To the moon or bust?
Factors of success of an Initial-Coin-Offering

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ABSTRACT
Whilst cryptocurrencies and initial-coin-offerings (ICO) have gained increased popularity and mainstream attention throughout the last decade, it is unclear as to whether investors rely on traditional investment criteria, or subjective indicators such as overall market sentiment, and additional psychological influences. This paper is an empirical analysis on whether the content and quality of a ICO whitepaper influences its success. The research has found that not all data on an initial-coin-offering is significant, and therefor begs the question on whether psychological investment drivers have a more significant effect on their success.

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Keywords:
Fintech, finance, crowdfunding, ICO, blockchain, cryptocurrency, whitepaper

11th IBA Bachelor Thesis Conference, July 10th, 2018, Enschede, The Netherlands.

1.INTRODUCTION

Since the beginning of the 2010s the popularity of blockchain technology has accelerated to unprecedented levels. One of the main drivers for this radical development was the introduction of the technologies' most popular application: Bitcoin. Bitcoin was initially introduced in 2008 by its developer Satoshi Nakamoto as an open source system. The timing of the introduction of this technology was ideal, due to the financial crisis. During the meltdown, financial institutions -mostly operating under their own centralized systems- sold and bought subprime mortgages in the form of complex financial vehicles such as Mortgage-Backed Securities, which eventually lead to a major financial collapse of organizations and nations.

Blockchain on the other hand, which is the underlying technology of initial-coin-offerings and cryptocurrencies, consists of a decentralized network of computers which act as nodes in order to certify transactions and thereby prove its legitimacy (Nakamoto, 2008). In the case of Bitcoin, it is generated by "miners", who use their computers in order to solve complex mathematical problems, and obtain remuneration in the form of Bitcoin once such a problem set is solved. One could imagine the system as a decentralized digital accounting ledger, where no central party has the overall power to influence it. Instead, a peer-to-peer network controls and operates the system. The value of a Bitcoin was majorly influenced by two key characteristics of its code. Namely, (1) It becomes increasingly difficult for the mining process to be completed, meaning that over time more computing power is needed (Nakamoto, 2008). As a reaction to the increased difficulty of coping with the system's complex nature, miners often form pools. As the name suggests, pools are groups of miners who collectively use their resources, i.e. computing power, in order to solve the underlying math and share the benefits of their efforts. (2) A maximum number of 21,000,000 Bitcoins will ever be mined, making it a finite digital asset. According to blockchain info approximately 18,000,000 Bitcoin have been mined as of April 2018.

Although this technology was originally perceived as a niche-market product, used solely by a handful of individuals around the world, its worthiness was soon proven when large multinational companies such as Microsoft and Amazon started to accept Bitcoin as a valid means of transaction. The interest further became prevalent when individuals saw the technology as a response to the previous misconduct of large financial and governmental institutions, and interpreted the technology as a way to resist corporate control.
To illustrate, in terms of fiat currency a central bank would guarantee the value of the underlying currency. In case of stocks, a central exchange would ensure the legitimacy of the transactions and ownership. This type of a system opens the opportunity for manipulation by agents of these institutions. Although in some cases manipulation occurs with good intentions, such as adjusting the interest rates for economies. However some financial services companies manipulate in order to influence the market to their own benefit.
Entrepreneurs observed the capacity of Blockchain technology, and identified its potential for numerous applications in the real world. One of which being the development of new-alternative cryptocurrencies, also now as "altcoins", and the emergence of initial-coin-offerings. I have established the following research questions for this thesis:

What are the factors contributing to the success of an Initial-Coin-Offering?

I have opted for this research question, due to a gap in the literature concerning ICOs. Although ICOs present themselves as a form of crowdfunding, much of the literature focuses on conventional forms of crowdfunding. Research papers written by authors such as Ethan Mollick from the Wharton School of the University of Pennsylvania explore the dynamics of crowdfunding, and which success factors may influence whether a project reaches its pre-established funding goal. Moreover, Lukkarinen et al. similarly explore the success drivers of online equity crowdfunding, in addition to the influence of personal networks. Moreover, a paper written by Catalini and S. Gans from MIT Sloan School of Management, draws attention towards the value of crypto tokens, thereby taking more of a technical angle on ICOs. Other publications such as from Ernst & Young (EY) provide an overview of the current state of ICOs and possibilities for future developments. The only other paper conducting research on success factors of ICOs is from Adhami et al., who focus on more holistic criteria. This paper therefor focuses exclusively on the effect of the specific content of the whitepaper of an ICO, and the team responsible for it.

2.LITERATURE REVIEW

In this section I will focus on the concepts revolving initial-coin-offerings, and how they differ from traditional crowdfunding schemes. Moreover, I will explain some of the basic ideas fo the blockchain, which is the underlying technology of ICOs. Lastly, I will lay the framework for success factors of ICOs.

2.1.Crowdfunding

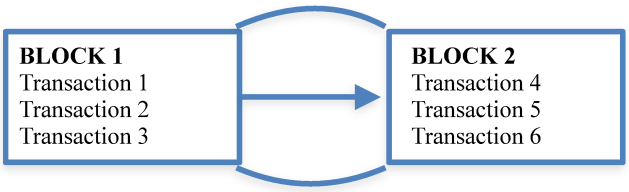
Before I proceed in explaining the concept of initial-coin-offerings, I would like to give a basic overview on crowdfunding as a general concept, since it is often used as an umbrella term for different types of funding. According to Belleflamme et al. (2013), this is because the relationship between the recipient of the funds and the funder may often be of different nature, depending on the context of the product or service that is being funded. Mollick (2013) distinguishes between four main types of funding relationships in his paper: (1) Patronage model: Funders act as donators, not expecting any return service or product; (2) Lending model: Funder lend out money in, whilst expecting some rate of return on the initial capital investment; (3) Reward model: Funder receive some sort of reward, e.g. exclusive pre-sale of the product; And finally (4) Equity crowdfunding: Providing the funder with an equity stake in the product or company, in return for their investment. Out of these four designs, equity crowdfunding presents itself to being the most similar to ICOs. This would present itself as an opportunity to delve into the success factors of equity crowdfunding, and apply these in our model.

