Are Blockchain Crowdsales the New "Gold Rush"? Success Determinants of Initial Coin Offerings[**]

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Initial Coin Offerings (ICOs) are a new and unregulated form of crowdfunding that raises funds through a blockchain by selling venture-related tokens or coins in exchange for legal tender or cryptocurrencies. In this paper, we establish token or coin tradability as the primary ICO success measure, and we develop a theoretical framework for how *venture uncertainty*, *venture quality*, and *investor opportunity set* interrelate. We use the largest available dataset to date, consisting of 1,009 ICOs from 2015 to March 2018. Our data highlights that *venture uncertainty* (not being on Github and Telegram, shorter whitepapers, higher percentage of tokens distributed) is negatively correlated, while higher *venture quality* (better connected CEOs and larger team size) is positively correlated, with ICO success. Moreover, providing a hard cap in a pre-ICO can help investors measure success in the pre-sale. This is another positive signal of funding success.

JEL Classification: E42, G15, L26

Keywords: Coin, Crowdfunding, Crowdsale, Cryptocurrency, Crypto Asset, Blockchain, Distributed Ledger, Equity Financing, Entrepreneurial Finance, Fintech, Initial Coin Offering, Token Offering

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1. Introduction

In a little less than a decade, blockchain technology has evolved from a by-product of bitcoins development to a forecasted $10 trillion market (Steves, 2018), with economically significant uses in virtually every industry (Pilkington, 2016). Such hyperbole is not unwarranted. In 2017, the implied market capitalization of blockchain-based coins and tokens rose from $2.4 billion to $373 billion, excluding bitcoins (see Coinmarketcap.com). To fully put this into context, in the space of only one year, the value created would rank thirty-second as a country measured in GDP, and it would be considered the tenth most valuable corporation in the world. At the root of this growth are two transformational effects that blockchain technology offers our understanding of existing business models: First, it enables radical new business models, such as "decentralized/ownerless" and "better than free," and, second, it replaces the need for trusted intermediaries (Swan, 2015)

Similarly to all new ventures, "decentralized/ownerless" and "better than free" business models still require financial capital to be established and to spur growth. Software developer J.R. Willett, fascinated with the technology's potential, proposed a mechanism for people (including himself) to raise funds and benefit from the development. He summarized his ideas in his famous article, "The Second Bitcoin Whitepaper" (see Willett, 2012). A few months later, he gave a flaming speech at the 2013 Bitcoin: The Future of Payments conference: "… *you could do it without going to a bunch of venture capitalists…here's who we are, here's our plan, here's our bitcoin address and anybody who sends coins to this address owns a piece of our new protocol. Anybody could do that! And I've been telling people this for at least a year now because I want to invest in it…Does anybody in this room want my bitcoins?*"[1] Less than four months later, Willett himself launched

[1] See https://www.youtube.com/watch?v=4bMf4xZg_4U&feature=youtu.be&t=4m19s or https://www.forbes.com/sites/laurashin/2017/09/21/heres-the-man-who-created-icos-and-this-is-the-new-token-hes-backing/#10523c7e1183.

what would become the first ever Initial Coin Offering (ICO)—a mechanism to raise funds by selling virtual tokens for capital. It promised 100 newly created mastercoins in exchange for every bitcoin received (Willet, 2013), and it raised a total of 4,740.620098 BTC, worth about $680,000.[2] There are no universally accepted definitions in the ICO space, but usually a *cryptocurrency* (also known as *crypto-asset*) is a generic term that encompasses both *coins* and *tokens*. A *coin* refers to a standalone *cryptocurrency* functioning on its own blockchain (platform) and a *token* refers to a *cryptocurrency* that requires the usage of a separate *coin* blockchain in order to operate. In practice, in the context of capital-raising these terms are used interchangeably as we do throughout the paper.

Just as blockchain spread beyond bitcoin, the concept of an ICO rapidly spread beyond fundraising to develop blockchain technology. Savvy entrepreneurs quickly realized that ICOs could be structured in ways that resembled established financing forms, such as equity, donation, lending, and reward-based crowdfunding, bonds, and stocks. Financial professionals are now also realizing the potential for blockchain tokens to also be structured to replace venture capital, private equity, and hedge fund investing. There are four primary reasons for the attractiveness and success of ICOs: 1) Little to no regulations, 2) greater cost efficiency, because they eliminate most intermediary costs, 3) larger pools of investors (no restrictions on investment or marketing), and 4) rapid liquidity for investors upon successful listing (investors can sell tokens almost immediately at no detriment to the project). As a result, by 2017 ICOs already dwarfed their predecessors (crowdfunding and venture capital). The world's largest (reward-based) crowdfunding platform, Kickstarter, raised about $3.6 billion from inception through April 2018,

[2] Mastercoin was incredibly transparent, and logged all funds online – see https://docs.google.com/spreadsheets/d/1nF_TEUgQsK3q7FR8Ebmov9cWCYpeaJmO8FLfW9t6a_w/edit#gid=15.

and one of the oldest equity crowdfunding platforms, ASSOB, has raised about $150 million since inception. Even within the highly technical blockchain-based domain, ICOs have raised in 2017 about $7.5 billion, versus $3.6 billion for venture capital (see Ernst & Young, 2017).

ICOs as a capital-raising method for blockchain-related ventures are a very recent phenomenon, dating only to 2013 and becoming popular in 2017 with the widespread adoption of the Ethereum Blockchain. Due to their degree of novelty, very little is yet known about the decision-making process of ICO investors. This paper is the first to delineate and describe the characteristics of a successful ICO, namely, how ICO-related tokens (with sufficient liquidity) ultimately become traded. We develop a theoretical framework of how *venture uncertainty*, *venture quality*, and *investor opportunity set* correlate with ICO success. To the best of our knowledge, we have compiled the largest possible dataset by collecting and cross-validating data from Cryptoslate.com and ICObench.com. Our sample contains 1,009 ICO-related ventures from 2015 through March 2018, with a comprehensive set of 22 explanatory variables. We argue that this data-gathering process is indispensable to ensuring sufficient data quality to analyze an unbiased set of ICOs. Collecting ICO data from only one website will likely result in data mistakes; gathering data from the ICO "universe" of websites that require pre-screening or listing fees such as Coinschedule.com and Topicolist.com[3], will most likely result in a sample selection bias towards the more promising and larger ICOs.

While there is a rich literature on how entrepreneurs of (young) start-ups signal their venture quality to institutional investors, such as venture capital funds or angel investors, there is little

[3] Fees can be flat, such as TOPicolist.com charging $500 for all listings or hierarchical, such as Coinschedule.com who charge up to 5 BTC for premium space and endorsement from the platform

evidence thus far in, e.g., the equity crowdfunding literature, on how entrepreneurs signal to small investors (see, for example, Colombo, Franzoni, and Rossi-Lamastra, 2014; Ahlers et al., 2015).

In an ICO context, entrepreneurs are not only targeting small investors in the fundraising process, but also institutional investors with greater sophistication, such as hedge funds. In this setting, it is interesting to identify which types of signals are the important determinants of ICO success. We argue that the signals will likely differ substantially from those in an equity crowdfunding context, where small investors, with less experience and financial knowledge, are the primary target group. Our results support the view that *venture uncertainty* (not being on Github and Telegram, shorter whitepapers, higher percentages of tokens distributed) is negatively correlated with ICO success, while higher *venture quality* (better connected CEOs and larger team size) is positively correlated with ICO success. We also find that i*nvestor opportunity set*, as measured by the price of ether and its volatility, is related to ICO participation. When the price of ether is high, it may be more appealing to invest or keep being invested in ether. But higher volatility usually correlates with regulatory uncertainty in the ICO market, and can trigger investments in ICOs because investors do not want to miss out on investment opportunities.

Similarly to fundraising in equity crowdfunding, we also find that retaining tokens, as well as reducing venture uncertainty, is positively correlated with funding success (see Ahlers et al., 2015). As a strong indicator that ICOs differ from equity crowdfunding, we found that social alliance and human capital (or *venture quality*) positively correlate with ICO success, which is not the case to the same extent in equity crowdfunding and could be driven by investments from institutional investors, who generally focus more on these aspects.

Finally, we gauged the impact of several pre-ICO characteristics, and find that having a hard cap in place increases both the probability of token tradability and the amount raised in the ICO.

This is in line with the argumentation that the lack of a hard cap and the imposition of an open goal in the pre-ICO period can make it difficult for investors to assess pre-sale success. Such information presumably impacts the decision to participate in the actual ICO.

The remainder of the paper proceeds as follows. Section 2 provides a detailed institutional background and an evolutionary history of ICOs, while section 3 develops a theoretical framework with related hypotheses. Sections 4 and 5 describe our data-gathering process and applied methodology. Our empirical results are in section 6. Section 7 concludes and provides some policy implications.

2. Institutional Background of Initial Coin Offerings

In this section, we explain the concept of Initial Coin Offerings (also known as Initial Token Offerings, initial crypto-asset offerings or token generation event) as a new method of capital formation for entrepreneurs. We first give a brief explanation of the blockchain technology that enables this new fundraising model, and we cover a short history of developments in the ICO market. We then discuss the mechanics of investing in an ICO, and highlight the differences with existing methods of capital formation.

2.1. Blockchain and Distributed Ledger Technology

In order for ICOs to function, they use the relatively new technology referred to as blockchain, or, distributed ledger technology (DLT). The origins of a distributed network trace back to building a communication network that could survive an attack if any one node was compromised the remainders could still communicate (see Baran, 1964 and Figure 1).

—Please insert Figure 1 about here—

Blockchain technology, leverages the same principle that regardless of any one node being compromised or dishonest, the distributed network would remain accurate. It does so by applying game theory (Harsani & Selten, 1988) to create incentives for each of the nodes to accurately and diligently maintain the network. The first example of this is the Bitcoin blockchain, created by someone(s) with the pseudo name Satoshi Nakamoto through a proof of concept article published in 2008 to members in a cryptography mailing list and became widely cited (see Bitcoin.org, 2018).[4] In the original article, the blockchain was used only as a mechanism by which to record ownership of bitcoins. Application of the blockchain technology is now widespread, and has evolved to record ownership of items such as intellectual property, property deeds, products within supply chains, smart-contracts and of course countless cryptocurrencies (Pilkington, 2016).

Today there are numerous variations of blockchains, ranging from publicly available or privately restricted, to "permissioned" (only certain people can alter them), to those that require KYC or are anonymous, to those where the consensus mechanism (governance) is decentralized (e.g., bitcoin), hierarchical-like (EOS), or centralized (ripple), and those where validation of the ledger is through proof of work, proof of stake, proof of authority, proof of capacity, or a hybrid thereof (see Tasca et al., 2018 for an overview). Despite the numerous variations, a blockchain within an ICO context is essentially an openly available, immutable ledger of the entire history of timestamped transactions recorded in sequential blocks.

A transaction has three main components: sender address (typically referred to as a "wallet"), receiver address (also a "wallet"), and transactional unit. The final essential property is that all units are already known to the blockchain, thereby preventing a double-spending problem and

[4] See https://bitcoin.org/en/faq.

ensuring proof of ownership (Nakamoto, 2008). The end result is that people are able to transact without a centralized authority (e.g., a bank or government). The centralized authority is replaced by decentralized nodes that are constantly incentivized to validate (maintain a record of) the blockchain through a process called mining (staking for proof of stake blockchains). While bitcoins are created through this mining process, as we discuss in the next section, the vast majority of tokens created in ICOs are only available through transactions.

