 2001; Freeman, Carroll, & Hannan, 1983). There is presently a considerable amount of uncertainty in the cryptocurrency sphere regarding the legitimacy of the start-ups in Fintech especially backed by ICO's. In the data section we provide details on ICO failures.

An alternative method in which ICOs are reinforced is through entrepreneurs creating a product or service in an under-organised domain (Trist, 1983). Bruton et al., (2010) describes an unorganised domain as a way in which entrepreneurs can recognise the amount of demand in their platform, without having to incur high costs. The emerging platform of ICOs allow entrepreneurs to utilise this mechanism. Chod and Lyandres (2018) provide evidence of ICOs being more optimal relative to traditional venture capital financing for ventures by identifying the following factors affecting ICO superiority over traditional financing: high risk of failure, right skewed payoff distributions, uncertain payoffs, higher percentage of idiosyncratic risk and low information asymmetry.

4. Hypothesis Development

As mentioned in the literature review, there is minimal published quantitative and qualitative research in this area; subsequently, our hypotheses are based on theory and not findings from other studies. Our hypothesis focus on the central key factors that effect ICO success or failure.

Size Effect of the ICO

The size of the ICO is measured by the target that each ICO sets. The hypothesis is that ICOs trying to raise more funds will have excess supply and not necessarily the demand to match it. We are the first to investigated this relationship. However, when examining IPO literature, we can see that Ritter (1984) finds a significant positive relationship between the size of the

offering and returns. Hence, we hypothesise that this relationship could occur in the ICO market as well.

H1a: The Size of the ICO will have a negative effect on the percentage of the ICO target reached.

H1b: The size of the ICO will have a positive effect on the post-ICO returns.

Length Effect of the ICO

This variable is the length of time an ICO is active for, before it reaches its funding target, is closed manually, or reaches the designated time frame. Although initially not observable for investors, ICOs have a bar tracking the amount of funds they have raised. Hence if it is observed that the ICO is going to reach its funding target in a short-time frame, investors can use this as a signal and invest in the ICO. An ICO finishing in a short-time frame would suggest to investors that there has been a lot of demand for the ICO and has raised sufficient funds for development. If the ICO had not raised sufficient funds, you would expect the entrepreneur to keep the ICO open for further investment.

H2a: Length of ICO will have a negative effect on the percentage of the ICO target reached.

H2b: Length of ICO will have a negative effect on the post-ICO returns.

Purpose Effect of the ICO

ICOs can be defined by various categories which are based on the purpose of their platform. The two most common uses of these platforms are Blockchain and Cryptocurrencies; Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. Cryptocurrencies are a digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank. These are two widely known usages of ICO, while uses such as gambling and gaming are relatively unknown and less

common. Investors will be reluctant to invest in ICOs which have less widely known uses, because of their unfamiliarity and lack of understanding. Investors are more likely to invest in ICOs in familiar categories, subsequently there will also be more speculation when these ICOs are listed, enhancing prices and increasing returns.

H3a: ICOs whose purpose is (either "Blockchain or Cryptocurrencies") will have a positive effect on the percentage of ICO target reached.

H3b: ICOs whose purpose is (either "Blockchain or Cryptocurrencies") will have a positive effect on post-ICO returns.

Market Sentiment Effect on the ICO

Presently, in the cryptocurrency marketplace, the price of tokens is primarily driven upwards by speculative pressures. The market's perception of sentiment around these coins is hypothesised to be a significant driver of why investors invest in certain ICOs and the returns these investors subsequently obtain post-ICO. One of the first studies in this area, Cheah and Fry (2015), found that the fundamental or intrinsic value of Bitcoin was zero. Their study concluded that Bitcoin's price contains a considerable speculative component. With a fundamental value of zero, the market's positive sentiment surrounding the prospects of each ICO should have positive effects on the percentage of target reached for each ICO, and also the returns post ICO. In this paper we use experts rating for each token as a proxy for sentiment. We hypothesise that those tokens with a rating classified as "Very High" will achieve more success at raising funds and have greater post-ICO returns.

H4a: Tokens rated as "Very High" will achieve a larger percentage of ICO target reached.

H4b: Tokens rated as "Very High" will achieve higher post-ICO returns.

Time until listing effect

Time until listing is the time it takes for an ICO to be listed on a cryptocurrency exchange after their ICO has been completed. This time between the end of the ICO and listing date is typically used by the ICOs to utilise the funds raised at ICO to develop their platform before listing it on an exchange. ICOs with a lower time until listing have developed their ICO faster, suggesting that they have a better support team and strategy. The process in which a token is listed on an exchange also involves an application process. This could also suggest that those tokens which are listed relatively quickly had fewer challenges in being accepted onto an exchange and that the exchange itself feels positively towards the prospects of the token. We hypothesise that the lower the time till listing the higher the post-ICO returns. Time till listing, however, will not affect our % of target reached as this is unobservable to investors at that time.