2.2.The Blockchain

Throughout the last decade the term Blockchain has gained in immense popularity, to the point that it has become a major buzzword in several industries. Its applications range from tech companies, to major financial institutions such as government treasuries and Wall Street banks. But what exactly does this technology represent, what are its basic properties, and why is its application viewed upon as so impactful?

2.2.1.What is a Blockchain?

In broad terms, a Blockchain is a network of economic actors deciding upon the validity of the shared data. It is an openly



verifiable digital ledger of a set of *transactions* bundled together in what is called a *block*. Each transaction is recorded within a certain time-window, allowing to distinguish between them. The blocks are chained together via digital fingerprints which occur as a random sequence of numbers and words. A critical factor of the blockchain, is that each new block contains specific aspects of the digital fingerprint of the previous block. In other words, the technology can be seen as a large scale public database, where the blocks share a certain DNA amongst one another that cannot be altered, once transactions have been processed and the identity has been established. Changes to the transactions contained within a block would lead to breaking the chain, deeming it as an irreparable breach in the system. Furthermore, the vast amount of programming languages and rules that can be implemented to create a blockchain, allow for the adoption of different strategies and a large amount of real-world applications. The figure above shows an example of the relationship between blocks and how they form a blockchain.

2.3.Initial Coin Offerings (ICOs)

Initial coin offerings, are a new form of money-raising mechanism for blockchain start-ups, and can be seen as a crowdfunding technique. Thus, we could derive the definition of ICOs from Ethan Mollick's definition on crowdfunding: Initial-Coin-Offerings refer to the efforts by entrepreneurial individuals and groups - cultural, social, and for-profit - to fund their venture by drawing on relatively small contributions from relatively large number of individuals, using the Internet as a medium to sell tokens in exchange for Bitcoin (BTC) or Ethereum (ETH), without conventional financial intermediaries (Mollick, 2013). The BTC and ETH can then be sold on exchanges in order to obtain fiat currency to fund the project.

2.3.1.Tokens and Cryptocurrencies

In order to fully understand an ICO, one must first distinguish between tokens and cryptocurrencies. The currencies are based on a certain Blockchain, and are often referred to as cryptocurrencies due to the fact that the technology relies upon computer cryptography in order to encrypt its content, and can be used to transfer value via e.g. exchanges.

Aside from the previously mentioned Bitcoin blockchain, Ethereum presents itself as the second most popular blockchain in terms of market capitalization (Coinmarketcap, 2018). In addition to having its own token called "Ether", which can be transferred on its peer-to-peer network. Ethereum has the additional advantage over Bitcoin of including the option of smart contracts in its program. Smart contracts can be viewed upon as an automated version of an actual physical contract. The blockchain can automatically enforce the smart contract, which is fueled by Ether in order to function. (Buterin, 2014)

A token is built on top of a blockchain, meaning that it will use a blockchain as a donor, in order to integrate itself and make use of the system. In other words, a token is meant for use in a specific product or program. A popular platform for such tokens is Ethereum, since it not only allow the transfer of funds, but also houses the smart contracts responsible for the distribution of tokens. (Massey et al., 2017)

2.3.2.Common ICO types

The ICO itself, is a public token sale, and can generally be compared to a crowdfunding campaign as provided on websites such as Indiegogo and Kickstarter, and more specifically equity crowdfunding. A token represents an equity stake in a project or company, where the amount of tokens sold represents the total amount of equity raised by the company. Some considerations that need to be taken into account in ICOs, is the structure of the token sale. The points below further delve into this matter (Buterin, 2017):

- Capped token sale: The predetermined price of the token is set and fixed, as well as the total number of tokens for sale.
- Uncapped token sale: The predetermined price of the token is fixed, however the number of tokens is not.
- Time-based token sale: A certain timeframe is given to the public to purchase the tokens. E.g. two months.

In addition to these ICO structures, tokens may be traded on cryptocurrency exchanges, such as Bittrex or GDAX, which allow for a high degree of initial liquidity on cryptocurrency markets.

2.3.3.The ICO process

Up to this point, we have mainly talked about definitions and basic structural aspects of an ICO. In this section however, we will delve into the actual process of how ICOs are conducted. Overall, the following six steps need to be taken into consideration: The Whitepaper, token smart contract, crowd-sale ICO smart contract, marketing, and legal-audits. In the following, I will delve into a more detailed explanation on these different steps:

- *Whitepaper:* According to Chris Brummer (2018) from Georgetown University Law Center, the following six aspects should be contained within the Whitepaper:
    1. *ICO company location.* According to Brummer, this presents itself as an important factor for investors, as whether to invest into a certain ICO or not. This is because it is impossible to find out the location of an ICOs promotion in case it is not mentioned, and therefor imposes an additional risk factor for investors in case the ICO turns out to be a fraud. information concerning the location may add an additional layer of investors protection, considering that buyers will be able to gauge the type of legal protection at their disposal, in addition to being able to contact the relevant legal bodies such as government agencies, in case of fraud.
    2. *Problem and proposed solution of the project.* In contrast to the more conventional IPOs, where a companies' past performance is evaluated via financial statements by potential investors, ICOs rely on the concept of realizing a future promise. This promise, may be presented in the whitepaper, but not necessarily in the form of a prototype product or even a theoretical concept. Furthermore, IPOs tend to be implemented as a bridging step between a companies' earlier startup stage and more mature business stage. ICOs on the other hand are mainly focused on providing finance for startups, and their tech-based solutions. Considering that no financial statements exist for crypto-startups, the investor mainly relies on the thoroughness and availability of documents. For this reason, as Brummer explains, many companies make their source code publicly available on websites such as GitHub. Instead of having a third party audit the statements -as is done in a conventional IPO-, the open source nature of ICOs enables developers and investors to conduct their own due diligence for the projects.