To illustrate how a typical ICO relates to a more traditional investment platform, consider the blockchain as an (equity) crowdfunding platform provider. Ventures wishing to raise capital submit to the platform (blockchain) the specifications of the equity offering (token offering), including price, total amount of tokens, time frame, and whitepaper. They then assign ownership of all the equity (tokens) to themselves. Investors wishing to participate send capital to the venture. If the specifications of the equity offering are met (e.g., the token funding requirement), the platform (blockchain) initiates the contract specifications and transfers ownership of the equity (tokens) to the investors.

We define an ICO (token offerings) as follows: *ICOs are an unregulated form of crowdsale to raise funds through a blockchain by selling venture-related tokens or coins in exchange for legal tender or cryptocurrencies.*

2.2. Mechanics and History of the ICO Market

The process described thus far relates to ICOs that use an already existing blockchain. However, it is possible to conduct an ICO that will subsequently create its own blockchain. In these cases, investors are sold a simple agreement for future tokens (SAFTs) as a promise of ownership of the coins once the blockchain is completed. This process is both technically challenging and costly in

both the short and long terms. Doing so would also require the venture to create an ongoing incentive mechanism (mining) to attract users to validate the ledger. Returning to the previous example, this would essentially be equivalent to creating a venture-related new equity crowdfunding platform just for the venture's funding campaign. As a result of this difficulty, the ICO market as we know it was essentially nonexistent until late 2015.[5]

In 2015, the blockchain Ethereum, followed by Waves in 2016, created platforms that enabled anyone to easily create an ICO on it through a mechanism called "smart contracts."[6] Initially, ventures required technical knowledge to operate an ICO. However, over time, the ERC20 standard became so widely adopted that anyone can create their own token in a matter of hours (as of April 2018, there were approximately 67,000 ERC20 token contracts).[7] As the technical requirements decreased, the ICO market began growing exponentially (see Table 2).

2.3. Categories of Tokens Issued in ICOs

As the technology behind ICOs is still developing, literature has not yet reached a consensus on definitions and classifications of tokens. We propose a simple tiered framework largely based on the rulings of the Securities and Exchange Commission as shown in Figure 2 below. At the highest level, they are classified by whether the cryptocurrencies have their own blockchain platform (*coins)* or if they operated on top of an existing separate blockchain (*tokens)*.

—Please insert Figure 2 about here—

[5] Prior to the Ethereum and Waves blockchains, which enabled ICOs to form their own platforms, ventures would typically "fork" or create a sidechain to existing blockchain to meet their needs, rather than create their own from scratch. Forking is possible due to the open nature of the underlying code.
[6] Interestingly, the concept of smart contracts predates the concept of blockchains, and was initially proposed as early as 1993 by Nick Szabo (Securities and Exchange Commission, 2017). In 1997, he developed the concept further in a paper entitled "Formalizing and securing relations on public networks." However, the economic and communications infrastructure was not developed enough to permit implementation at that time (see Szabo, 1997).
[7] See https://etherscan.io/tokens.

At the second level, is the tokens legal status. A distinction extremely important due to the regulations that will apply to the *coin* or *token*. In 2015, the first important ruling by the U.S. Commodity Futures Trading Commission ruled that cryptocurrencies resembling bitcoin were commodities. In 2017, the SEC undertook an investigation of tokens issued by a virtual organization known as "The DAO." The SEC ultimately decided that any token that passes the "Howey" test[8] is likely to be considered a security, and therefore subject to the Securities Act of 1933 and the Securities Exchange Act of 1934. This set an important precedent. In a subsequent statement, the SEC chairman advised prospective investors that the potential for a secondary market is one of the key hallmarks of a security. Therefore, "*by and large, the structures of initial coin offerings…involve the offer and sale of securities*" (Clayton, 2017). Based on these rulings, we can further separate the tokens by legal status, it is important to note that by definition a *token* cannot have the legal status of a commodity, however both *coins* and *tokens* can be either securities or utilities.

Within the context of ICOs, all of the different token purposes fall under only two of legal classification types:[9] *utility tokens*, which have similar funding designs to donation base crowdfunding, reward-based crowdfunding and sales of APIs and s*ecurity tokens*, which have similar funding designs to equity crowdfunding, lending crowdfunding, and venture capital funding. In practice, the exact names given to all the different types vary significantly and often are at disagreement between different ventures. Although we include several name examples at

[8] The Howey test considers the sale of a token to be an investment contract if purchasers 1) invest valuable goods or services, 2) are investing in a common enterprise, 3) have reasonable expectations of earning a profit, and 4) earn profits that are dependent on the efforts of others. See https://corpgov.law.harvard.edu/2017/10/30/sec-enforcement-against-initial-coin-offering/.

[9] The third, widely accepted, category of "crypto-currency" tokens, such as bitcoin is excluded from an ICO analysis. We agree with the U.S. Commodity Futures Trading Commission's classification of cryptocurrencies as commodities, which are by definition not creatable through an ICO sale. See https://www.reuters.com/article/us-usa-cftc-bitcoin/virtual-currencies-are-commodities-u-s-judge-rules-idUSKCN1GI32C.

the third level of our classification figure for informative purposes, the important aspect in the context of ICOs analysis is to define success in a method that encompasses all of the different token types.

Legal classification aside, when examining ICO success factors, it is critical to note that some ICOs are held to decentralize or create entirely new business models. These funding campaigns may draw contributors for, e.g., psychological reasons (Shiller, 2018), such as to make the world a better or more equal place. This does not mean these campaigns involve less entrepreneurship. To the contrary, they are perhaps the truest example of entrepreneurship, as they offer only ideas. As such, regardless of whether the ICO structure is equity- or decentralization-related, the determinants of success are largely the same and are essential to understanding the entrepreneurship required in this funding method.

2.4. Differences Between (Equity) Crowdfunding and Initial Coin (Token) Offerings

Ahlers et al. (2015) argue that empirically studying equity crowdfunding is the most relevant methodology for assessing entrepreneurial signaling to small investors. Given that the information asymmetries in an ICO context are much higher, we believe Ahlers et al.'s (2015) arguments have even greater validity due to the diverse nature of individual ICO goals. The authors formulate their arguments on the basis of comparisons with donation crowdfunding, reward-based crowdfunding, and lending crowdfunding. ICOs by nature encompass all of these, thereby necessitating the development of a new framework to study the success factors that fit their more diverse nature.

As previously discussed, an ICO can theoretically be structured as a perfect substitute for all other funding mechanisms. All the components and attributes of crowdfunding (including equity, reward, donation, and lending) for venture capital and security issuance are possible. However,

currently, adherence to regulations is largely voluntary. Thus, proper due diligence by investors is essential.

In addition to serving as substitutes for existing funding mechanisms, ICOs have several unique attributes that help explain their popularity. By design, ownership of the tokens purchased in ICOs is verifiable[10], with no need for a government or corporate registry. The transfer of ownership can also be done without the consent or advanced knowledge of the token offeror. In addition, fractional ownership is possible. This combination of attributes equals significantly greater ease of transferability when compared to other funding mechanisms. For successful ICOs with tradable tokens, investors are effectively able to cash out almost immediately (assuming no lookup periods), eliminating the market frictions and liquidity issues present in equity or reward-based crowdfunding.[11]

In practice, however, the ICO market until now has borne little resemblance to the aforementioned theoretical description. Typical venture goals are categorically similar to their corresponding traditional fundraising mechanisms, but they rarely structure the offering in the same manner.[12] For example, the details of a typical offering are summarized in the ICO's "whitepaper," which is comparable to a prospectus (Siegal et al, 2017). However, there is no consistent format for whitepapers, which makes comparing projects difficult for investors.

[10] The exception is for ICOs with their own blockchain. The future *coins* are issued as SAFTs. In these cases, ownership is not completely verifiable without the corporate registry until the blockchain is created.

[11] An ICO for reward-based crowdfunding refers to a case where token holders are promised a product once it is completed. Therefore, only investors who desire the product contribute. With ICO liquidity, a savvy investor who believes in the product could participate in the ICO not for the product itself, but to resell the acquired token for a profit at a later point in time.

[12] For example, ICOs promising a product (similarly to reward-based crowdfunding) almost always retain a portion of the tokens for themselves.

Marketing of an ICO also tends to differ greatly from that of traditional mechanisms, where there are platforms that precisely list crowdfunding campaigns, and brokers who present investment opportunity proposals to interested venture capitalists. In contrast, ICOs are generally conducted on their own websites.[13] They are open to both large and small investors, which enables entrepreneurs to raise funds from small investors, who likely lack the appropriate finance and investment-related knowledge. Ultimately, the amount of information disseminated, the use of funds, and the regulatory compliance of the ICO is all under the control of the entrepreneurs, and investors must validate all information independently. Given the heterogeneity among ICOs, empirically examining success factors becomes even more important.

2.5. Defining Success in an ICO

Differentiating between "successful" and "unsuccessful" ICOs is not trivial, and many facets must be considered. Many of the ventures that undergo ICOs involve creating a revolutionary new technology, or decentralizing existing technology, with time frames measured in years (perhaps decades). Moreover, most ventures are in the "idea" or early stages; Ernst & Young (2017) found that only 5% of ventures had running projects, 11% had prototypes, and 84% were merely ideas. Thus, most will undergo major changes in concept from the time of their ICO to their final product launch, and will likely face numerous unexpected challenges.

As a result, comparing product output with stated goals is not necessarily pertinent here, nor is defining "on-time" delivery as a measure of success, or whether the "goal amount" (hard cap) is reached (both popular measures in the crowdfunding context).[14] Instead, we argue that the

[13] However, the ICOs can be cross-listed on websites such as Cryptoslate.com.

[14] Siegal et al. (2017) provide measure "post-ICO" success measure and argue that after an ICO *success* should also be defined by how the venture develops after its crowdfunding phase, which is similar to the (equity) crowdfunding research where the first papers start looking at venture performance after the campaign ends and data becomes available. This is further exemplified by Ethereum founder forward of his article analyzing token sales models stating

strongest measure of ICO success is whether the token is subsequently listed on an exchange (token tradability) and traded actively.[15] Our reasoning for this is twofold.

First, exchanges are protective of their reputations. They conduct expert due diligence on prospective token listings to screen "*total trash*" projects (see Buterin, 2017) or fraudulent ventures regardless of the amount of capital raised in the ICO. Second, we posit that defining success as tradability is the only consistent and unbiased method when the dataset consists of both *security* and *utility tokens*. With *security tokens*, listing on an exchange enables investors to monetize their investments, being consistent with traditional Initial Public Offerings (IPOs). It also gives entrepreneurs access to additional capital by offering unsold tokens in the future, which is similar to seasoned equity offerings (SEOs) for publicly listed firms.

With *utility tokens*, listing on an exchange is often a necessary component for the project to actually function. Upon completion, access to the platform/product requires users to have the token itself. Thus, without the token becoming tradable, the project will fail, regardless of how much it may have raised.

3. Hypothesis Development

In this section, we develop the theoretical framework for the determination of a *successful* ICO. Our framework builds on the work of Baum and Silverman (2004) and Ahlers et al. (2015) on venture and (equity) crowdfunding selection criteria. We put forth three hypotheses that relate *venture quality*, *venture uncertainty*, and *investor opportunity set* as determinants of ICO success.

"*It's entirely possible for any given project to be total trash as a whole and yet still have an awesome token sale model*" (Buterin, 2017).