H5: Time until listing will have a negative effect on post-ICO returns

4.5 Control Variables

Niel and Halaburda (2014) examined the correlation between Bitcoin and other related cryptocurrencies. This study also casts light on Bitcoin's price, and on how its volatility affects investor's market-wide sentiment. This leads to the possibility that sentiment affects the percentage of funds raised during various ICOs. This is reinforced by Rohr and Wright (2017) who finds that Bitcoin's performance has an essential influence on investor's overall perception of the ICO market. With a high Bitcoin price we expect market sentiment to be higher, hence investors will invest more in ICOs over the period. In turn, high volatility might deter investors from investing in ICOs due to the increased uncertainty in the market. Wang (2014) concludes that over periods of high volatility, the possibility of Bitcoin, and cryptocurrencies in general, being used as a currency is largely negatively affected; if a currency's value is not relatively stable, the appeal of it being used as a means of exchange is very limited. Subsequently,

volatility is a negative factor for market sentiment. Kość, Sakowski and Ślepaczuk (2018) finds short-term momentum effects of Bitcoin's price on the whole cryptocurreny market. This suggests the momentum of Bitcoin's price is a strong proxy for the current conditions of the cryptocurreny market and subsequent investor sentiment. Hence, we will control for both one week and one month positive momentum as well as the volitility in the price of Bitcoin.

Molnar, Azzi, Rouband and Hagfors (2017) finds that extreme movements in both "up" and "down" US stocks, especially in the S&P 500, are associated with negative 10th, 5th and 1st quantiles of the Bitcoin return distribution. Although some studies find little or no correlation between stock-markets and Bitcoin prices, extreme stock movements may affect Bitcoin price and in turn the ICO market. Krause and Nga (2017) find that Bitcoin is a favourable instrument to diversify a portfolio as it appears to be negatively correlated with their stock market indices, including the S&P 500. Kość et al., (2018) finds statistically significant diversification potential of all cryptocurrency portfolios with relation to the S&P500 index. As a result, we will control for one month and three-month S&P500 momentum prior to listing.

Percentage of target reached is the proportion of funds raised of the total target that the ICO has specified. Most ICOs have a live tracker progress bar indicating the quantity of funding that has been raised so far and the target; although obviously the end result of funds raised cannot be known at that stage. Investors could use this as an investment signal by monitoring the progress of the ICO, triggering an investment in the ICO when the funds raised are close to the target of the ICO. This means that the higher the percentage of target reached, the higher the post-ICO returns for investors. Hence, we will use the percentage of target reached as a control variable.

5. Research Methodology

5.1 Dataset

Our unique database compiled for this study is an amalgamation of several databases for ICO's. The first database we utilize is https://icodrops.com/. This contains data on 432 completed ICOs; including the token sale price, the date the ICO was conducted and closed, the category of ICO, the amount of USD raised at the ICO, the target of the ICO and also an expert's rating. Ico Drops is widely regarded in the cryptocurrency community as a reliable source for ICO data, as well as being one of the very few sites which contains data on ICOs.

The only potential limitation of this dataset is that for an ICO to be listed on this site, they need to go through an application process. Notwithstanding this, it is the best source of data for our study, there being no viable alternatives. Our second database is coinmarketcap.com. This is highly regarded as the best and most accurate place to obtain prices of all cryptocurrencies. It currently contains historical data on 1629 cryptocurrencies spanning 11363 crypto-exchanges. CoinMarketCap requires organisations to submit a form in order to list their currencies, so there is occasionally a small lag between the exchange listing date and the date when prices start appearing on the website. It is important to note that the price reported by CoinMarketCap is the average price of the token on all exchanges, value weighted for each exchange using the volume traded of that token on the exchange.

Our third database is Datastream, which contains daily S&P500 index data. We compile these datasets on 10th September 2018 at 4:43 pm NZT. As seen in our literature review, previous researchers have struggled to obtain price and ICO data. This is the fundamental limitation to most of the studies mentioned previously. However, now coders have released a publicly available application programming interface (API) which can read the data on two aforementioned data sources (Ico Drops and CoinMarketCap) and convert this to raw data on

an excel spreadsheet. This API is utilised to extract the required data from the aforementioned databases.

5.2 Variable Definitions

A key aspect of our research model is the expert rating in the icodrops database which we use as a proxy for investor sentiment. Ico Drops has current and historical ratings for each ICO, based on the risk, speculation and possible returns of the project. This rating scale is based on "experts" views on the upcoming ICOs and also publicly rated by the wider ICO community. This scale varies from Very High interest to Very Low interest, which we convert into dummy variables. Hence, the dummy variable for *Very High* is equal to 1 if the token has a rating of Very High and 0 otherwise. A large proportion of ICO investor communities uses this as a base indicator for whether they should invest in an ICO project or not, providing a proxy for whether the sentiment of ICO is very high or not. The variable of *Size* is the target funding amount that is set by the entrepreneur. The period from the start of the ICO to the end is measured in days and is referred to as *Length of ICO.* The period from the end of the ICO to the date it is listed is measured in days and is referred to as *Time till listing*. *S&P500 1M, S&P500 3M and S&P500 6M* are the one month, 3 month and 6 month change in price of the S&P500 index on the date that the ICO is launched respectively. Momentum is calculated for Bitcoin, as the change in price for one month, and one week, before the launch of the ICO, represented by *Bitcoin 1M and Bitcoin 1W* respectively. *Bitcoin Volatility* is measured as the standard deviation of Bitcoin's price over the period in which the ICO funds are being raised. The dummy variable of *Crypto* is made up of ICOs which have an underlying purpose associated with cryptocurrencies or crypto exchanges, while the dummy variable of *Blockchain* is made up of ICOs with an underlying purpose of being a blockchain or providing blockchain services. % *of target reached* is the percentage of the investment goal achieved at the end of the funding

stage of the ICO. *S&P500 Return* is the daily return of investing in the S&P500 over the period since the ICO has been listed. These variable definitions are summarised in Appendix 1.