This however, requires the investor to have the necessary technical knowledge, underlying the project.

3. *Token description:* In the token description section, the issuer has the opportunity to highlight the key quantitative and qualitative features of a token/coin. For example, the type of architecture which the token relies on, such as "ERC20". Moreover, whether and on which exchanges the token will be traded, and at which quantity. Furthermore, it is commonly disclosed whether the owner will hold a certain amount of reserve tokens, and how these may be liquidated over a certain timeframe. This is an important peace of information, since fraudulent individuals may decide to dump a large amount of tokens on the market, which would eventually lead to a price crash due to sudden increased supply of the token. It is therefor important that reserve tokens may not be dumped onto the market all at once. Lastly, Intellectual Property concerning the technology or product offering by the issuing organization may be disclosed in this section, in order to highlight the potential competitive advantages of the project, in contrast to its peers.
4. *Governance of the Blockchain.* Another factor is the blockchain governance, which explains how and by whom changes to the blockchain's architecture are implemented. An example of this is a process called a "Hard-Fork". One can think of a Hard-Fork as the adoption of a rule upgrade to an existing blockchain. This usually occurs, when a competing consensus emerges between two or more groups of individuals, as to how a blockchain should proceed in future developments. An example is the Ethereum DAO fork, of which its split resulted into two different currencies and communities: Ethereum Classic, and Ethereum (Coindesk, 2017). Such a fork as in the case of Ethereum has shown its effect in the difference in price between the old and new version of Ethereum. On the 28th of July 2018 Ethereum Classic traded at a high of US$15.68, whilst Ethereum traded at US$445 (Bittrex exchange, 2018).
5. *Team:* Next to all of the factual data provided by an organization participating in an ICO, information on the team behind the offering also presents itself as important. Due to the limited historical data on some firms, the composition of the team and the amount of experience of the individual members, provides itself as an indicator for investors to assess the likelihood of a project's success. For example, having the support of high-profile board members from Fortune 500 companies, may signal the type of commitment of the company.
6. *Risks:* Finally, investors need to be made aware of the potential risks associated with investing into ICOs. Risks may arise internally (within the company) as well as externally (from outside factors). E.g.: The company may decide to chose a different development path for its product/service, or a community might choose another application for the solution more viable, after which the company -together with the investors- may be forced to change their strategy. Additionally, risks may arise from hackers (as has previously been the case), where exchanges or blockchains may be hacked. This could result in the loss of money, or even render the technology worthless. Finally, industry disruption due to legal issues or increased government intervention, may drastically change the blockchain/crypto landscape to the point that certain technological "solutions" may no longer be possible or feasible.

- *Token Smart Contract:* Generally, an organization can proceed with this step in two different manners. Either ICO projects use an existing blockchain platform, in order to make use of a proven infrastructure, or they decide to create their own blockchain (EY research, 2018). Whereby the former has proven itself as a popular option, since this does not require projects to attract a new network of individuals in order to run the blockchain. A commonly used standard for token smart contracts is the ERC-20 token standard. A token contract is a type of smart contract that lists and tracks both the user-address and the amount of tokens a certain user owns. ERC20 is simply a framework based on the Ethereum blockchain, which allows users to program functions, such as the transfer of a token from to different addresses via pre-established command code. For example: *balanceOf(address _owner) constant returns (uint256 balance)* would return the total amount of tokens held by a certain address owner/user; *transfer(address _to, uint256 _value) returns (bool success)*, would transfer tokens from one address to another (Ethereum.org). An example of a current company in the midst of transferring from the ERC20 Ethereum blockchain to its own blockchain is TRON (TRX). The company is a Chinese startup -which according to its website- is dedicated towards creating a decentralized web. The migration from the Ethereum blockchain to its custom blockchain will bring two major advantages with it. Firstly, transaction fees between users would be virtually non-existent. TRON claims that transactions will cost 0.00001 TRX. Currently one TRX=US$ 0.60 (May, 2018), making the transaction cost negligible. In comparison, the Bitcoin transaction fees amount to US$ 5 on average. Second, scalability of the platform and its use cases, is also one of the major points which TRON wants to improve upon. I already mentioned the low transaction costs, however this does not provide the complete picture, since the number of transactions that can be completed within a certain interval is equally important. For example, Visa handles 25,000 transactions/second, Bitcoin currently handles 7, and Ethereum 13. TRON on the other hand is said to start at 1000 transactions/second, but it would be to no surprise if we see this number rise 10x (TRON, 2018).
- *Token Crowdsale Smart Contract:* As soon as the token smart contract has been created, one needs to find a way to distribute the tokens. Of course one could do this manually, however, this would take up a large amount of time and effort. Therefor, companies tend to rely on smart contracts to manage the crowdsale and distribution of new tokens. Overall the distribution of tokens is a very complicated process, since each company may have different terms, and hence a differently structured crowdsale smart contract. In essence a crowdsale smart contract encompasses the following scenarios:
    1. The contract would allow the exchange of money in return for a set amount of tokens, e.g.: US$1=1000 Tokens.
    2. The campaign will only succeed if the campaign goal has been reached. I.e.: The startup will only receive the funds from the investor via the Smart

Contract, if a goal of e.g. US$ 100,000 has been reached.