[15] Tokens can also be traded outside an exchange, where buyers send funds to sellers' wallets. However, having tokens listed on an exchange provides additional assurance that the tokens are considered valuable, rather than being just a string of code.

Figure 3 illustrates the relationship between the aforementioned determinants and ICO success. In contrast to (equity) crowdfunding, where a fully funded campaign is the most important measure of success, in an ICO, a tradable token is of the utmost importance (equally for investors and venture founders, e.g. because it enables founders to raise additional funds and investors to monetize). However, we also use total amount raised as a complementary success measure (see Ahlers et al., 2015, for a detailed discussion on success measures in crowdfunding campaigns).

—Please insert Figure 3 about here—

3.1. ICO Investors

To better understand the funding dynamics of ICOs, it is important to be aware of the different investor/contributor types participating in them. While venture capital has predominantly institutional investors, such as pension funds and accredited investors, equity crowdfunding was previously attractive only to accredited investors.[16] With the recent change in the Jobs Act Title III (Crowdfunding) regulation, it is now open, to some extent, to individual investors.[17]

In contrast, in the absence of regulation, ICOs are equally available to institutional and accredited investors, as well as (and without restrictions on) individual investors. Due to the anonymity of the funding process, however, we do not have a breakdown of ICO financiers or which investor types are targeted. Some token offerings provide significant discounts to early investors or require high minimum contributions (both usually geared to institutional investors); others impose maximum individual contributions (geared to individual investors).

[16] Accredited investors are broadly categorized as institutional investors, or individuals whose wealth exceeds USD $1 million, and whose annual income has exceeded USD $200,000 for each of the two most recent years (see https://www.investor.gov/news-alerts/investor-bulletins/investor-bulletin-accredited-investors).
[17] Investments are limited to $2,000 to $10,000 depending on the individual investor's annual income and net worth.

Moreover, token offerings may also attract the attention of so-called technical or "sentiment" traders, who disregard the fundamentals of the offering and instead focus on achieving short-term returns through sentiment analysis.[18] Token offerings also appeal to hedge funds[19] and even criminal money launderers. Given the heterogeneity in the investor base, it is necessary that participants follow similar decision criteria to maximize their risk-to-reward ratio. This allows us to pinpoint the common success determinants more precisely. This view is supported by Wang and Vergne (2017), who also find that cryptocurrency returns are not driven by pure speculation. Instead, the market matures, which supports our previous assumption. Furthermore, the ultimate goal for all token investors, from individuals to criminal money launderers, is that the token become actively traded. Otherwise, the invested capital is presumably lost (unless a soft cap is in place).

The ICO market is far from being information transparent because of, e.g., misrepresentation,[20] lack of technological knowledge,[21] and even proven fraud,[22] which results in severe information asymmetries. Information asymmetries are a common phenomenon in related markets such as venture capital or (equity) crowdfunding (see Ahlers et al., 2015; Connelly et al., 2011; Megginson and Weiss, 1991). However, in those markets, it does not lead to a collapse, but instead to an increase in the value of information, which helps reduce the asymmetry.

[18] See http://www.cryptocamacho.com/sentiment/.
[19] In April 2018, George Soros's hedge fund Soros Fund Management announced it would begin trading in cryptocurrencies (see https://finance.yahoo.com/news/billionaire-george-soros-reportedly-getting-144100148.html).
[20] For example, there are cases where celebrities are unlawfully promoting ICOs on social media (see https://www.sec.gov/news/public-statement/statement-potentially-unlawful-promotion-icos).
[21] PwC found that 86% of financial services companies (the industry most exposed to blockchain) have yet to develop the necessary blockchain skills (see http://usblogs.pwc.com/emerging-technology/the-blockchain-challenge/).
[22] The Quebec-based Plexcoin ICO raised $15 million from thousands of investors by falsely promising a thirteenfold profit in less than a month before it was halted by the SEC (see https://www.sec.gov/news/press-release/2017-219).

As we noted before, entrepreneurs have been able to raise substantial amounts of funding through ICOs on platforms such as ICObench.com or Cryptoslate.com. Therefore, investors have seemingly been able to infer the quality of ventures undergoing an ICO by interpreting the information and attributes provided therein. In this sense, investors seem to evaluate and process information about a e.g. venture's quality, because not all ventures obtained financing or were listed afterward. If we assume that investors and entrepreneurs act rationally, theoretically the latter will try to bridge any information asymmetry by signaling to the former, or by providing what they perceive as valuable information (Michael, 2009).

3.2. Venture Uncertainty

3.3.1. ICO Characteristics

The variables most closely related to *venture uncertainty* are *ICO characteristics and financial details*. Certain *ICO characteristics* of token offerings are suitable for reducing uncertainty and result in a greater likelihood of ICO success. For example, when ventures post project code and updates on Github, it enables potential investors to audit the code themselves and monitor the progress leading up to the token offering (variable *Github*). Logically, projects without quality code will be reluctant to establish an account on Github[23], and will therefore be less likely to succeed.

In a similar manner, offering tokens on the Ethereum blockchain provides additional transparency for investors to conduct due diligence on the offering (variable *ETH platform*). Among many reasons for this is that unlike bitcoin, Ethereum is Turing complete (Swan, 2015).

[23] Github is commonly used even for tokens built on top of Ethereum where code is of less or no importance. The reason being is that Github shows timestamped changes to the whitepaper, project goals or team members. Given this strongly differs from Github's initial purpose we argue this is a strong signal from the entrepreneurs to reduce uncertainty. For the same reason, we did not include the measure of Github Stars as a variable as it would presumably be biased towards code-oriented tokens.

This enables programmers' a greater ability to verify and recalculate information.Moreover, when tokens are issued on Ethereum, it facilitates ease of investment because potential investors can use standard wallets. Lastly, it also increases the speed and convenience of the token being listed on an exchange, because the security standards are already in place.

Pre-ICO sales are often used to cover, e.g., marketing expenses and ICO setup costs, and they can be characterized by the participation of renowned investors such as hedge funds or venture capital funds at discount prices (also called bonuses) (variable *pre-ICO*). Convincing these investors to purchase tokens in a pre-ICO might be seen by later investors as an endorsement. However, if a venture needs a pre-ICO to cover marketing expenses and endorsing investors, it could also mean the entrepreneurs do not have deep enough pockets to cover the costs themselves, or that they are unsure about the success of the ICO. Furthermore, there is a risk that large investors will dump their tokens once they are tradable to maximize profits from their bonus structure at the expense of later investors. Both features correlate positively with higher *venture uncertainty*.

The presence of a whitelist, as well as "restricted areas" (variables *restricted areas* and *whitelist*) signal project knowledge of regulatory issues and reduce regulatory risk. The implementation of a whitelist relates to government regulations for disclosure of customer requirements. Restricted area lists are used to ensure compliance with international sanctions and to avoid litigation in areas deemed high risk, this reduces *venture uncertainty* from both the signal that the management is knowledgeable in potential regulations and in reducing the likelihood that the venture may subsequently be investigated by authorities in respective countries. Therefore, it has become common to restrict U.S. investors to mitigate any risk of SEC intervention. Both are desirable given the uncertainty related to the classification of tokens and the resulting taxation laws.

Token offerings listed in tax havens should reduce uncertainty for potential investors and minimize the risk of future regulatory costs to ventures (variable *tax haven*). Moreover, a presence on the prominent communication application "Telegram" gives potential investors the ability to communicate directly with management to address any questions or concerns (variable *Telegram*). Telegram has become the de facto medium for cryptoenthusiasts. Thus, a presence on it would signal higher industry knowledge reducing *venture uncertainty.*

The whitepaper is similar to a prospectus in a regular IPO or offering documents in equity crowdfunding campaign. In equity crowdfunding, platform providers require that documents follow a certain template, and may also require entrepreneurs to use advisors to ensure the standards are met. It is very different in the ICO market, because there is no "platform provider" whose reputation is related to venture quality and has a self-interest in maintaining high document standards. It is therefore complex to effectively measure the quality of a whitepaper and the level of preparedness. We argue that entrepreneurs recognize this information uncertainty and have greater knowledge of the likelihood of their proposed venture to succeed. Ventures with a high confidence in the success of the proposed token will arguably be more forthcoming to share the technical details, projected timeframes and competitor analysis in their whitepaper. Conversely, ventures with a lower confidence may withhold technical information or competitor information from the whitepaper. Taken together, the smaller the number of pages in the whitepaper (variable *# WP Pages*) the greater the *venture uncertainty.* [24]

3.2.2. Financial Details

[24] We opted not to run any text analyses, such as calculating readability indices, on the text in the whitepaper, because many are written in non-English languages. In addition, a high percentage are not machine-readable and seem to be presented primarily in pictures likely due to the ability to convey the message across numerous languages.

When evaluating the *financial details* of an ICO, the entrepreneurs' indirect investment in the venture (or, put differently, the percentage of tokens sold in the ICO) is a very strong signal of the unobservable characteristics of the token offering (variable *% distributed in ICO*). This is comparable to the equity shares sold in an IPO or an equity offering in equity crowdfunding (see Leland and Pyle, 1977; Ahlers et al., 2015). Higher levels of entrepreneurial confidence in the venture are positively correlated with the amount of tokens they retain. In this way, they align their interests with those of their investors to reduce venture uncertainty.

The development of any new project is a risky endeavor. The potential to create a successful project correlates strongly with the amount of funding available. Some projects offer investor protection in the form of a soft cap mechanism (variable *soft cap*), which is similar to the all-or-nothing mechanism in crowdfunding (see Cumming, Gaël, and Schwienbacher, 2015). In this case, all contributions are returned to the investors if sufficient funds are not raised. ICOs with soft caps in place clearly reduce uncertainty and decrease investor risk.

Individual ICOs raise funds by investors sending existing cryptocurrencies or "Fiat" currencies (variable *accepting Fiat*). A Fiat currency is any government-backed legal tender. When an ICO accepts Fiat currencies, there are two potentially opposing effects on venture uncertainty at play. Accepting of Fiat presumably means it has ties with the traditional banking system, might signal greater trustworthiness of the venture and could potentially increase the pool of investors beyond those owning cryptocurrencies. However, this comes at the cost that it might be interpreted as a lack of confidence to complete the ICO by "cryptocurrency investors" only and instead "Fiat investors" are needed too. Moreover, unlike sending cryptocurrencies there is no "smart-contract" in place ensuring the Fiat contributions are returned if the soft cap is not reached. Taken together on average we expect that *accepting fiat* increases venture uncertainty.

We note that issuing tokens to investors has both direct and indirect costs. Each supplementary transaction requires additional auditing resources and computing power to process. In addition, ventures incur direct costs from the transfer fees that are necessary to send newly created tokens to investors. On the Ethereum platform, this is a fixed amount irrespective of transaction value (21,000 Gas), resulting in higher costs for servicing smaller investors. Token offerings that feature minimum contribution requirements signal to potential investors that the entrepreneurs are confident in the quality of their offering (or less uncertain), and do not need to depend on small contribution amounts (variable *min-contribution*).

Note further that exchanging capital between the different major cryptocurrencies is relatively simple and cheap for investors. But token offerings that accept numerous currencies require significant blockchain expertise in order to integrate functionality among them (variable *# accepting cryptos*). Thus, the greater the number of cryptocurrencies accepted, the higher the venture's technical expertise in listing the tokens after the ICO is completed, which is one of the key determinants of success.