5.3 Empirical Methodology

Following the merging of these three databases we firstly, present descriptive statistics and three OLS regressions. We also winsorise our dataset to the 1% and 99% levels to remove any outliers which will affect our results. In this section of the investigation we will use a cross-sectional analysis to investigate the abnormal returns of ICOs, a similar methodology to Mitchell and Stafford (1998), though using more appropriate variables for cryptocurrencies. Variables such as earnings per share or market to book ratio do not apply to cryptocurrencies.

$$\begin{aligned} \%OfTarget = {} & const + B_1 Veryhigh + B_2 Blockchain + B_3 Crypto + B_4 Size \\ & + B_5 Length\ of\ ICO + B_6 Bitcoin\ 1W + B_7 Bitcoin\ 1M + B_8 S\&P500\ 1M \\ & + B_9 S\&P500\ 3M + B_{10} S\&P500\ 6M \\ & + B_{11} Volitility\ of\ Bitcoin\ during\ ICO \\ & + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} R_R = {} & const + B_1 Veryhigh + B_2 Blockchain + B_3 Crypto + B_4 \%oftargetreached \\ & + B_5 Size\ + B_6 Lenght\ of\ ICO + B_7 Time\ until\ listing + \varepsilon \end{aligned} \quad (2)$$

$$\begin{aligned} R_A = {} & const + B_1 Veryhigh + B_2 Blockchain + B_3 Crypto + B_4 \%oftargetreached \\ & + B_5 Size\ + B_6 Lenght\ of\ ICO + B_7 Time\ until\ listing \\ & + \varepsilon \end{aligned} \quad (3)$$

Where $\boldsymbol{R_R}$ is the daily unadjusted post-ICO return and $\boldsymbol{R_a}$ is the post-ICO return adjusted for Bitcoin price movements. Our abnormal Bitcoin adjusted return is each token's daily return subtracted by the daily return of Bitcoin over the same period. This the same method that various studies have conducted to adjust for Bitcoin returns (Chuen & Guo & Wang, 2017). This adjustment is done due to Bitcoin's status representing the current state (Bull/Bear) of the

cryptocurrency market, as it contributes to more than 40% of the current market cap. Utilizing only the unadjusted raw returns from our dataset, would result in a strong bias in our results due to the high volatility of cryptocurrencies. For example, if we collect our data during the bull run of early January 2018, then without the adjustment for the state of the cryptocurrency market, we would have very positive returns for investors compared to returns, following five months of a bear trend in the cryptocurrency market. This adjustment also allows for Bitcoin being an investment benchmark in the ICO community, with many investors trying to achieve positive returns relative to Bitcoin rather than USD.[2]

We also standardised the long-term returns to daily returns to remove the potential bias from the varying lengths of each ICOs listing.

6.Empirical Results

6.1 Descriptive Statistics

Table 1 shows the characteristics of 421 ICOs. The difference between the number of observations for "Amount Raised" and "Target" is that 27 of these Initial Coin Offerings are uncapped, meaning there is no limit or target to the funds raised. Initially, we observe the "average" ICO raised $29.21 million USD, with a cap of $31.99 million USD, resulting in an average of 78.09% funds raised per each ICO. On average each ICO lasts for 22 days and then takes 40 days to list on an exchange following the end of the funding stage of the ICO. The difference in observations here is 68 is due to these ICOs on Ico Drops having conducted an ICO but have not been subsequently listed (yet). However, we are unable to determine whether this is due to these ICOs no-longer existing or still waiting to be listed. These observations are removed from our regressions. When comparing 2018 descriptive statistics to 2017, we notice 2017 is more successful for ICOs, raising more funds and achieving a greater percentage of

[2] Plot of Bitcoin's price can be found in Appendix 2

target reached. These results suggest that the ICO market place has changed and that in 2018 it is more difficult to raise funds through this new platform.

Table 1: Descriptive Statistics by the Characteristics of each ICO

This table contains summary statistics on ICOs listed on icodrops.com. The time period of these ICOs range from the 5th of November 2016 till the 10th of September 2018. ICOs are classified into year groups based on when the ICO started raising funds. The two ICOs in the 2016 time period are excluded. Summary statistics are calculated on information derived from icodrops.com. Refer to Appendix 1 for a detailed description of each variable.

		Obs	Mean	SD	Min	Max
Amount Raised (m)	Total	421	29.21	88.750	0	1700
	2018	200	24.28	32.520	0	320
	2017	219	33.61	119.010	0	1700
Target (m)	Total	394	31.99	35.020	1	407.50
	2018	195	29.43	38.540	2	407.50
	2017	197	34.38	31.200	1	215.90
% of Target Reached	Total	394	78.09%	0.452	0	642.50%
	2018	195	70.19%	0.282	0	133%
	2017	197	86.07%	0.563	0	642.50%
Length of ICO (Days)	Total	428	21.95	29.269	0	327
	2018	207	17.30	27.970	0	181
	2017	219	26.13	29.830	0	327
Time till listing (Days)	Total	353	40.30	57.510	0	421
	2018	156	35.97	35.760	1	172
	2017	195	42.19	66.750	0	421