3. In case the campaign goal has not been reached, the funds will be directed back to the original investors via the smart contract.
4. The tokens may be traded amongst other users, or they may be used to buy products and services from the issuing company. For example, the Swiss startup TEND allows its users to purchase luxury services and/or products in a shared-economy platform (TEND, 2018).

Smart Contracts essentially replace the middle man, and add an extra layer of safety for the investor. This is because the contract is open-source, and may theoretically be audited and tested by anyone with a computer, a internet connection, and the relevant programming knowledge.

- *Marketing*: As one of the most important steps, marketing may present itself as the deciding factor on whether an ICO will be successful or not. Considering that not a lot of historical information exists about most startups running an ICO, it is important to keep investors up-to-date on the progress of the project. Additionally, much of the success of an ICO may also be dependent on the hype of a product. This can be compared to the Gartner Hype Cycle, which presents a visual methodology on how society creates and reacts upon a technological hype (Gartner, 2018). Popular marketing platforms include the following: Reddit (subreddits), Twitter, Youtube, Facebook, and Instagram. These platforms can of course also be used in order to update the public on any changes and updates made to the ICO.
- *Legal and Audit:* Finally both the investors as well as the project owners and staff need to be legally protected. The ICO should best be transformed into a corporation, in order to legally protect the ICO staff from criminal action. Moreover, the investor needs to be able to protect him/herself in case of and ICO scam. Moreover, ICO companies need to complete audits of their Smart Contracts, in order to make add an additional layer of security for both the investor and the company. Audits can be completed by professional audit companies such as Zeppelin, which has conducted several of such ICO audits. Whilst the blockchain itself is extremely secure, Smart Contracts are only as good as their code. Therefore it is of utter importance to have an independent from audit the contracts. An example of a situation where thorough auditing was not conducted occurred in 2016, where a hack led to US$ 50 million to be stolen from the Ethereum network (Wired, 2016).

2.4.Psychological Investment Drivers

In more traditional investment ventures, companies and teams of individuals come together in order to explore investment opportunities they feel are either currently undervalued, or have major future potential. In the start-up world these investors usually emerge as *angel investors* and *venture capital*. The latter usually being a more formal company setting. Apart from these investment companies, hedge funds and private equity companies exist which primarily invest into stocks and purchase other companies, respectively. These companies however often have one thing in common, namely that they tend to conduct a thorough due-diligence on their potential future investments, before providing their capital.

In the ICO and cryptocurrency space, this may not always be the case, due to three main reasons:

1. The field of ICOs and cryptocurrencies tends to be relatively opaque, meaning that not all information is always available to investors, in order for them to conduct a thorough investment analysis. Moreover, investments are made on the basis that a future product will be delivered within a certain time-frame, and not on the basis of a functioning product or for the very least a technology showcase in the form of e.g. a beta-version.
2. The lack of regulation in the space makes it risky for investors to invest into companies. For example, the lack of investor protection could expose individuals to fraudulent companies.
3. The majority of crypto-investors are individuals with a relatively small amount of capital at their disposal for trading and investing, unlike VC-funds and major angel-investors who often have a large pool of capital (ranging into millions), at their disposal.

In the following sections, I will delve into the common psychological concepts which may influence whether an individual were to invest into an ICO or cryptocurrency. At this point it is important to not that these factors are commonly referred to, and openly discussed within the cryptocurrency-community.

2.4.1.Fear-Of-Missing-Out

Fear-Of-Missing-Out or commonly referred to in the Community as “FOMO” is a phenomenon in which investors seem to fear the idea of doing poorly relative to their competitors more, than actually inquiring losses with their investments. As Marguerite Rigoglioso from Stanford Graduate School of Business explains: “even though investments in areas such as new technology may be particularly risky, investors tend to cluster around such pie-in-the-sky opportunities to avoid being the only one in the neighborhood to miss out on the "next big thing.” (Stanford GSB, 2007). According to Peter DeMarzo from Stanford GSB, investors fear being poor in relation to their peers. This type of emotional influence leads to investors choosing similar investment portfolios to those of their peers, where: “such herding around certain investments allows you to combat the fear that everyone else might be betting on the winner while you're not”, says DeMarzo. Moreover, Rigoglioso highlights that this sort of behavior mainly occurs in high-tech spaces, where a general sentiment arises that these technologies may revolutionize the current market.

This sort of investment strategy shows how rapidly the risk of bubbles may arise, where overinflation of prices may eventually lead to the burst of the bubble. Rigoglioso stresses the dangers of overpriced stocks and assets with the following example: “Firms' decisions to invest follow suit, the researchers have discovered. In the late 1990s, telecommunications companies, for example, overinvested in droves in fiber optics. Because they ended up laying far more lines around the country than were needed, by 2003 the value of fiber-optic networks fell by more than 90 percent from its all time high.” (Rigoglioso, 2007).

Mark Haefele, CIO Wealth Management at UBS explains: “A young tech entrepreneur recently told me that social media postings are fueled by a Fear of Missing Out (FOMO) and a Fear of Joining In (FOJI). Talking about FOMO vs. FOJI sounds a bit more sophisticated than the old Wall Street mantra of greed vs. fear. But the concepts are the same. The ongoing run in equities is leading to FOMO (greed) building up among investors currently sitting on cash. On the flip-side, all-time highs in equity markets and the potential for central banks to withdraw stimulus mean plenty of investors are starting to feel the FOJI (fear) too.” (UBS, 2017). Haefele thereby exemplifies the relationship between the sentiments of greed and fear in the world of investing.