And token offerings that feature bonus structures incentivize investors to, e.g., make larger investments (size discounts), invest earlier (timing discounts), and bring in new investors (referral bonuses). Bonus structures reduce investment risk for investors aiming to solicit early contributions, which, according to Hornuf and Schwienbacher (2017), is positively correlated with funding success in crowdfunding campaigns (variable *ICO bonus*).

Finally, we control for the number of tokens offered in an ICO (variable *# of tokens*). Fundamentally, the number of tokens should not be related to funding success, because tokens are dividable and investors can buy, e.g., a fraction of 0.001 of a token. From an economic perspective, this is similar to a stock split that is decided upon by the investors, not by the venture. However, it

has long been known that mental accounting matters (Thaler, 1999). Considering utility tokens it is common for the ventures to set aside a percentage of tokens to be later used attract new users to their platform/app. It is much more likely a user will respond to "get 100 free tokens" versus "get 0.02 free tokens," in addition for those willing to accept the tokens from a psychological perspective it seems easier to believe a token will double in value from fractions of pennies than from $1,000 (Thaler, 1999). Given that it is likely the greater the number of tokens the greater ability to attract new users and therefore the lower the venture uncertainty.

Hypothesis 1 (Venture Uncertainty): *Higher levels of venture uncertainty are negatively correlated with ICO success.*

3.3. Venture Quality

The block of variables most closely related to *venture quality* are *team characteristics*. One of the key ingredients of a venture's quality is its human capital. It is well documented in the literature that venture capital funds base their investment decisions on their assessment of the quality of management (see MacMillan et al., 1985; Muzyka et al., 1996). However, in addition to human capital, straight head count is also important, because preparing and launching an ICO requires a significant amount of work to, e.g., craft the whitepaper, market the offering, manage social media and investor relations communications, and carry out all subsequent operations. Once the offering is complete, in order to be successfully listed on a major exchange, the project must show significant potential. It is documented that, "team founded" ventures appear to outperform "individually founded" ventures (Chandler et al., 2005) and that the size of the top management team among high-tech firms correlates with growth of a new venture (Cooper and Bruno, 1977) and with success (Teach et al., 1986). The larger the team size, the more likely it can accomplish that objective. This also serves as a signal of overall confidence in the project. We thereby measure human capital by the number of team members (variable *team size*).

At the intersection of human capital and social alliance capital are the ICO advisors (measured by their number) (variable *# advisors*). Advisors can be "veterans" in the token or fintech space. They can be used as a think tank, to bridge a potential lack of cryptocurrency market understanding, and can provide valuable access to their networks.[25] Furthermore, having advisors within an ICO may also serve as an endorsement, because they are putting their reputations on the line.

[25] See https://tencapital.group/how-to-run-an-ico-advisors/.

Social alliance capital can be measured by the CEO's or founders' networks on, e.g., LinkedIn (*CEO LinkedIn 500+* and *CEO LinkedIn followers*). Those networks can be used to achieve faster access to information, to promote the ICO itself, or to advertise the venture's products. Moreover, larger networks, especially on LinkedIn, could contribute to a venture's legitimacy, because a failing would be visible to all LinkedIn connections, and would result in a loss of social capital (see Baum and Silverman, 2004; Cumming et al., 2017).

Hypothesis 2 (Venture Quality): *Higher levels of human capital and greater social alliance capital are correlated with higher venture quality, which positively affects ICO success.*

3.4. Investor Opportunity Set

In addition to the characteristics unique to each token offering, the *investor opportunity set* at the time of offering can factor into its determinants of success. To better understand the cryptocurrency ecosystem, we first describe the process of investing in an ICO, and how to convert the tokens received to a Fiat currency.

The investment process generally involves three steps. First, investors register with a secure exchange that is connected to an established banking system, enabling the transfer of Fiat currencies to cryptocurrencies. These exchanges are characterized by higher security and minimal crypto options. For example, the most popular exchange in North America, Coinbase offers only bitcoin, ether, or litecoin. Second, investors create a separate "wallet" to send funds from their account on the secure exchange (each exchange holds all participant funds in the same wallet) to their private wallet. Third, investors transfer the cryptocurrencies from their private wallet to the address of the token offering.

To exit the ecosystem after the reception of tokens from an ICO requires additional steps. Secure exchanges usually do not accept newly created tokens. Therefore, investors must send the new tokens from their private wallets to a separate or intermediary exchange. On this exchange, the new tokens need to be converted to a primary cryptocurrency, which is subsequently transferred back to a secure exchange. Finally, the primary cryptocurrency is traded back to a Fiat currency. This final step is costly, with transactions costs of converting to dollar deposits ranging from 1.5% to 4% (Conley, 2017) because primary exchanges such as Coinbase charge base rates (e.g., 4% for USD transactions).

Because this multilayer process involves many sets of transaction costs, especially when exiting to a Fiat currency, there is an incentive to keep capital within the cryptocurrency ecosystem. Once investors hold a primary cryptocurrency, they face an investment opportunity set that includes the primary cryptocurrencies, existing tokens, or participating in an ICO. If their primary cryptocurrency is appreciating in value, they may not see the need to participate in an ICO. ICO funds are "locked in" for a certain time period, until the new token is traded, funds are returned (due to a soft cap), or if the ICO-related token is not traded they are lost (variable *ETH value*[26]). This could decrease the likelihood of ICO participation. On the other hand, if their primary cryptocurrency is depreciating in value, investors may be more inclined to participate in token offerings in order to mitigate expected further losses.

Note that token offerings are largely unregulated, and any announcement of a change in regulation will likely impact the ICO market. For example, ether's success, or token value, largely depends on the prosperity of the ICO market. There is a positive correlation between the amount

[26] We use ether rather than bitcoin because the vast majority of ICOs are conducted on the Ethereum Blockchain and the majority accept only ether as payment. Therefore, ether is a better representation of the opportunity set facing the investor.

of token offerings built on the Ethereum platform and the expected future demand for ether due to the ventures transactions fees.

Transferring Ethereum-based tokens requires transfer payments in ether. Thus, its volatility depends to some extent on uncertainty in regulatory changes (variable *ETH volatility*). From a visual inspection, we observe spikes in ether's volatility when regulatory or institutional changes affecting token offerings are discussed. Recent topics leading to an increase in volatility involved restricting the exchange of Fiat to a primary cryptocurrency (e.g., Toronto-Dominion Bank banning cryptocurrency purchases on credit cards),[27] restricting the pool of potential investors (e.g., China banning cryptocurrency websites),[28] additional costs and complexity of the token offering (e.g., knowing customer requirements), and restricting fundraising (e.g., the U.S. financial crimes enforcement network FinCEN issued a letter stating that developers of ICOs are considered money transmitters, and can be charged with a federal felony for failing to register as such and following the associated regulations).[29,30]

An empirical analysis of the effects of these regulation announcements has not yet been developed. However, a visit to any pro-cryptocurrency website provides countless anecdotal evidence.[31]

[27] See https://www.bnn.ca/td-halts-cryptocurrency-purchases-made-on-its-credit-cards-1.1008731.
[28] See http://www.scmp.com/business/banking-finance/article/2132009/china-stamp-out-cryptocurrency-trading-completely-ban.
[29] See https://coincenter.org/link/fincen-raises-major-licensing-problem-for-icos-in-new-letter-to-congress.
[30] This is echoed by Jay Clayton (SEC chairman), who states that, "*By and large, the structure of initial coin offerings I have seen promoted… directly implicated the securities registration requirements.*" This contradicts the vast majority of ICOs that claim to be utilities and not securities (see https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11).
[31] A recent example is Kodak, which, despite reputational and financial consequences, postponed its ICO due to the need to verify the accredited investor status of each interested investor (at the time, it had over 40,000). The repercussions of the postponement extended beyond the separate entity offering the ICO, and ultimately caused KODK shares to tumble 24% in the two days following the announcement.

At first glance, one could conclude that rising regulatory concerns would reduce investors' willingness to invest in token offerings. However, following the relevant blogs and posts, we have observed the opposite effect: Investors want to get on the cryptocurrency train before it is too late. Moreover, such announcements can provide wider exposure of the concept of token offerings to a larger audience of potential investors. Similar effects have been observed, for, e.g., tax-optimized investments just before regulation changes..

> **Hypothesis 3 (Investor Opportunity Set):** *Relative attractiveness to primary cryptocurrencies and uncertainty about future token offering availability are positively correlated with ICO success.*

4. Sample Construction

Entrepreneurs' ability to bypass centralized institutions, such as stock exchanges, by directly reaching out to potential investors in an ICO is challenging for the empirical research on ICOs. The typical venture distributes relevant information about its planned ICO directly on its website. Unfortunately, once the ICO is complete websites often change focus from marketing to promoting the venture and its services, which could result in removing ICO-related information. However, ventures also promote ICOs on third-party ICO listing websites, which list upcoming ICOs to increase awareness. These websites archive information before and during the ICO process, which arguably serves as a clear indicator of the information set investors have when making their investment decisions.

We conducted an extensive Google search to identify the "best" ICO listing websites, meaning that the most complete sample of ICOs is shown and detailed information about each ICO is

available. In our first step, we identify a short list, which we manually examined to locate the source with the highest amount of completed ICOs.

The ICO listing website with the largest amount of ICOs[32] that contained the most detailed ICO information was ICObench.com, with a total of 1,009 completed ICOs (March 7, 2018). However, we found that the ICO data was far from complete, which is unfortunately a common feature on ICO listing websites. We supplemented the data for each individual ICO with information from Cryptoslate.com, whitepapers, and venture websites whenever possible. For any discrepancies between the two sources, we used timestamped sources such as news clippings, Github, and Bitcointalk to determine accuracy. For any discrepancies between ICObench.com and Cryptoslate.com regarding "ex ante" ICO information (such as number of tokens offered and cases where no time-stamped information was available), we used the information provided by ICObench.com because we found greater accuracy when checking time-stamped sources.

For the ex post ICO variables, such as whether the token was traded, we supplemented and cross-referenced the information with additional sources. For example, we considered ICO status as *trading* if the tokens were listed on CoinMarketCap.com. As CoinMarketCap.com has a strict listing policy and screens out certain tokens. We also manually determined if an ICO token was trading on any of the exchanges of Yobit.net, Etherdelta.com, HitBTC.com, Livecoin.net, or Bancor.Network, and identified sixty that were *trading*, but that were missing from CoinMarketCap.com.

[32] We determined that tokendata.io had the most comprehensive list, with a total of 1,129 ICOs (March 7, 2018). Unfortunately, tokendata.io offered no additional ICO information, directing back to each individual ICO website for offering details.

Whenever available, we obtained *total amount raised* from ICObench.com and Cryptoslate.com. We then cross-checked *total amount raised* with the other data sources (CoinSchedule.com, Tokendata.io, and CoinMarketPlus.com), and accepted 15% deviations. We adjusted a total of eleven cases. We excluded all non-profit ICOs, because they are not entrepreneurship-related. When *total amount raised* was missing from both ICObench.com and Cryptoslate.com, we again used CoinSchedule.com, Tokendata.io, and CoinMarketPlus.com to collect information. In total, our database contains 1,009 unique ICOs, and 573 ICOs that provide information about ICO amount raised. The 573 ICOs ultimately raised about $8.5 billion (see Table 2).[33] To the best of our knowledge, this represents the most comprehensive ICO dataset created.