Table 2 shows that, on average, our total sample of ICOs obtain an average daily return of -0.39% between 5th of November 2016 and 10th of September 2018. However, when broken down, ICOs launched in 2017 obtain a higher average daily return (-0.09%) relative to those launched in 2018 (-0.77%). This shows us that investors are on average making a larger loss on ICOs that launched in 2018, compared to those launched in 2017. Through the regression of factors mentioned previously we identify investor signals that may predict those ICOs with abnormal profits. One key result from Table 2 is that ICOs that have a *Very High* rating are the only category of ICOs with a positive average daily return (0.62%), with the total sample having an average negative daily return of -0.39%. However, this effect is even more prominent

in 2017 with an average daily return of 1.51%, compared to an average daily return of -0.27% in 2018. Furthermore T-Stat shows this difference to be significant. These preliminary results appear to support Hypothesis 4b.

Table 2: Descriptive Statistics by the Rating Dummy Variable of each ICO

This table contains summary statistics on ICOs listed on icodrops.com. The time period of these ICOs range from the 5th of November 2016 till the 10th of September 2018. ICOs are classified into year groups based on when the ICO started raising funds. The two ICOs in the 2016 time period are excluded. Summary statistics are calculated based on the unadjusted post-ICO daily returns. T-tests are also conducted on the difference in means, *a < 0.10, **a < 0.05, ***a < 0.01. Refer to Appendix 1 for a detailed description of each variable.

		Obs	Mean	STD	Min	Max
Very High	Total	18	0.62% ***	0.251	-5.41%	5.42%
	2018	9	-0.27%	0.028	-5.41%	5.42%
	2017	9	1.51% ***	0.019	-0.47%	4.85%
High	Total	44	-0.17%	0.008	-2.19%	3.98%
	2018	18	-0.52%	0.006	-2.19%	3.97%
	2017	26	0.08%	0.008	-0.38%	3.98%
Medium	Total	103	-0.33%	0.008	-3.42%	2.66%
	2018	45	-0.45%	0.010	-3.21%	2.66%
	2017	57	-0.24%	0.005	-3.42%	0.85%
Neutral	Total	40	-0.63%	0.006	-2.33%	-0.09%
	2018	20	-0.80%	0.006	-2.15%	-0.21%
	2017	20	-0.47%	0.005	-2.33%	-0.09%
Low	Total	6	-0.23%	0.002	-0.45%	0.11%
	2018	0	0.00%	0.000	0.00%	0.00%
	2017	6	-0.23%	0.002	-0.45%	0.11%
Very Low	Total	2	-0.25%	0.001	-0.29%	-0.20%
	2018	0	0.00%	0.000	0.00%	0.00%
	2017	2	-0.25%	0.001	-0.29%	-0.20%
Not Rated	Total	140	-0.58%	0.015	-12.84%	4.00%
	2018	64	-1.12%	0.019	-12.84%	4.00%
	2017	75	-0.12%	0.006	-1.39%	3.06%
Total	Total	353	-0.39%	0.012	-12.84%	5.42%
	2018	156	-0.77%	0.015	-12.84%	5.42%
	2017	195	-0.09%	0.008	-3.41%	4.85%

In Table 3 we observe that Blockchain and Cryptocurrency ICOs have a higher average return than the overall average. However, t-tests show this difference to not statistically significant.

This also holds for Table 5 after adjusting for Bitcoin's price movements; suggesting that hypotheses 3b may not be supported.

Table 3: Descriptive Statistics by the Underlying Usage of each ICO

This table contains summary statistics on ICOs listed on icodrops.com. The time period of these ICOs range from the 5th of November 2016 till the 10th of September 2018. ICOs are classified into year groups based on when the ICO started raising funds. The two ICOs in the 2016 time period are excluded. Summary statistics are calculated based on the unadjusted post-ICO daily returns. T-tests are also conducted on the difference in means, *a < 0.10, **a < 0.05, ***a < 0.01. Refer to Appendix 1 for a detailed description of each variable.

		Obs	Mean	Std. Dev.	Min	Max
Blockchain	Total	118	-0.29%	0.018	-12.84%	5.42%
	2018	66	-0.66%	0.020	-12.84%	5.42%
	2017	52	0.17%	0.013	-3.42%	4.85%
Cryptocurrency	Total	17	-0.37%	0.013	-2.82%	3.07%
	2018	8	-0.95%	0.124	-2.82%	0.55%
	2017	9	0.15%	0.011	-0.49%	3.07%
Other	Total	218	-0.45%	0.008	-4.91%	4.00%
	2018	82	-0.83%	0.011	-4.91%	4.00%
	2017	134	-0.21%	0.004	-1.39%	2.10%
Total	Total	353	-0.39%	0.012	-12.84%	5.42%
	2018	156	-0.77%	0.015	-12.84%	5.42%
	2017	195	-0.09%	0.008	-3.41%	4.85%

When we use the adjusted daily returns to Bitcoin, as depicted in Table 4, we show results in terms of the rating dummy variables. After this adjustment (for Bitcoin's price movement) we obtain an average daily return of -0.34% over the entire time period.