2.4.2.Social Proof and Inaction Inertia

Social Proof is a phenomenon in which investors start investing into ICOs without conducting their own research, and instead rely on the general trend and opinion of the surrounding community in order to make investment decisions. As chairman and CEO of Berkshire Hathaway -Warren Buffet- explained: "they get excited when other people get excited, they get greedy when others get greedy, they get fearful when others get fearful.". Patrick Oberstadt (2017) explains that due to cryptocurrency and blockchain technology being a new and complicated technology to grasp, many investors tend to look at the overall market sentiment in stead of objectively trying to identify good investment opportunities.

On the flip-side, Inaction Inertia prevents potential investors from investing their capital into an ICO or cryptocurrency. The following represents an example of this phenomenon: Imagine two separate individuals *A* and *B*. Individual *A* invests into a cryptocurrency at a price of US$1.00. Shortly after, the price jumps to US$5.00. In this case *A* is probably very happy since he/she 5x the original investment. Individual B on the other hand may be less motivated to invest into the token or crypto coin, since he/she believes that the opportunity to reap the benefits of this investment has passed, and that money cannot be made, or even be lost. Essentially describing the feeling an investor experiences after missing out on a deal, and consequentially, making him or her less likely to invest into the same opportunity in the future (Oberstadt, 2017).

2.4.3.Fear, Uncertainty, Doubt

Fear, uncertainty, doubt, or commonly know as "FUD", is a propaganda strategy in which a company or individual tries to instill a negative notion of e.g. an investment. Thereby trying to influence the public sentiment against a prospective investment. FUD is usually created by broadcasting false news, and dubious information. A result that may occur, and has previously occurred in the world of cryptocurrencies and ICOs is that markets may drop by billions of US dollars due to false information, showing that market manipulation is very much possible with this technology. Fear, uncertainty, and doubt are expressed in the form of skepticism, e.g. when JP Morgan Chase CEO Jamie Dimon publicly expressed his disbelief in Bitcoin. Another example is when the U.S. Commodities and Futures Trading Commission (CFTC) supposedly subpoenaed four major cryptocurrency exchanges earlier in June 2018, leading to a large sell-off. Moreover and ironically, enough, a price decrease in a certain asset, may also trigger FUD, and the further sell-off of the asset at stake (Medium, 2017).

2.4.4.Confirmation Bias

Confirmation bias -as explained by Michael Shavel, CFA at Cornerstone Capital- is a phenomenon in which individuals tend to believe and favor facts and data that strengthen their favored opinion. Shavel highlights that confirmation bias increases as market volatility increases. Additionally, Investors have a higher tendency of seeking facts that confirm their ideas and hypotheses, as well as surrounding themselves by other individuals that share the same thoughts. Lastly, Shavel emphasizes the effect of technology on confirmation bias, where the increased availability and instant access to data allows investors to seek out facts supporting their thoughts, in an easier fashion (Shavel, 2014).

3.HYPOTHESIS

In his paper on the dynamics of crowdfunding, Mollick (2014) raises his concern that "project quality may not be as clear or as influential to funders in crowdfunding settings compared with more traditional investments". In case investors indeed do not conduct the necessary due diligence on prospective investments, this may indicate unsystematic investment practices and the potential for misconduct. Such unsystematic investing may indicate the dominance of psychological investment drivers such as fear-of-missing-out, over objective investment criteria. However, if ICO investments are due to factual data, such as in the case of venture capital funds, it would reinforce our hypothesis that the availability and quality of hard-facts influence the success of initial-coin-offerings.

3.1.1.The Roadmap

The roadmap is a distinct feature of most businesses in the field of blockchain and cryptocurrency. This is because it allows investors to understand what the future milestones of the firm are. This can be seen as an important indicator for the quality of the project. According to Mollick (2014), the quality of a project can be indicated by the preparedness of the team, in order to attract investors. As a result, the availability and sophistication of a roadmap may be indicative towards commitment, in addition to professionalism in terms of business development. Lastly, Mollick highlights the importance of information flow between founders and funders, in the form of updates. This is because updates represent efforts by the team to keep interest levels amongst investors high.

3.1.2.The Product Offering

The product offering focuses solely on the what the company has to offer in terms of a prototype, beta-software, or a concept. This variable is all about being able to convey the project in a more tangible manner to potential investors than purely theoretical signals. Lukkarinen et al. (2016) explain, companies that offer products are more successful in attracting funding, than intangible services. I decided to implement this measure in my data collection, since a more detailed and realistic description of a product would help gauge investors' appeal towards an ICO.

3.1.3.The Team

The team behind an ICO is the backbone of and ICO. Lukkarinen et al. (2016) highlight the importance of both management and the entrepreneur as the most important investment factor for angel investors and venture capitalists. Moreover, Mollick (2013) equally points out the importance of the team for crowdfunding campaigns. As a part of the team, I have defined any individual that directly contributes towards the business's development. As the team is foremost important for the actual success of the project itself, it additionally represents a layer of confidence and trust for the investors. The following example should clarify: Imagine two distinct companies that offer and have all things the same, except for one individual on the advisory board. *Company A* has an unknown person as one of its advisors, whilst *company B* has Warren Buffett on the team. One could argue that the latter would create more awareness and trust for investors than the former.