The variables in the blocks *ICO characteristics*, *financial details*, and *pre-ICO characteristics* come from ICObench.com and Cryptoslate.com. If a respective variable was only available on one ICO listing website, we included it in the dataset. If the variable was available on both websites, we compared them, and, if matching, we included them in the dataset. Otherwise, we searched for alternative sources, such as whitepapers, to confirm accuracy (see Table 1 for details). In the *team*

[33] We recognize that the discrepancies for amount raised among the different data sources are related to the reference point (starting or ending ICO date) to the Fiat and other cryptocurrency exchange ratios, which fluctuate during the ICO period, and to the structure of the ICO. For example, a typical successful ICO will instantly disclose that the *hard cap* (the funding goal) has been reached when the amount raised equals the funding goal. However, while funding goals are normally stated in Fiat currency, they are encoded in the smart contract mechanism as units of cryptocurrencies, assuming a certain exchange rate. After the launch of the ICO, fluctuations in the underlying cryptocurrency price can result in the actual amount raised differing from the funding goal. Certain ICO structures further complicate this calculation, because bonuses may be offered based on the day the investment was made (e.g., Day 1, $1\ ETH = 6{,}000\ ABC$, Day 2, $1\ ETH = 5{,}600\ ABC$, and so on, with a *hard cap* of 1 billion ABC). Total amount raised would then depend on the days the investments were made. In the weeks following the original announcement, the venture completes an audit and discloses the actual amount raised, which may differ from the funding goal amount. Furthermore, the exact amount raised also depends on the value of the underlying currency (ETH in the previous example) on the respective day. ICO listing websites use the start, middle, or end date of the ICO, resulting in differences. To mitigate these issues, we use amount raised in USD when available. We found four cases where the data was only available in ETH, so we converted the closing price of Ethereum to USD on the day the ICO ending date was used.

characteristics block, the variables *# advisors* and *team size* were collected from ICObench.com; *CEO LinkedIn 500+* and *CEO LinkedIn followers* came from the CEO's or founder's LinkedIn profile. The variables in the *cryptocurrency dynamics* block are based on Ethereum prices from CoinMarketCap.com.

5. Methodology

To illustrate a detailed picture of a successful ICO, we conduct the following regressions:

$$ICO - Success = \alpha + \sum_i \gamma_i \cdot ICO\ Characteristics_i + \sum_j \phi_j \cdot Financial\ Details_j + \sum_k \xi_k \cdot Team\ Characteristics_k + \sum_l \vartheta_l \cdot Cryptocurrency\ Dynamics_l + \varepsilon \quad (1)$$

The dependent variable *ICO-success* is measured by *total amount raised*, *trading*, and *CMC trading* (see Ahlers et al., 2015, for a discussion of the various success measures in a crowdfunding context). The dependent variables *trading* and *CMC trading* are dichotomous. Thus, they provide an indication of whether we classify an ICO as successful if the ICO-related tokens are traded or if the trading takes place at CoinMarketCap (CMC). Therefore, we use logistics regressions.

Total amount raised indicates the natural logarithm of the sum of funds raised in the ICO, which is analyzed using OLS. Detailed descriptions of all variables are in Table 1. The main explanatory variables in the *ICO characteristics* block are *ETH platform*, *Github*, *patent*, *restricted areas*, *tax haven*, *Telegram*, *whitelist*, and *# WP pages*. The *financial details* block includes *# accepting cryptos, accepting FIAT, % distributed in ICO*, *ICO-bonus*, *# of tokens*, *min-contribution*, and *soft cap*. The *team characteristics* include *# advisors*, *CEO LinkedIn 500+*, *CEO LinkedIn followers*, and *team size*. Finally, the *cryptocurrency dynamics* include *ETH volatility* and *ETH value* (see Table 1 for detailed variable descriptions).

As mentioned earlier, before the actual ICO takes place, some ICOs undergo a so-called "pre-ICO." Similarly to our analysis of ICO success, we analyze the success of the pre-ICO. We did not include these dynamics in our ICO analysis because only about 20% have the complete pre-ICO details[34], which would dramatically reduce our sample size. Instead, we include a dummy variable (*pre-ICO*) to control for whether the ICO had a pre-ICO.

Similarly to the analyses of *ICO-success,* we perform the following regressions:

$$ICO - Success = \alpha + \sum_i \gamma_i \cdot Pre - ICO\ Characteristics_i + \varepsilon \quad (2)$$

Success is again measured by using *trading*, *CMC trading*, and *total amount raised*. The *pre-ICO characteristics* block includes *# days between pre-ICO and ICO*, *pre-ICO bonus*, *pre-ICO duration*, and *pre-ICO hard cap.*

—Please insert Table 1 about here—

6. Empirical Results

The market for ICOs began in 2015, with only 2 ICOs in our data sample and increased rapidly thereafter to 16 in 2016, 648 in 2017, and 338 as of March 2018 (see Table 2). Our dataset is the most complete and largest available dataset on ICOs in terms of number (1,009), volume (about $8.5 billion), and related characteristics. Volume can be seen as a lower bound, because 436 ICOs did not report their volume raised. The dominant country by number of ICOs and volume is the U.S., at 178 ICOs with a volume of about $2.4 billion, based on the 108 that reported volume. Switzerland is next, at about $1.1 billion, and Russia has the second largest number of ICOs, with

[34] Many Pre-ICOs are not publicly advertised. In these cases, only certain Pre-ICO details become public knowledge in the course of the ICO.

111. However, the ICO phenomenon is widespread; our dataset shows launches in 74 different countries.

—Please insert Table 2 about here—

Table 3 gives descriptive statistics for the 26 explanatory variables and the 3 dependent variables. From the descriptive statistics, we see that about 42% of ICOs had tradable tokens after completion, and raised on average $14 million. The vast majority (about 85%) are on the Ethereum platform (EY Research found that 77% of projects in total were on Ethereum as of December 2017, indicating a continued rate of adoption). Approximately 50% have a presence on Github. Most accept one or two different cryptocurrencies, 40% have bonus structures in place, and the average amount of tokens distributed during the ICO is 60%. Teams usually consist of about eight members, with three advisors, and one-third have a well-connected CEO or founder on LinkedIn.

Some variables are not available or are only established ex-post[35] for certain token offerings, so the sample size in some regressions does not equal the number of ICOs in each dataset. Moreover, certain explanatory variables are statistically significantly correlated with each other. Thus, we run the first four regressions separately for each block of variables (*ICO characteristics*, *financial details*, *team characteristics*, and *cryptocurrency dynamics*); the fifth regression includes all blocks of variables simultaneously (see Table 4). For each regression, we calculate the maximum and average variance inflation factors, which are all below the critical value of 5 (meaning no evidence of multicollinearity) (see Kutner et al., 2005).

—Please insert Table 3 and 4 about here—

[35] The main issues are *% distributed* and *Total tokens*. Certain token sales were uncapped where total tokens was dependent on the amount invested or similarly the *% distributed* was a function of the amount invested (see Buterin, 2017).

Next, we present multivariate evidence by first running logistics regressions to analyze the correlations among *venture uncertainty*, *venture quality*, and *investor opportunity set* on ICO success, measured by traded tokens. Thereafter, we replace the success measure of being traded with the amount raised in the ICO. Finally, we analyze the impact of pre-ICO characteristics on ICO success.

Tables 5 and 6 summarize the main results for the tradability success measure. The first set of variables, characterizing *venture uncertainty*, are within the *ICO characteristics* block. We find statistical significance for 1) launching a token offering on the Ethereum platform, 2) being present on Github (characterized by, e.g., posting updates and code), 3) offering a communication channel on Telegram, and 4) offering a more complete whitepaper. These variables are positively correlated with the probability of having tradable tokens after ICO completion (see the variables *ETH platform*, *Github*, *Telegram*, and *# WP pages* in specification (1) in Table 5).

All of these attributes are hypothesized as being negatively correlated with *venture uncertainty*, which is in line with *Hypothesis 1*. Furthermore, we find a negative relationship between having a pre-ICO and the likelihood of a tradable token, which also supports *Hypothesis 1*. This is because entrepreneurs who may be "insecure" about venture quality are more likely to launch a pre-ICO, thereby signaling greater uncertainty. The absence of a pre-ICO also serves as a proxy for token sale bring part of an existing business, further supporting *Hypothesis 1*.

However, when we include all the explanatory variables simultaneously, some lose their statistical significance, and only using Github and being on Telegram remain significantly positively related to token tradability (see specification (5) in Table 5). Furthermore, when we focus on the stricter form of tradability, namely, tokens listed on CoinMarketCap.com, we find a similar picture (see specifications (1) and (5) in Table 6).

For the second set of variables characterizing *venture uncertainty*, we focus on the ICO's *financial details*. The two variables statistically significantly related to the likelihood of having a tradable token at all or on CoinMarketCap.com are the percentage of tokens offered in the ICO (variable *% distributed in ICO*), and the overall amount of tokens (variable *# of tokens*) (see specifications (1) and (5) in Tables 5 and 6). We find support for the notion that distributing a higher percentage of tokens in the ICO presumably reduces the alignment between entrepreneurs and investors, and may be a signal to investors that the entrepreneurs are less convinced about their future success. In line with *Hypothesis 1*, this increase in *venture uncertainty* is negatively correlated with token tradability. A similar relationship is seen in equity crowdfunding (see Ahlers et al., 2015).

Furthermore, it seems investors value having more tokens available, even though it corresponds to a lower unit value. For the less strict form of tradable tokens, we also find, in line with *Hypothesis 1*, that a bonus in the ICO (variable *ICO bonus*) is statistically significantly positively related, and that accepting Fiat currencies (variable *accepting Fiat*) is statistically significantly negatively related, to the probability of having tradable tokens (see specification (5) in Table 5).

The bonus structure is especially helpful for soliciting early contributions, which has been shown to positively correlate with funding success in crowdfunding (see Hornuf and Schwienbacher, 2017). Sufficient venture funding is a key ingredient in developing products, hiring personnel, and rolling out services. Any interruption in financing arguably increases venture uncertainty. Although accepting Fiat currencies presumably establishes a relationship with the traditional banking system given the global nature of ICOs, it is unclear if this relationship is appreciated by investors. We find negative relationship between accepting Fiat and ICO success indicating that entrepreneurs opening the fundraising to "Fiat investors" signals entrepreneurs

insecureness to raise required funds from "cryptocurrency investors" and also exposing the venture to the possibility of interventions by regulators to e.g. freeze bank accounts, which increases *venture uncertainty*.

To summarize, all variables statistically significantly related to token tradability show the expected sign as hypothesized under *Hypothesis 1*, which we interpret as strong support for the view that lower *venture uncertainty* positively contributes to the likelihood of venture success as defined by token tradability.

In the next step, we analyze how *venture quality*, which we divide between social alliance capital and human capital, is related to token tradability (*team characteristics* variables block). First, we find that having more advisors and well-connected CEOs or founders is statistically positively related to having tradable tokens after the ICO ends (see variables *# advisors* and *CEO LinkedIn 500+* in specification (1) in Table 5). Both variables are indicators of broader networks, which correspond to greater social alliance capital. Both coefficients are in line with *Hypothesis 2*. However, when considering all explanatory variables simultaneously, only having a network on LinkedIn remains statistically significant for tradable tokens and for those on CoinMarketCap.com (see specification (5) in Tables 5 and 6).

Second, we find some support for the idea that human capital as a facet of *venture quality* is positively related to token tradability. When including only *team characteristics* in the regressions, we find that more human capital, measured by larger team size, is positively related to token tradability (see variable *team size* in specification (1) in Tables 5 and 6). This is in line with *Hypothesis 2*. However, this statistical significance fades when we include all variables simultaneously.