Table 4: Descriptive Statistics by the Rating Dummy Variable of each ICO

This table contains summary statistics on ICOs listed on icodrops.com. The time period of these ICOs range from the 5th of November 2016 till the 10th of September 2018. ICOs are classified into year groups based on when the ICO started raising funds. The two ICOs in the 2016 time period are excluded. Summary statistics are calculated based on the post-ICO daily returns adjusted to Bitcoin's price movements. T-tests are also conducted on the difference in means, *a < 0.10, **a < 0.05, ***a < 0.01. Refer to Appendix 1 for a detailed description of each variable.

		Obs	Mean	STD	Min	Max
Very High	Total	18	0.63% ***	0.025	-5.43%	5.57%
	2018	9	-0.10%	0.029	-5.43%	5.57%
	2017	9	1.35% ***	0.203	-0.73%	5.12%
High	Total	44	-0.13%	0.007	-1.71%	3.89%
	2018	18	-0.32%	0.005	-1.71%	0.47%
	2017	26	0.01%	0.009	-0.07%	3.89%
Medium	Total	103	-0.30%	0.010	-6.96%	3.27%
	2018	45	-0.18%	0.009	-2.32%	3.27%
	2017	57	-0.38%	0.105	-6.96%	0.69%
Neutral	Total	40	-0.41%	0.005	1.83%	0.17%
	2018	20	-0.48%	0.004	-1.57%	0.03%
	2017	20	-0.35%	0.005	-1.83%	0.17%
Low	Total	6	-0.33%	0.001	-0.50%	-0.22%
	2018	0	0.00%	0.000	0.00%	0.00%
	2017	6	-0.33%	0.001	-0.50%	-0.22%
Very Low	Total	2	-0.47%	0.001	-0.52%	-0.41%
	2018	0	0.00%	0.000	0.00%	0.00%
	2017	2	-0.47%	0.001	-0.52%	-0.41%
Not Rated	Total	140	-0.54%	0.155	-12.88%	4.20%
	2018	64	-0.74%	0.019	-12.88%	4.20%
	2017	75	-0.33%	0.012	-8.79%	2.76%
Total	Total	353	-0.34%	0.013	-12.88%	5.73%
	2018	156	-0.46%	0.015	-12.88%	5.73%
	2017	195	-0.23%	0.113	-8.79%	5.11%

Table 5 shows that, after adjusting for Bitcoin price movements, ICOs with Blockchain usage have a lower mean daily return of -0.12%, compared to the average of -0.07%. This shows that the reverse of Hypothesis 3b could be true for Block chain based ICO's. Hypothesis 3b for cryptocurrencies is further supported in this table, being the only category to have a positive mean return (0.02%).

Table 5: Descriptive Statistics by the Underlying Usage of each ICO

This table contains summary statistics on ICOs listed on icodrops.com. The time period of these ICOs range from the 5th of November 2017 till the 10th of September 2018. ICOs are classified into year groups based on when the ICO started raising funds. Summary statistics are calculated based on the post-ICO daily returns adjusted to Bitcoin's price movements. T-tests are also conducted on the difference in means, *a < 0.10, **a < 0.05, ***a < 0.01. Refer to Appendix 1 for a detailed description of each variable.

		Obs	Mean	Std. Dev.	Min	Max
Blockchain	Total	118	-0.17%	0.177	-12.88%	5.73%
	2018	66	-0.39%	0.205	-12.88%	5.73%
	2017	52	0.11%	0.133	3.80%	5.11%
Cryptocurrency	Total	17	-0.39%	0.113	-2.32%	2.76%
	2018	8	-0.58%	0.010	-0.23%	0.63%
	2017	9	-0.22%	0.013	-1.82%	2.76%
Other	Total	218	-0.43%	0.010	-8.79%	4.20%
	2018	82	-0.58%	0.087	-2.90%	4.20%
	2017	134	-0.36%	0.102	-8.79%	2.06%
Total	Total	353	-0.34%	0.013	-12.88%	5.73%
	2018	156	-0.46%	0.015	-12.88%	5.73%
	2017	195	-0.23%	0.113	-8.79%	5.11%

The correlation matrix shown in Table 6 confirms the lack of auto-correlation between the variables in our regression.

Table 6: The Correlation between Key Variables

The pairwise correlation coefficients are presented across the key variables used in this study.

		1	2	3	4	5	6	7	8	9	10	11
1	Bitcoin 1W	1.00										
2	Bitcoin 1M	0.64	1.00									
3	Volatility of Bitcoin	0.25	0.19	1.00								
4	S&P500 1M	0.07	-0.09	0.10	1.00							
5	S&P500 3M	0.10	0.12	0.21	0.47	1.00						
6	Size	0.08	0.09	0.24	0.12	0.14	1.00					
7	% Target Reached	-0.03	-0.05	-0.12	0.03	0.02	-0.14	1.00				
8	Length of ICO	0.14	0.15	0.32	0.03	0.04	0.13	0.16	1.00			
9	Time Till Listing	0.03	0.02	0.08	-0.05	-0.02	0.00	0.28	0.24	1.00		
10	Daily ICO Return	0.15	0.15	0.01	0.05	0.16	0.03	0.01	-0.05	-0.20	1.00	
11	Bitcoin Adjusted ICO Return	0.13	0.16	0.06	0.04	0.15	0.04	-0.03	-0.25	-0.37	0.86	1.00

6.2 Empirical Results

The results of our OLS regression for equation (2) are presented in Table 7. Hypothesis 1a is supported as *Size* has a statistically significant effect in the direction in which we predict. This shows that our hypothesis of simple laws of supply and demand hold. As expected in Hypothesis 2a, we observe that the shorter the time period the ICO is active for, the higher the percentage of target reached, suggesting that a lower time period indicate success in the funding of the project.