3.1.4.The Source Code

The source code offers potential investors the option to verify and understand the underlying software., given the investor possesses the technical knowledge. Lukkarinen et al. (2016) indicate the positive effect of product understandability and the crowdfunding campaign success. For example, it is not unusual to publish the token smart contract code online on websites such as Github, in order for investors to make sure the program will exchange the fiat currency for tokens. Moreover, the source code allows outsiders to improve the program by fixing bugs in the code. In some cases, companies open a bounty for coders to find bugs and in exchange provide renumeration. Not only does this provide the company with a large pool of international talent to improve the product, but it also serves as a strategic implementation to show its confidence in it.

As opposed to conventional businesses that have their stocks traded on the stock markets, ICOs and cryptocurrencies are comparably opaque industry sector, and therefor often do not provide potential investors with a large amount of data in order to conduct thorough due diligence on the coin offerings. Consequentially, the detailedness of the whitepaper presents itself as an important element for investors to compare different investment opportunities and decide upon which ones to commit to. Some whitepapers may be highly detailed, by e.g. providing the source-code of the project. Others may be vague, by not providing any detailed- or technical information. I have established the following hypothesis in order to find out whether specific ICO whitepaper characteristics such as the availability and quality of team information, have an influence on its outcome:

H1: The availability and detailedness of a Whitepaper, including information regarding: 1.Roadmap; 2.Product offerings; 3.Team; 4.Source-code, positively influences the success of the ICO.

4.METHODOLOGY

4.1.Regression Model

I will use a Logit regression model in order to explore patterns within my data sample. I opted for this type of regression, since our dependent variable -success- is represented in a binary form, where successful=1 and unsuccessful=0. The regression will consist of one model, which will test my hypothesis H1. It will include the four independent variables which may influence the investment behavior of a rational investor, given that required hard-data such as those found in the roadmap, product offering, team quality, and source code, may influence whether or not an individuals invest into a coin offering. In addition, the model takes into account the the availability of a fintech-oriented business as control variable, and the success of the ICO as the dependent variable.

The variables are assigned as follows:

- Roadmap sophistication- **RM**
- Product offering sophistication- **PO**
- Level of team sophistication- **T**
- Detailedness of source code- **SC**
- Whether a company is active in the fintech- **FT**

The model thus appears in the following form:

$$Success = \beta 0 + \beta 1RM + \beta 2PO + \beta 3T + \beta 4SC + \beta 5FT + \varepsilon$$

4.2.Dependent Variable

With regards to success factors of ICOs, I have based my research on the key success factors that are presented in publications on crowdfunding as a whole, since it is a more established field of research. Nonetheless, this will give a good representation of the determinants for successful ICOs, considering they are a form of crowdfunding.

The main goal of an ICO is to raise capital in order to fund the underlying project, as is the case with more traditional crowdfunding. In previous research conducted by others in more conventional investment methods, I have found that companies spend a large amount of their resources in creating attention for their brand and products, with the help of marketing, promotions, and beta-testing. It would therefor be a natural step to also consider how much interest a firm has received, by also taking into account the number of individuals that have invested into its ICO. Although this would certainly be an interesting statistic to take into consideration, it is close to impossible to find this statistic, as it is not publicly disclosed.

I have based my definition of success on the basis of Lukkarinen et al.'s (2016) work on the success factors of online equity crowdfunding, and have therefore defined the dependent variable for success as follows:

- Successful ICOs reach their funding goals, and commence their projects. I will represent our dependent variable in a binary form, where 1=the ICO was successful, and 0=the ICO was unsuccessful.

Understanding this factor, and its determinants, i.e. the independent variables, can be a useful tool for analysis for future investors looking to participate in ICOs. However, one of the caveats of ICOs is that it tends to be an opaque field, where detailed information about the future activities of a company are in some cases hard to come by. Investors therefor often rely on a limited set of information. These information sources comprise of:

- *The Whitepaper:* Which contains all information concerning the business model, business goals, developers, management, and the underlying technical information of the product. In some cases the ICO structure is added, however this can also be offered in a separate instance.
- *Open source software:* Which means that the public has access to the software of the project. According to von Hippel et al. (2003), open-source software allows for a smoother innovation process, and more flexible technology development.

4.3.Independent Variables

Regarding my model, I will use four independent variables in addition to a control variable. Firstly, I checked weather or not the companies conducting the ICOs published a whitepaper. Considering that the realm of cryptocurrency, and in particular that of ICOs is relatively opaque, the whitepaper presents itself as one of the main resources for potential investors to conduct their research. In comparison to other investment opportunities such as stocks, where companies are required by regulation to disclose their financial information. After confirming that indeed all ICOs published a whitepaper, I started to delve into four distinct elements of each whitepaper. I have created a ranking, in which each variable is given a score of one to three, where: 1=weak, 2=nor weak nor strong, 3=strong. In the sections below, I will explain the meaning of the ranking for every variable independent variable:

- *Roadmap*: 1 signifies that no roadmap is made available for potential investors to analyze. 2 signifies that a roadmap is available, however it is not particularly detailed. For example when only a vague timeline is provided with no specific dates or months in which certain goals are to be met. 3 signifies that a detailed roadmap exists, which includes specific dates, detailed goals, and precise vocabulary.
- *Product offering:* 1 signifies that no clearly identifiable product, concept, or prototype exists. 2 signifies that a theoretical concept has been realized, in order to give prospectors a visual cue on a companies' idea(s). A 3 is given to ICO companies that provide a visualization of a working product or prototype.
- *Team:* In the case of the team, the score 1 represents an ICO where either no information on the team is provided by the whitepaper nor the ICO website. Moreover, if the information on the team cannot be verified, a score of 1 will also be given. 2 represents teams in which members have graduated from a a recognized university. A 3 is given to teams in which team members have graduated

from university and have work experience in either the field their business is intended to compete in (e.g. finance), or in cryptocurrency and ICOs in general.