One possible explanation is that headcount is a poor variable by which to measure human capital, because important variables, such as education and years in business, are not being considered. Unfortunately, the curriculum vitae of the team members are rarely available during an ICO. Therefore, we cannot provide solid empirical evidence about the relationship of human capital to ICO success beyond our proxy variable.

To summarize, we find support for the view that social alliance capital as part of *venture quality* is positively related to token tradability, which supports *Hypothesis 2*.

In our final step, we analyze how *investor opportunity set* is related to token tradability (*cryptocurrency dynamics* variable block). As expected under *Hypothesis 3*, we find that higher values for Ether decrease the likelihood of participation in an ICO. It seems that, during periods of higher primary cryptocurrency prices, ICOs are less appealing to investors. In contrast, higher levels of ether volatility, because they are correlated with increasing regulatory uncertainty, can foster investments in ICOs. In line with *Hypothesis 3*, this result may be attributable to the fact that investors fear missing out on an investment opportunity due to a regulatory ICO market closure (see variables *ETH volatility* and *ETH value* in specification (1) in Tables 5 and 6).

—Please insert Tables 5 and 6 about here—

In the previous set of analyses, we measured ICO success by token tradability. Next, we change perspective and focus on the amount raised during the token offering. Overall, we find very similar results as for token tradability. Higher *venture uncertainty*, as measured by not being on Telegram, having a pre-ICO, having fewer pages in a whitepaper, not accepting Fiat currencies, distributing a higher amount in the ICO, and not having a soft cap, is negatively correlated with the amount raised in the ICO (see variables *pre-ICO*, *Telegram*, *# WP pages*, *accepting Fiat*, *% distributed in ICO*, and *soft cap* in specifications (1) and (2) in Table 7). Moreover, we find evidence that *venture*

quality, as measured by social alliance capital (variables *# advisors* and *CEO LinkedIn 500+*) and human capital (*team size*), is positively correlated with amount raised (see specification (3) in Table 7).

Interestingly, we find a negative correlation with the Ethereum platform (see variable *ETH platform* in specification (5) in Table 7). This may be because some of the largest ICOs required their own blockchain due to limitations in the functionality of Ethereum. From a psychological point of view, investors might desire truly revolutionary technology removing the need for governments or central businesses (see Shiller, 2018). To do so these technologies require their own blockchain with higher functionality than Ethereum and also often do not place any limitations on the maximum amount raised. Taken together, this might help explaining the funding success of the largest ICOs.[36]

However, we do not find the same empirical support for the relationship between i*nvestor opportunity set* and amount raised. We also do not find any evidence that ether's volatility is related to amount raised. In fact, we find that the price of ether is positively related to amount raised, which could be explained by the fact that many newly created tokens are priced relative to, e.g., ether. When the price of ether appreciates, so does the amount raised. In other words, if a token is priced relative to ether, an increase in ether's value automatically increases the amount raised.

To summarize, we again find empirical evidence for our *Hypotheses 1* and *2*, that *venture uncertainty* is negatively related, and *venture quality* is positively related, to ICO success, as measured by amount raised.

[36] See, for instance, Filecoin, with approximately $257 million for decentralized cloud storage, Tezos with approximately $232 million for a digital commonwealth or Bankera, with about $150 million for a decentralized exchange

—Please insert Table 7 about here—

Finally, we shed some light on the potential influence of pre-ICO characteristics on the success of the actual ICO. Most importantly, we find that the presence of a hard cap increases both the probability of token tradability, and the amount raised in the ICO (see variable *pre-ICO hard cap* in Table 8). Without a hard cap, and with an open goal in a pre-ICO, investors may find it difficult to assess the success of the pre-sale. This information presumably impacts the decision to participate in the actual ICO.

On a related note, investors may also consider the time until the hard cap is reached, because this denotes the strength of demand for the venture's token. It will likely translate into higher demand for the token offering, and could also signal good performance once traded. In line with our previous argumentation, we find that the coefficients are negative, and is statistically significant for the amount raised in the token offering (see variable *pre-ICO duration* in specification (3) in Table 8).

We also relate the availability of a discount or a bonus to early investors in the pre-ICO to success in the subsequent ICO. One of the main motives for holding a pre-ICO is to attract sophisticated investors, such as hedge funds or venture capital funds. Having these investors as early contributors can signal an important endorsement, which may increase investor interest. However, to convince these investors, it is usually necessary to offer a steep discount or a bonus, ranging from about 20% to 60%.

This bonus is a double-edged sword. Higher bonuses (e.g., 50%) will certainly attract the attention of sophisticated investors. But, at the same time, investors can immediately sell or dump their tokens at a 100% profit (assuming the token starts trading at issue price), to the disadvantage

of later investors. In our regressions, we find no evidence that the existence of a bonus in a pre-ICO is related to success in token sales (see variable *pre-ICO bonus* in Table 8).

However, this does not mean there is no relationship. Our variable is a dummy variable, and simply measures whether a bonus is in place. But, as outlined before, the more interesting concept is how the bonus is structured, not its existence. We tried to present a more granular measurement, but most pre-ICOs have fairly complex bonus structures, with amount and time-varying features, which makes it very difficult to measure appropriately.

—Please insert Table 8 about here—

7. Conclusion

This paper is the first to establish a measure of success (token or coin tradability) for ICOs and to develop a theoretical framework for how *venture uncertainty*, *venture quality*, and *investor opportunity set* relate to it. We find that *venture uncertainty* (e.g., the lack of a presence on Github and Telegram, shorter whitepapers, higher percentage of tokens distributed) is negatively related, while higher *venture quality* (better connected CEOs and larger team size) is positively related, to ICO success. Furthermore, a higher price of ether—decreasing the relative attractiveness of ICOs (*investor opportunity set*)—is negatively correlated with ICO success. We also find that providing a hard cap in the pre-ICO, which helps investors measure success in the pre-sale, is positively related to funding success.

These findings are relevant to entrepreneurs who consider ICOs as the fundraising method of choice and investors alike. ICOs that are not on Github and Telegram signal less transparency and fewer communication channels. Shorter whitepapers indicate a less sophisticated business plan, and make it less likely that the ICO-related token will become tradable. Also, the higher the

percentage of tokens offered in the ICO, which is very comparable to the equity offered in equity crowdfunding or stock-related IPOs, the less incentivized entrepreneurs will be to take the necessary steps to having tradable tokens.

Having tradable tokens also correlates with team size. Overall, we find that a successful ICO requires multiple important *ingredients* from beginning to end: the venture should transparently provide information to potential investors, it should communicate a sophisticated and sound business plan, the entrepreneurs should stay incentivized and have a team in place that is capable of executing the business plan while managing the logistics of having tradable tokens. Without all of these characteristics, an ICO is likely to fail, and investors are likely to lose their investments (assuming no soft cap is in place). The entrepreneurs' business will also most likely be unrealized, resulting in a loss of time and resources for them.

To summarize, we interpret our findings as strong support for the notion that investors and entrepreneurs largely follow well-established and proven decision-making processes in fundraising, even in the absence of any specific regulations. These insights could also help regulators design sound regulations in the future that would simultaneously protect investors and allow entrepreneurs to continue using this innovative channel of fundraising. Some of the critical angles for regulators to examine are the information transparency of venture characteristics (ensure detailed and comprehensive whitepapers, including, e.g., business plans and projections, review the available smart contracts) and team members (explore social media and business network profiles, ensure registration with natural names, mandate reliable curriculum vitae be available). The ICO market is still in its infancy, but it holds superior potential to both revolutionize the entire fundraising process, as well as challenge the business models of established industries with financed ventures.

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Figure **1: Distributed Communication Networks (Baran, 1964)**

Figure 2: Crypto-currency Classification

This figure is based upon rulings by the US Securities and Exchange Commission in order to provide a informative classification measure for crypto-tokens.

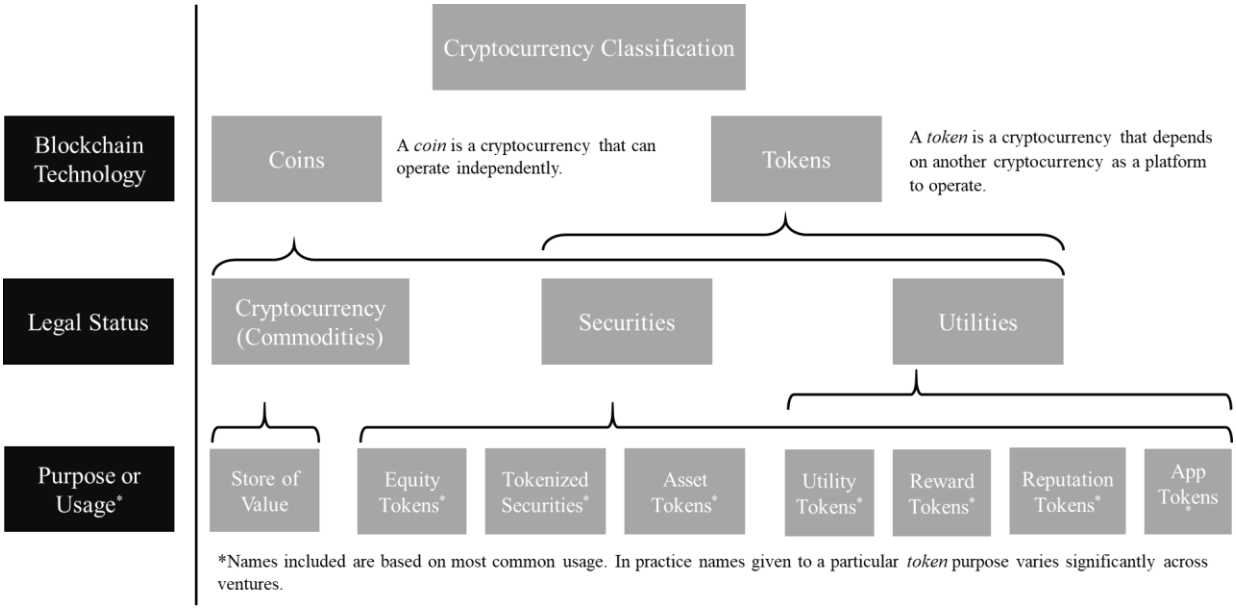

Figure 3: Directions of the Actions of Determinants of Success in ICOs

This figure follows Figure 1 in Ahlers et al. (2015) showing the success determinants in equity crowdfunding.

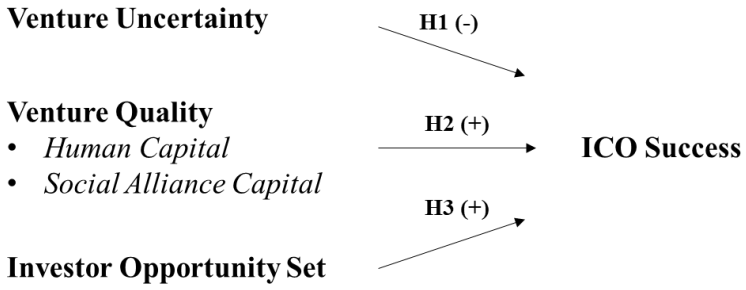

Table 1: Variable Definitions

This table gives a detailed description of our data-gathering process, calculation method, and our variable descriptions.