We re-run this regression using a Probit model, as there could be a threshold of percentage of target reached that entrepreneurs determine as a successful ICO. The Probit model shows the length of the ICO as still being a statistically significant predictor of the percentage of target reached. Interestingly, the remainder of our hypotheses regarding the predicted "success" factors are insignificant, which will be explained subsequently in our discussion.

Table 7: Factors which Determine the Success of an ICO

The left-hand variable is the percentage of ICO target reached. Panel A is a simple, ordinary least squares regression using robust standard errors. Panel B is a Probit model. *p < 0.10, **p < 0.05, ***p < 0.01

	Variable	Predicted Sign	Panel A	Panel B
	Bitcoin 1W	+	0.005	0.139
			(0.044)	(0.421)
	Bitcoin 1M	+	-0.088	-0.612
			(0.137)	(1.01)
	Volatility of Bitcoin	-	-0.001	-0.001
			(0.001)	(0.001)
	S&P500 1M	+	-0.107	0.313
			(0.074)	(5.45)
	S&P500 3M	+	0.698	-0.093
			(0.559)	(0.390)
H1a	Size	-	-0.001 **	-0.002
			(0.001)	(0.005)
H2a	Length of ICO	-	-0.002 ***	-0.006 *
			(0.001)	(0.003)
H3a	Blockchain	+	0.025	-0.262
			(0.042)	(0.281)
H4a	Crypto	+	0.151	-0.390
			(0.078)	(0.537)
H5a	Very High	+	0.176	0
			(0.027)	Omitted
	Adjusted R-squared		0.0828	
	Pseudo R-squared			0.0744
	Number of observations		393	377

In Table 8 we change our independent variable to the post-ICO returns, as observed in regression 2. The variable *Very High* is statistically highly significant, supporting Hypothesis 4b. This shows that the higher the market sentiment for the token, the higher the returns for investors. On average a token classed with a *Very High* rating has 0.81% higher daily returns. The other statistically significant variable is *Time until listing*, which supports Hypothesis 5, showing that the shorter the time to listing, the higher the daily raw returns.

We test the robustness of these results by adding the market return of the S&P500 factor and find that our results still hold. However, we also note that this control variable has high explanatory power for the raw daily returns increasing the adjusted r-squared value to 12.38%.

Table 8: Factors which Determine Unadjusted Post-ICO Returns for Investors

The left-hand variable is the unadjusted post-ICO daily return for investors. Panel A is a simple, ordinary least squares regression. Panel B includes the S&P500 return to test robustness.
*p < 0.10, **p < 0.05, ***p < 0.01

	Variable	Predicted Sign	Panel A	Panel B
H1b	Size	+	0.0001	0.0001
			(0.0002)	(0.0002)
H2b	Length of ICO	-	-0.0001	-0.0003
			(0.0003)	(0.0001)
H3b	Blockchain	+	-0.0001	-0.0009
			(0.0015)	(0.0014)
H4b	Crypto	+	0.0012	0.0012
			(0.0032)	(0.0031)
H5b	Very High	+	0.0081 ***	0.0078 ***
			(0.0031)	(0.0030)
H6	Time until listing	-	-0.0001 ***	-0.0001 ***
			(0.0001)	(0.0001)
	% of Target Reached	+	0.0003	0.0006
			(0.0015)	(0.0013)
	S&P500 Return	Control		0.0792 ***
				(0.0126)
	Adjusted R-squared		0.0426	0.1238
	Number of observations		322	322

Furthermore, we adjust the daily returns to Bitcoin's price movements in Table 9, following regression 3. The critical point from this table is that the *Length of ICO* is now statistically highly significant, confirming Hypothesis 2b, that the shorter the length of ICO, the higher the Bitcoin adjusted returns. The variable *Time until listing* has becomes more significant and further confirms that Hypothesis 5 is valid. The variable of *Very High* is no longer significant at the 1% level but is still significant at the 5% level, furthermore supporting Hypothesis 4b. After adjusting our independent variable to the price of Bitcoin we see our six explanatory

variables now explain more of the variation in returns, increasing the r-squared value to 17.75%. Furthermore, after adding the S&P500 return over that period the robustness of our results are further supported.

Table 9: Factors which Determine Post-ICO Returns for Investors Adjusted to Bitcoin's Price Movements.

The left-hand variable is the daily post-ICO returns for investors adjusted for Bitcoin's price movements. Panel A is a simple, ordinary least squares regression. Panel B includes the S&P500 return to test robustness. *p < 0.10, **p < 0.05, ***p < 0.01

	Variable	Predicted Sign	Panel A	Panel B
H1b	Size	+	0.0001	0.0001
			(0.0002)	(0.0002)
H2b	Length of ICO	-	-0.0001 ***	-0.0001 ***
			(0.0003)	(0.0001)
H3b	Blockchain	+	0.0005	0.0008
			(0.0015)	(0.0014)
H4b	Crypto	+	0.0017	0.0017
			(0.0032)	(0.0032)
H5b	Very High	+	0.0065 **	0.0064 **
			(0.0031)	(0.0031)
H6	Time until listing	-	-0.0001 ***	-0.0001 ***
			(0.0001)	(0.0001)
	% of Target Reached	+	0.0006	-0.0004
			(0.0015)	(0.0015)
	S&P500 Return	Control		0.0223 *
				(0.0186)
	Adjusted R-squared		0.1775	0.1836
	Number of observations		322	322