- *Source code:* Considering that I will retrieve my information on company source code from Github, where the codes are presented in different folders (e.g. ICO smart contract, algorithms, applications, etc.), I will score this variable as follows: 1 if no source code is provided at all. 2 In case a minimum of one source code folder is provided. 3 if more than one source code is provided, such as several blueprints for developers.

4.4.Control Variable

As the control variable within my model, I will use the information on whether business in the fintech space. I have decided to take this criteria into account as a control, since fintech (incl. trading, payments, general finance) represented over 32% of all ICOs in 2017 (Coinschedule, 2018). It would therefore be of interest to see whether or not the fintech space attracts additional investors. Additionally, it is worth mentioning Adhami et al. (2018) have also used this measure as a control.

5.DATA

The dataset for this study has been provided by two distinct ICO databases. I used the Tokendata website in order to seek out 170 successful ICOs that were conducted throughout 2017. In addition, I made use of the Icobench database, which provides supplementary information such as: Industry type, total amount US$ raised, ICO price of token, and finally -in case the tokens are publicly traded on one of the many crypto-exchanges- the current trading prices are displayed.

I have decided to opt for the 2017 financial year, since it is the first year in which over a billion dollars have been raised for ICOs, and during the time of the writing fo this research paper, 2018 has not yet ended. In comparison to 2016, Coinschedule only recorded a total of 43 ICOs, which raised a total amount of US$ 95,181,391. Although this is certainly not a small amount with each ICO raising an average of approximately US$2.2 million, the 2017 numbers will provide a more representative sample size. In total US$ 3,880,018,203 have been raised across 210 individual ICOs (coinschedule, 2018). Although investments in the beginning of last year were somewhat low and similar to 2016 numbers, they quickly rose from a modest US$15.36 million in January 2017 to US$1.09 billion by December 2017. This represents an approximate 7000% increase within twelve months. The five largest ICOs and the total amount of US$ raised in 2017 are presented in the table below:

Table 1: Five largest crypto ICOs in 2017

ICO	Raised (US$)
Hdac	258,000,000
Filecoin	257,000,000
EOS	185,000,000
Paragon	183,157,275
Bancor	153,000,000

(Source: Icoschedule, 2018)

According to Coinschedule, from the 210 ICOs conducted in 2017, 23 raised >100% of funds, 63 raised 50%-100% of the funds, and 124 raised less than <50%. Moreover, the following five sectors represent the biggest industries for ICOs in 2017:

Table 2: Five largest ICO industries

Industry	Raised (US$)	% of total ICOs
Infrastructure	1,002,499,502	25.8
Finance	564,621,336	14.6
Trading & Investing	386,323,075.47	10.0
Communications	322,565,362	8.3
Payment	291,219,299	7.5

(Source: Icoschedule, 2018)

In my results, I provide the descriptive statistics on the mean, median, and standard deviation of the scores of both successful and unsuccessful ICOs. The descriptives allow for an initial overview of the gathered data, and prepare the reader for the detailed analysis that follows.

6.RESULTS

6.1.Sample

As previously explained in the data section, I opted for the year 2017 for my sample of statistics concerning ICOs. The sample consists of a total of 188 ICOs that were thoroughly analyzed with regards to the variables mentioned in my hypothesis and the research methodology. The 188 ICOs I looked at are split into two distinct groups. From this sample, 170 observations represent successful ICOs, whilst 18 observations represent unsuccessful ICOs.

I retrieved my data from coinschedule.com and tokendata.io, where I compared the two websites for similarities and differences in their listings. Because dissimilarities were indeed initially found already regarding the top-ten ICOs, I decided to crosscheck the data with two more additional sources, in order to verify the data more precisely. For this, I added both medium.com as well as cryptocurrencyhub.io. Note that the last two sources are secondary sources. This way I made sure that no data has been missed out.

6.2.Descriptives

Tables 3 and 4 show the descriptive statistics of successful and unsuccessful ICOs, respectively. In the following five sections, we will look at each of the variables separately and proceed with a comparison between the successful and unsuccessful initial coin offerings. Before we proceed, I would like to point out the difference in the number of observations between the two groups. A total of 170 observations were taken into account for successful ICOs, whilst 18 unsuccessful ICOs were included. As I will explain in the limitations section (8), difficulties arose when trying to obtain the necessary whitepaper, as most of the websites of failed ICOs had been closed down.

As one can see, the descriptives are measured for five variables, in terms of their scores regarding the availability and quality of: RM=Roadmap, PO=Product offering, T=Team, and SC=Source. FT, or fintech, is used as control variable, and is categorized as a nominal variable since I am purely interested on whether or not the ICO business is active in the financial technology field. The former four variables are ordinal, considering they are given scores from one to three. In order to not repeat myself, I will point out that the minimum and maximum of each variable also ranges from one to three, which is in cohesion with the scale I developed in order to score these. This shows that there is potential for both successful as well as unsuccessful ICOs to perform very well in certain parts of the whitepaper.