Variable Name	Description and Calculation
	Dependent Variables
CMC Trading	Dummy variable that equals 1 if the related token is traded or futures on the token are listed as traded on CoinMarketCap.com (CMC), and 0 otherwise. This is the stricter form of the dependent variable *Trading*, because it requires sufficient trading volume.
Total Amount Raised	Natural logarithm of amount raised in the ICO in USD.
Trading	Dummy variable that equals 1 if the related token is traded or futures on the token are traded, and 0 otherwise.
	ICO Characteristics
ETH Platform	Dummy variable that equals 1 if the ICO is on the Ethereum blockchain, and 0 otherwise.
Github	Dummy variable that equals 1 if the ICO is represented on Github, and 0 otherwise.
Patent	Dummy variable that equals 1 if patents are mentioned in the whitepaper, and 0 otherwise.
Pre-ICO	Dummy variable that equals 1 if the ICO had a pre-ICO, and 0 otherwise.
Restricted Areas	Dummy variable that equals 1 if the ICO is restricted in certain countries, and 0 otherwise.
Tax Haven	Dummy variable that equals 1 if the country is on the G20 countries agreed upon blacklist for tax havens (OECD, 2009), and 0 otherwise.
Telegram	Dummy variable that equals 1 if the ICO is represented on Telegram, and 0 otherwise.
Whitelist	Dummy variable that equals 1 if the ICO has a whitelist, and 0 otherwise.
# Pages Whitepaper	Number of pages in the whitepaper.

(continued)

Table 1: Variable Definitions—*continued*

Variable Name	Description and Calculation
	Financial Details
# Accepting Cryptos	The number of cryptocurrencies accepted in the ICO.
Accepting FIAT	Dummy variable that equals 1 if the ICO is accepting any FIAT currency, and 0 otherwise.
% Distributed in ICO	Percentage of tokens distributed in the ICO.
ICO Bonus	Dummy variable that equals 1 if the ICO offers a lower price (referral bonus or quantity bonus) for early investors, and 0 otherwise
# of Tokens	Natural logarithm of the number of total tokens.
Minimum Contribution	Dummy variable that equals 1 if the ICO has a minimum required contribution, and 0 otherwise.
Soft Cap	Dummy variable that equals 1 if the ICO has a soft cap, and 0 otherwise.
	Team Characteristics
# Advisors	Number of advisors.
CEO LinkedIn 500+	Dummy variable that equals 1 if the CEO or founder (if no CEO is mentioned) has 500 or more contacts on LinkedIn, and 0 otherwise.
CEO LinkedIn Followers	Natural logarithm of the number of 1 plus the founder's (in case no CEO is mentioned) or CEO's LinkedIn followers. In cases with cofounders, the first cofounder listed on ICObench.com is used.
Team Size	Number of team members.
	Cryptocurrency Dynamics
ETH Volatility	Ethereum volatility over the twenty-five trading days before the ICO start date (data source: CoinMarketCap.com).
ETH Value	Natural logarithm of the Ethereum price at the ICO start date (data source: CoinMarketCap.com).
	Pre-ICO Characteristics
# Days between Pre-ICO & ICO	Number of days between the pre-ICO end date and the ICO.
Pre-ICO Bonus	Dummy variable that equals 1 if the pre-ICO offered a bonus, and 0 otherwise
Pre-ICO Duration	Number of days the pre-ICO lasted.
Pre-ICO Hard Cap	Dummy variable that equals 1 if the pre-ICO had a hard cap, and 0 otherwise.

Table 2: Sample Overview

This table shows the number of ICOs (with and without information on *total amount raised*) and amounts raised in USD (amount raised) for each respective year in each country. The amount raised at the end of the ICO is converted to USD if given in cryptocurrency, such as bitcoin. The sample period is 2015 through March 2018. Amount raised is given in thousands.

Country/Year	Not Specified	2015	2016	2017	2018 March	Total:	# With Available Volume	Amount Raised
ARGENTINA				2		2	2	29,000
ARMENIA				1		1	1	1,400
AUSTRALIA			1	12	3	16	9	50,844
AUSTRIA				2	1	3	3	10,476
BELARUS				2	3	5	2	6,338
BELGIUM				1	3	4	0	-
BELIZE				4	4	8	2	9,225
BRAZIL				2	2	4	1	19,629
BRITISH VIRGIN ISLANDS				3	7	10	6	173,790
BULGARIA				6	2	8	6	37,193
CAMBODIA				2		2	1	10,500
CANADA				15	14	29	14	238,869
CAYMAN ISLANDS				2	4	6	6	127,475
CHILE				1		1	1	28
CHINA				13	2	15	12	141,234
COLOMBIA				1	1	2	1	20,000
COSTA RICA				3		3	3	17,017
CROATIA					2	2	0	-
CYPRUS				2	4	6	2	37,000
CZECH REPUBLIC				4	3	7	4	29,248
DENMARK				1	1	2	0	-
ESTONIA				17	12	29	19	268,586

(continued)

Table 2: Sample Overview—*continued*

FINLAND		1	1	2	1	6,000
FRANCE	1	8	4	13	8	110,974
GEORGIA		1		1	1	5
GERMANY		11	4	15	7	128,634
GIBRALTAR		5	6	11	8	185,907
GREECE		1		1	0	-
GUINEA-BISSAU		1		1	1	153
HONG KONG		9	11	20	13	117,899
INDIA		4	3	7	2	63,711
INDONESIA		1	3	4	1	12,966
ISRAEL	1	11	1	13	11	242,451
ITALY	1	3	2	6	4	1,861
JAPAN	1	10	2	13	7	176,254
JERSEY			1	1	0	-
KAZAKHSTAN			2	2	1	1,000
KYRGYZSTAN		1		1	0	-
LAOS			1	1	0	-
LATVIA		4	2	6	5	6,498
LICHTENSTEIN			1	1	1	18,000
LITHUANIA		7	4	11	7	253,211
LUXEMBOURG		1	4	5	3	26,663
MALAYSIA		5		5	1	4,500
MALTA		3		3	2	1,933
MARSHALL ISLANDS			2	2	1	11,900
MEXICO		1		1	0	-
MOLDOVA		1		1	0	-
MONACO		1		1	0	-

(continued)

Table 2: Sample Overview—*continued*

NETHERLANDS				10	2	12	8	48,845
NIGERIA				1		1	1	19
NORWAY					1	1	1	741
PAKISTAN					1	1	0	-
PANAMA				1		1	1	1,000
POLAND			1	6	2	9	4	51,998
ROMANIA				1	2	3	1	30,000
RUSSIA				93	18	111	62	519,702
SERBIA				1		1	1	9,000
SEYCHELLES				3	2	5	4	27,926
SINGAPORE			1	43	31	75	47	748,797
SLOVENIA			1	12	5	18	11	97,259
SOUTH AFRICA	1			2	2	5	2	15,206
SOUTH KOREA				4	3	7	2	14,225
SPAIN				8	1	9	6	27,478
SWEDEN				2		2	1	14,528
SWITZERLAND	1	1	2	24	18	46	35	1,126,455
TAIWAN				3	3	6	1	13,200
THAILAND				3	2	5	0	-
TURKEY					1	1	0	-
UAE				7	4	11	5	17,529
UK				46	34	80	43	373,324
UKRAINE				6	9	15	4	28,759
US	3	1	2	116	56	178	108	2,458,215
VANUATU					1	1	0	-
NOT SPECIFIED			4	70	18	92	44	250,647
Total	**5**	**2**	**16**	**648**	**338**	**1,009**	**573**	**8,473,254**

Table 3: Summary Statistics

This table gives descriptive statistics (mean, standard deviation, min, and max) for the full sample. All variables are considered in subsequent analyses (see Table 1 for variable descriptions and calculation methods).

Variable	# Obs.	Mean	Std. Dev.	Min	Max
		Dependent Variables (ICO)			
Trading	1,009	0.42	0.49	0.00	1.00
CMC Trading	1,009	0.36	0.48	0.00	1.00
Total Amount Raised	573	15.24	2.06	6.04	19.37
		ICO Characteristics			
ETH Platform	938	0.88	0.32	0.00	1.00
GitHub	1,009	0.48	0.50	0.00	1.00
Patent	733	0.12	0.33	0.00	1.00
Pre-ICO	1,009	0.40	0.49	0.00	1.00
Restricted Areas	1,009	0.06	0.23	0.00	1.00
Tax Haven	1,009	0.06	0.24	0.00	1.00
Telegram	1,009	0.67	0.47	0.00	1.00
Whitelist	1,009	0.05	0.21	0.00	1.00
# WP Pages	732	27.49	15.67	1.00	127.00
		Financial Details			
# Accepting Cryptos	1,009	1.61	1.30	1.00	13.00
Accepting Fiat	1,009	0.07	0.26	0.00	1.00
% Distributed in ICO	584	0.59	0.20	0.02	1.00
ICO Bonus	1,009	0.41	0.49	0.00	1.00
# of Tokens	704	18.13	2.42	5.70	36.10
Min-Contribution	1,009	0.18	0.38	0.00	1.00
Soft Cap	1,009	0.32	0.47	0.00	1.00
		Team Characteristics			
# Advisors	890	2.64	3.74	0.00	20.00
CEO LinkedIn 500+	1,009	0.35	0.48	0.00	1.00
CEO LinkedIn Followers	1,009	1.81	3.30	0.00	11.67
Team Size	888	8.43	5.68	1.00	49.00
		Cryptocurrency Dynamics			
ETH Volatility	1,000	0.06	0.02	0.01	0.14
ETH Value	1,000	6.13	0.90	-0.37	7.24
		Pre-ICO Details			
# Days between Pre-ICO and ICO	360	24.82	45.12	0.00	364.00
Pre-ICO Bonus	244	0.68	0.19	0.00	1.25
Pre-ICO Duration	360	25.24	34.96	1.00	397.00
Pre-ICO Hard Cap	1,009	0.09	0.29	0.00	1.00

Table 4: Correlation Matrix

This table shows the Pearson correlation coefficients for all the independent variables. All variables are considered in subsequent analyses (see Table 1 for variable descriptions and calculation methods). * indicates statistical significance at a 5% level or below.