6.3 Discussion

One of the most interesting findings from our empirical results is that our variable of *Very High* is statistically significant for both our independent variables of raw daily returns, and daily returns adjusted for Bitcoin. This supports our Hypothesis 4b. However, there is a reduced significance which may reflect that, during a "bull" run in Bitcoins price, investor sentiment for the market becomes more positive, with investors believing that cryptocurrencies are more

likely to be implemented into real-world applications and is more likely to persevere. This means that ICOs listed during a period of bullish Bitcoin activity may be rated higher due to the market's perception of the current state of the cryptocurrency market.

Hypotheses 3, regarding the investors perception of the usage of the ICO, are shown to be insignificant in terms of the "success" and investor returns. This shows that investors may not consider the category of the ICO when investing but rather look at finer details such as the quality of the team and CEO. This data may not be directly observable but reflect the detailed specifics of the idea and road map found in the white paper. One thing which may not be discernible is the level of market manipulation at play. Cryptocurrencies are a small and growing market and are more susceptible to manipulations compared to traditional markets. These manipulation often comes from unknown large bitcoin block holders, hackers and hedge-fund investors who manipulate the market for their own benefit, at the cost of uninformed investors (Mycryptopedia, 2018). When manipulating token prices, the underlying characteristics and sentiment associated to tokens are irrelevant to the investor.

An example of manipulation is a strategy that "whales" engage in called "Pump and Dumps". A "whale" gradually accumulates a certain coin, resulting in significant price increases which are observable to all investors. These price increases attract other investors who are unaware of this "pump and dump" scheme and invest because they have a "fear of missing out". Some investors perceive that this price increase is due to insider trading on potentially favourable information which, once released to the public, will push the price up even higher. Once the token has been pushed to a certain pre-determined price by the "whales", they sell all their holdings in the coin, causing the tokens price to crash. This raises the possibility that investors who rationally trade on token characteristics may have little impact on the cryptocurrency market.

The *Length of ICO* can be perceived as a measure of success for the ICO, as the entrepreneur would not close the ICO if sufficient funding for the progress on the token is not achieved. Initially, Hypothesis 2b is not supported, but after adjusting for Bitcoin, the *Length of ICO* becomes significant; showing that the shorter the length of the ICO, the higher the returns would be relative to Bitcoin. Adjusting returns for Bitcoin movements is a better measure of listing returns.

Our most statistically significant variable is *Time Until Listing*, which is significant for both raw and Bitcoin adjusted daily returns. This supports Hypotheses 5, that the shorter the time till listing, the more profitable the token would be for investors. The *Time till listing* could be used as an investment signal for investors, as they perceive this to be a positive sign as mentioned in our hypothesis. Although this is not directly observable to investors at the ICO stage of the token, investors can watch out for listings of recent ICOs. If it has been a relatively short-time frame, they can invest in these tokens on the open market on a cryptocurrency exchange.

This can also be interpreted in the opposite manner; if investors invest in a token at the ICO stage and they notice the token is taking a long period of time to list, they can pre-empt this and sell their token as soon as it is listed on an exchange. Hence, mitigating the potential for future losses. This argument does rely on market inefficiencies.

From the descriptive statistics we notice that ICOs launched in 2017 are both more successful in raising funds and provide investors higher post-ICO returns than those launched in 2018. A possible reason for this is that as the awareness of the ability to raise capital with ICOs increase, more entrepreneurs turn to ICOs as a way of funding their projects, thus creating an oversupply in the ICO marketplace. Also, with the increased awareness of ICOs potentially being a scam, investors are now more watchful and vary into which ICOs they invest in.

6.4 Robustness Checks

We test the robustness of the factors that determine the success of an ICO by running a Logit model in succession to our original OLS model as mentioned previously in Table 7. To check the robustness of the predictors of post-ICO returns we both adjust for Bitcoin's price movements and the return on the S&P500 market index, and find that our results still hold. To add to the robustness of the *Very High* variable we add the additional rating dummy variables. This is shown in Table 10. We find that *Very High* is still statistically significant and the inclusion of the other rating dummy variables provides no additional predictive power.

Table 10: Factors which Determine Post-ICO Returns for Investors

Panel A is a simple, ordinary least squares regression using the unadjusted post-ICO daily return for investors as the left-hand variable. Panel A is a simple, ordinary least squares regression using the daily post-ICO returns for investors adjusted for Bitcoin's price movements.
*p < 0.10, **p < 0.05, ***p < 0.01

	Variable	Predicted Sign	Panel A	Panel B
H1b	Size	+	0.0001	0.0001
			(0.0002)	(0.0002)
H2b	Length of ICO	-	-0.0001	-0.0001 ***
			(0.0001)	(0.0001)
H3b	Blockchain	+	-0.0001	0.0004
			(0.0015)	(0.0014)
H4b	Crypto	+	0.0013	0.0019
			(0.0032)	(0.0033)
H5b	Very High	+	0.0092 ***	0.0051 **
			(0.0036)	(0.0036)
	High		0.0033	-0.0017
			(0.0028)	(0.0028)
	Medium		0.0018	-0.0019
			(0.0023)	(0.0023)
	Low		0.0036	0.0018
			(0.0052)	(0.0053)
	Very Low		0.0065	-0.0037
			(0.0031)	(0.0088)
	Not Rated		0.0025	-0.0022
			(0.0087)	(0.0022)
H6	Time until listing	-	-0.0001 ***	-0.0001 ***
			(0.0001)	(0.0001)
	% of Target Reached	+	-0.0007	-0.0007
			(0.0015)	(0.0015)
	Adjusted R-squared		0.0393	0.1701
	Number of observations		322	322

7. Limitations

There are several limitations to this study, particularly due to it being one of the first in the field to utilise combined empirical data from several databases on ICO's. As mentioned in the literature review, other studies have conducted qualitative studies due to the difficulty in obtaining empirical data. The source and size of our dataset are two limitations of our study.

Although the source of icodrops.com is widely respected in the community and is unlikely to have errors or falsified data, there is a potential issue regarding what tokens are listed on their website; They state, “Every day we look for new appealing ICOs on the web. You can send us information about your ICO. We concentrate on the most significant projects for our users”. This shows that ICO Drops chooses which ICOs are listed on their website and have the right to deny ICOs if they are not significant or relevant for their users. This creates a potential selection bias, and as it is identifiable, we cannot be certain as to how it will impact our results. However, this is the only accurate data source available at the time of this study. This lack of data may be surprising to people as there is a perception that cryptocurrencies are all online, so their characteristics and prices should be easy to trace and track. Secondly, if icodrops.com include more data such as country of origin, what exchange the tokens are listed on and other observable characters relating to the ICOs, it would be beneficial for future studies and the wider cryptocurrency community.

In addition, more in-depth or accurate research than this would require significant and onerous data collection, necessitating having to read each individual white paper to determine specific characteristics. These characteristics would also be hard to quantify accurately and would depend largely on the perception of the person collecting the data. Therefore, even with the extensive data collection process, it could potentially be inaccurate due to the grey areas and perception required to measure key variables which affect both the success of an ICO to raise money and the post-ICO returns to investors. Potentially, a computer programmer could be utilised to take away some of this subjectivity.

Another limitation is the lack of accessibility to data on ICOs which have failed. This is due to the lack of transparency regarding the progress of ICOs, making it difficult to determine whether the ICO is still developing their platform post-ICO or whether the ICO has ceased development and become a failure.

The final limitation of the study, and potential for further research, is that the quantification of funds raised at the ICO is in USD. It is impossible, but would be of interest, to look at what cryptocurrencies each ICO accepted and if the amount of funds received over the period of the ICO was associated with movements of those cryptocurrencies accepted as payment.

8. Conclusion

In this study we investigate factors which determine the success and post-ICO returns. To this end, we conduct one of the first empirical studies on ICO's by compiling a unique database of 430 ICO's and other related factors. The study identifies key factors which can be used by ICO investors and other market participants to aid in making more informed investment decisions. ICO's being a novel entrepreneurial theory and a new financing mechanism requires much more empirical research which is limited due to inaccessibility of data. Moreover, the demand for such research is vital due to the investments involved in terms of billions of dollars and very limited regulation globally. Our results which are robust to several different specifications identify the length of the ICO, the number of days till listing and market sentiment as factors that predict post-ICO returns. Generally, a majority of investors measure their returns against their local currency. However, we identify that adjusting ICO returns for Bitcoin price movements would be a better measure for investors to measure their post-ICO returns.

Moreover, this study provides insights into smaller and shorter ICOs being more successful by raising a higher percentage of their target funding. We also shed light on the changing dynamics of the ICO marketplace, with ICO funding and high post-ICO returns becoming harder to obtain as time goes by. We believe, that more research of the ICO market place will greatly benefit from more enhanced abilities to obtain data regarding ICOs and with increased widespread awareness among investors and regulators.

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Appendix 1

Variable Definitions

Variable	Definition
Very High	Dummy variable equal to 1 if the experts rating is Very High
Size	Funding target set by entrepreneur
Length of ICO	Number of days from the start of the ICO to when it is closed
Time till listing	Number of days from the closing of the ICO till the day it is initially listed on any cryptocurrency exchange
S&P500 1M	Percentage price change in the S&P500 index in the month before the ICO starts raising funds
S&P500 3M	Percentage price change in the S&P500 index in the three months before the ICO starts raising funds
Bitcoin 1W	Percentage price change in bitcoin in the week before the ICO starts raising funds
Bitcoin 1M	Percentage price change in bitcoin in the month before the ICO starts raising funds
Bitcoin volatility	The standard deviation of bitcoins daily prices during the period of the ICO
Crypto	Dummy variable equal to 1 if the ICO is categorised by icodrops.com as "Cryptocurrency" or "Crypto-exchange"
Blockchain	Dummy variable equal to 1 if the ICO is categorised by icodrops.com as "Blockchain" or "Blockchain Service"
% of target reached	The percentage of the investment goal achieved at the end of the funding stage of the ICO
Rr	The daily unadjusted return on the ICO
Ra	The daily unadjusted return on the ICO minus the daily return of bitcoin over the same period of the ICO
S&P500 Return	The daily return of investing in the S&P500 over the period since the ICO has been listed

Appendix 2

Variation in the price of Bitcoin