		1	2	3	4	5	6	7	8	9	10	11	12	136	14	15	16	170	18	19	20	21	22
											ICO Characteristics												
1	ETH Platform	1																					
2	GitHub	0.17*	1																				
3	Patent	0.04	-0.03	1																			
4	Pre-ICO	0.05	0.05	0.06	1																		
5	Restricted Areas	-0.01	0.04	0.06	0.08*	1																	
6	Tax Haven	-0.03	0.03	-0.03	0.07*	0.08*	1																
7	Telegram	0.03	0.15*	0.09*	0.24*	0.14*	0.03	1															
8	Whitelist	-0.01	0.02	0.06	0.05	0.37*	0.04	0.11*	1														
9	# WP Pages	0.08*	0.13*	0.23*	0.18*	0.04	0.06	0.19*	0.07	1													
												Financial Details											
10	# Accepting Cryptos	-0.17*	-0.09*	0.03	0.10*	-0.01	0.06	0.07*	0.02	0.07*	1												
11	Accepting Fiat	-0.03	-0.04	0.01	0.05	0.00	-0.02	0.09*	-0.04	0.09*	0.36*	1											
12	% Distributed in ICO	0.01	-0.10*	-0.04	-0.04	0.01	-0.02	0.04	-0.08	-0.08	0.08*	0.00	1										
13	ICO Bonus	0.08*	0.06*	0.06	0.28*	-0.02	0.07*	0.21*	0.00	0.16*	0.13*	0.07*	0.11*	1									
14	# of Tokens	0.10*	0.08*	0.04	0.03	0.03	0.00	0.13*	0.04	0.10*	-0.06	-0.06	-0.16*	0.0	1								
15	Min-Contribution	0.07*	0.06	0.10*	0.19*	0.09*	0.04	0.06*	0.05	0.14*	0.06*	0.04	-0.03	0.12*	0.02	1							
16	Soft Cap	0.16*	0.14*	0.05	0.16*	0.09*	0.01	0.17*	0.03	0.13*	0.07*	0.06*	0.04	0.17*	0.07	0.13*	1						
													Team Characteristics										
17	# Advisors	0.11*	0.15*	0.15*	0.18*	0.07*	0.06	0.22*	0.09*	0.29*	0.05	0.05	-0.03	0.10*	0.14*	0.10*	0.12*	1					
18	CEO LinkedIn 500+	0.17*	0.15*	0.05	0.10*	0.00	0.03	0.17*	-0.04	0.28*	0.02	0.08*	-0.10*	0.10*	0.11*	0.02	0.13*	0.28*	1				
19	CEO LinkedIn Followers	0.08*	0.10*	0.06	0.08*	0.04	0.03	0.14*	0.00	0.18*	0.01	0.05	-0.05	0.1	0.07	0.01	0.06*	0.19*	0.61*	1			
20	Team Size	0.10*	0.11*	0.07	0.15*	0.02	0.04	0.18*	0.04	0.29*	0.03	0.07*	-0.07	0.07*	0.13*	0.06	0.07	0.21*	0.21*	0.15*	1		
													Cryptocurrency Dynamics										
21	ETH Volatility	-0.06	0.02	0.07	-0.08*	0.09*	0.01	-0.04	0.09*	-0.05	-0.06*	-0.07*	-0.05	-0.11*	0.05	-0.01	-0.05	-0.06	-0.03	0.00	-0.02	1	
22	ETH Value	0.04	0.03	0.12*	0.26*	0.13*	0.05	0.28*	0.14*	0.16*	0.07*	0.06	0.03	0.17*	0.03	0.14*	0.16*	0.20*	-0.02	0.04	0.04	0.06*	1

Table 5: Multivariate Analysis of ICO Funding Success (Trading)

In this table, we apply logistics regressions to analyze the determinants of whether the tokens are traded, where the dependent variable equals 1 if the token is traded, and 0 otherwise (see Equation (1) for details). Variance inflation factors (VIFs) reveal no evidence of multicollinearity, given that the mean and max VIFs are well below the critical value of 5 in all specifications (see Kutner et al., 2005). See Table 1 for variable definitions and Table 3 for summary statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			ICO Characteristics		
ETH Platform	0.612**				0.538
	(2.15)				(0.90)
Github	0.776***				0.724***
	(4.74)				(2.64)
Patent	-0.204				-0.364
	(-0.81)				(-0.95)
Pre-ICO	-0.398**				0.092
	(-2.37)				(0.34)
Restricted Areas	-0.302				0.137
	(-0.86)				(0.26)
Tax Haven	0.067				-0.550
	(0.20)				(-1.04)
Telegram	0.262				1.169***
	(1.35)				(2.81)
Whitelist	-0.091				0.115
	(-0.24)				(0.19)
# WP Pages	0.012**				0.009
	(2.13)				(0.97)
			Financial Details		
# Accepting Cryptos		-0.162*			-0.164
		(-1.90)			(-1.45)
Accepting Fiat		-0.468			-1.049**
		(-1.10)			(-2.03)
% Distributed in ICO		-1.342***			-1.312*
		(-2.67)			(-1.87)
ICO Bonus		0.604***			0.634**
		(2.95)			(2.21)
# of Tokens		0.194***			0.178**
		(3.73)			(2.55)
Min-Contribution		-0.058			-0.177
		(-0.25)			(-0.57)
Soft Cap		0.474**			0.068
		(2.35)			(0.25)

(continued)

Table 5: Multivariate Analysis of ICO Funding Success (Trading)—*continued*

			Team Characteristics		
# Advisors			0.036*		0.050
			(1.80)		(1.50)
CEO LinkedIn 500+			0.779***		1.009***
			(4.33)		(3.21)
CEO LinkedIn Followers			-0.002		-0.031
			(-0.10)		(-0.76)
Team Size			0.043***		0.008
			(3.17)		(0.38)
			Cryptocurrency Dynamics		
ETH Volatility				5.683*	3.240
				(1.95)	(0.53)
ETH Value				-1.081***	-1.089***
				(-9.69)	(-3.68)
Constant	-1.499***	-3.380***	-1.014***	6.002***	1.243
	(-4.64)	(-3.22)	(-7.23)	(8.41)	(0.54)
Mean VIFs	1.11	1.07	1.35	1.00	1.23
Maximum VIF	1.23	1.15	1.64	1.00	1.60
Observations	684	481	888	1,000	342
Pseudo R^2	0.052	0.072	0.050	0.101	0.201

Table 6: Multivariate Analysis of ICO Funding Success (CMC Trading)

In this table, we apply logistics regressions to analyze the determinants that the token is traded, where the dependent variable equals 1 if the token is traded at CoinMarketCap.com, and 0 otherwise (see Equation (1) for details). Variance inflation factors (VIFs) reveal no evidence of multicollinearity, given that the mean and max VIFs are well below the critical value of 5 in all specifications (see Kutner et al., 2005). See Table 1 for variable definitions and Table 3 for summary statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			ICO Characteristics		
ETH Platform	0.368				0.331
	(1.26)				(0.57)
Github	0.811***				0.622**
	(4.76)				(2.22)
Patent	-0.182				-0.172
	(-0.70)				(-0.45)
Pre-ICO	-0.565***				0.059
	(-3.26)				(0.22)
Restricted Areas	-0.231				0.203
	(-0.63)				(0.38)
Tax Haven	0.317				-0.220
	(0.95)				(-0.43)
Telegram	0.022				0.922**
	(0.11)				(2.16)
Whitelist	0.120				0.498
	(0.31)				(0.83)
# WP Pages	0.013**				0.013
	(2.36)				(1.56)
			Financial Details		
# Accepting Cryptos		-0.024			-0.027
		(-0.28)			(-0.24)
Accepting Fiat		-0.190			-0.522
		(-0.45)			(-1.04)
% Distributed in ICO		-1.661***			-1.226*
		(-3.21)			(-1.76)
ICO Bonus		0.196			0.208
		(0.94)			(0.73)
# of Tokens		0.206***			0.220***
		(3.79)			(3.07)
Min-Contribution		-0.067			-0.063
		(-0.27)			(-0.21)
Soft Cap		0.229			-0.262
		(1.10)			(-0.97)

(continued)

Table 6: Multivariate Analysis of ICO Funding Success (CMC Trading)—*continued*

			Team Characteristics		
# Advisors			0.014		0.005
			(0.72)		(0.15)
CEO LinkedIn 500+			0.625***		0.791**
			(3.46)		(2.55)
CEO LinkedIn Followers			0.013		0.005
			(0.54)		(0.12)
Team Size			0.033**		-0.003
			(2.53)		(-0.16)
			Cryptocurrency Dynamics		
ETH Volatility				8.317***	8.723
				(2.77)	(1.45)
ETH Value				-1.129***	-1.012***
				(-9.94)	(-3.49)
Constant	-1.429***	-3.705***	-1.108***	5.841***	-0.211
	(-4.37)	(-3.38)	(-8.01)	(8.09)	(-0.09)
Mean VIFs	1.11	1.07	1.35	1.00	1.23
Maximum VIF	1.23	1.15	1.64	1.00	1.60
Observations	684	481	888	1,000	342
Pseudo R^2	0.052	0.054	0.034	0.116	0.156

Table 7: Multivariate Analysis of ICO Funding Success (Total Amount Raised)

In this table, we apply OLS regressions to analyze the determinants of the amount raised in the ICO (see Equation (1) for details). Variance inflation factors (VIFs) reveal no evidence of multicollinearity, given that the mean and max VIFs are well below the critical value of 5 in all specifications (see Kutner et al., 2005). See Table 1 for variable definitions and Table 3 for summary statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			ICO Characteristics		
ETH Platform	-0.210				-1.027**
	(-0.64)				(-2.21)
Github	0.099				0.164
	(0.54)				(0.67)
Patent	-0.073				0.152
	(-0.27)				(0.47)
Pre-ICO	-0.483***				-0.245
	(-2.60)				(-1.06)
Restricted Areas	0.511				0.248
	(1.17)				(0.55)
Tax Haven	0.487				0.331
	(1.38)				(0.88)
Telegram	0.626***				1.129***
	(2.79)				(3.03)
Whitelist	0.507				0.507
	(1.04)				(1.01)
# WP Pages	0.024***				0.008
	(4.44)				(1.27)
			Financial Details		
# Accepting Cryptos		0.006			0.029
		(0.06)			(0.33)
Accepting Fiat		0.785*			0.536
		(1.72)			(1.33)
% Distributed in ICO		-1.071*			-1.607***
		(-1.74)			(-2.78)
ICO Bonus		-0.049			0.132
		(-0.20)			(0.55)
# of Tokens		0.166***			0.133**
		(2.67)			(2.30)
Min-Contribution		0.043			0.012
		(0.15)			(0.05)
Soft Cap		0.478**			-0.087
		(1.98)			(-0.38)

(continued)

Table 7: Multivariate Analysis of ICO Funding Success (Total Amount Raised)—*continued*

			Team Characteristics		
# Advisors			0.063***		0.033
			(3.03)		(1.20)
CEO LinkedIn 500+			0.663***		0.625**
			(3.40)		(2.42)
CEO LinkedIn Followers			-0.000		0.011
			(-0.01)		(0.34)
Team Size			0.063***		0.039**
			(4.87)		(2.34)
			Cryptocurrency Dynamics		
ETH Volatility				0.091	4.577
				(0.03)	(0.92)
ETH Value				0.341***	0.302
				(3.90)	(1.52)
Constant	14.553***	12.661***	14.255***	13.221***	10.386***
	(39.72)	(9.86)	(92.05)	(23.87)	(6.27)
Mean VIFs	1.20	1.08	1.28	1.00	1.27
Maximum VIF	1.64	1.17	1.51	1.00	1.67
Observations	404	276	528	568	214
Adjusted R^2	0.086	0.040	0.119	0.023	0.281

Table 8: Multivariate Analysis of Pre-ICO Funding Success

In this table, we analyze the determinants of pre-ICO funding success (see Equation (1) for details). In specifications (1) and (2), the dependent variables are *Trading* and *CMC Trading*, and we apply logistics regressions. In specification (3), the dependent variable is *total amount raised*, and we apply OLS regressions. Variance inflation factors (VIFs) reveal no evidence of multicollinearity, given that the mean and max VIFs are well below the critical value of 5 in all specifications (see Kutner et al., 2005). See Table 1 for variable definitions and Table 3 for summary statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
# Days between Pre-ICO & ICO	0.006	0.005	0.006*
	(1.40)	(1.32)	(1.67)
Pre-ICO Bonus	0.576	0.610	1.018
	(0.68)	(0.69)	(1.15)
Pre-ICO Duration	-0.007	-0.006	-0.008*
	(-1.39)	(-1.15)	(-1.84)
Pre-ICO Hard Cap	1.280***	1.039***	0.633*
	(4.10)	(3.24)	(1.96)
Constant	-1.370**	-1.661**	14.688***
	(-2.19)	(-2.52)	(21.59)
Mean VIFs	1.26	1.26	1.67
Maximum VIF	1.50	1.50	1.39
Observations	205	205	113
Adjusted R^2	-	-	0.025
Pseudo R^2	0.073	0.051	-