Table 3: Descriptive statistics successful ICOs

	RM	PO	T	SC	FT
N	170	170	170	170	170
Mean	2.27	2.51	2.73	2.78	0.42
Median	2	3	3	3	0
Std. Deviation	0.695	0.637	0.484	0.458	0.495
Range	2	2	2	2	1
Minimum	1	1	1	1	0
Maximum	3	3	3	3	1

Table 4: Descriptive statistics unsuccessful ICOs

	RM	PO	T	SC	FT
N	18	18	18	18	18
Mean	1.33	1.72	1.50	1.83	0.33
Median	1	2	1	1	0
Std. Deviation	0.594	0.752	0.786	0.985	0.485
Range	2	2	2	2	1
Minimum	1	1	1	1	0
Maximum	3	3	3	3	1

6.2.1.The Roadmap

When taking a closer look at the roadmaps, we may immediately notice a difference in terms of the mean scores, where the mean of successful ICOs is 2.27, and 1.33 for unsuccessful ICOs, demonstrating a higher-quality roadmap in the case of successful ICOs. Another observation we can make when comparing this value to the means of the remaining variables is that the roadmap is on average the lowest scoring variable for both successful and unsuccessful ICOs (excluding the control). With the median being lower than the mean, we note the data is skewed to the right. When looking at the standard deviations, one can observe how both successful as well as unsuccessful ICOs have differing standard deviations of 0.695 and 0.594 respectively, which indicates a less homogeneous distribution amongst unsuccessful ICOs considering the lower mean.

6.2.2.The Product Offering

Considering the product offering, the scores are higher for both un/successful ICOs in comparison to the roadmap variable. Here, successful ICOs obtained a mean score of 2.51 out of 3 and unsuccessful ICOs 1.72. The median of unsuccessful product offerings is slightly higher than the mean, which shows the data is skewed to the left. In comparison, the data for successful ICOs is equally skewed to the left, as the median of 3.0 is larger than the mean. We should keep in mind the mean may be skewed due to the influence of outliers. In addition, the standard deviation of product offerings in the case of unsuccessful ICOs is higher than of successful ICOs, which points towards more heterogeneous observations.

6.2.3.The Team

The team variable by far shows the largest difference in mean scores between the two categories of ICOs, with a difference in means of 1.23 between successful (mean=2.73) and unsuccessful (mean=1.50) ICOs. This indicates that the quality of the team has a strong influence on investor interest in an ICO, and consequently ICO success. Moreover, it also points towards a team's higher capability to develop the business. The observations are skewed in opposite directions for successful and unsuccessful ICOs, where the former is negatively skewed and the latter positively. The standard deviation is noticeably larger for unsuccessful ICOs, which may be due to the lower sample size, as with a larger sample the variability decreases.

6.2.4.The Source Code

The source code is the highest scoring variable for both successful and unsuccessful ICOs, with a mean of of 2.78 and 1.83 respectively. Although with regards to successful coin offerings, the difference between the mean of the source code and the team is only 0.05. This indicates the importance of the two variables for the success of an ICO. Additionally, the data is skewed in the same directions as in the case of the teams for un/successful ICOs. Finally, the standard deviation of the source code for unsuccessful ICOs is more than double the standard deviation for successful ICOs, further pointing towards the effect of having a low sample size in the case of unsuccessful ICOs.

6.2.5.Fintech (control variable)

In the case of successful ICOs more companies tend to be active in the fintech field as opposed to unsuccessful ICOs. However, the low mean in case of the latter, may be an indicator of the effect of a small sample size. Both categories of ICOs have similar standard deviations, which is unsurprising considering the binary nature of the control variable.

6.3.Regression Results and Analysis

Table 6 shows the regression results of the variables in the equation. Overall, three variables are statistically significant, namely: RM (roadmap), T (team), and SC (source code). Both the product offering (PO) and fintech (FT) variables are considered statistically insignificant according to our results.

RM (roadmap) is a significant predictor of the odds of the success of an ICO. The beta coefficient of the roadmap is negative in the case of the regression. In accordance with the

Table 5: Correlation matrix

	RM	PO	T	SC	FT
RM					
PO	.479** (.000)				
T	.404** (.000)	.462** (.000)			
SC	.227** (.002)	.319** (.000)	.413** (.000)		
FT	-0.014 (.853)	0.013 (.859)	0.084 (.251)	-0.033 .649	

** Correlation is significant at the 0.01 level (2 tailed)

Table 6: Logit regression results

	B	S.E.	Exp(B)
RM	-4.490*	2.209	0.011
PO	3.525	2.073	33.939
T	-6.202*	1.884	0.002
SC	-5.198*	1.570	0.006
FT	-0.585	1.002	0.557

*p<0.05

definition of the variable we can therefore state that ICOs with a highly detailed roadmap including specific dates and precise language do not experience an increase in the likelihood of success, over ICOs that have a less detailed roadmap with a vague timeline, using indistinct language. This result differs from Lukkarinen et al.'s (2016) results concerning information in crowdfunding. In addition, we can use the value of the odds ratio Exp(B) to state that roadmaps of successful ICOs have the odds of being successful that are 0.011 of the odds of unsuccessful ICO roadmaps. This means that the odds of an ICO to be successful is lower with a more detailed roadmap. This certainly does not coincide with our hypothesis, and may be indicative of the significant correlation between the variables: Roadmap and product offering.

Furthermore T (team) is also a significant predictor of the odds of the success of an ICO. The beta coefficient of the team variable is also negative. This means that an ICO where the team consists of employees that have a university degree in addition to relevant work experience in cryptocurrencies, ICOs, or fields of speciality (e.g. finance), are not more likely to succeed than ICOs who's teams do not have the relevant work experience. Exp(B) of the team variable indicates that teams of successful ICOs have the odds of being successful that are 0.002 of the odds of teams from unsuccessful ICOs.

Finally, SC, or source code, is also considered a significant predictor of the odds of the success of an ICO. The beta coefficient of the source code is also negative, which indicates that ICOs with multiple published detailed source codes are not more likely to succeed than ICOs that do not publish their source codes, or only publish the minimum of one code. This result differs from the results of Lukkarinen et al., on the understandability of the product. Additionally my result also differs from Adhami et al.'s (2018) results on the significance of the source code availability to the success of the project. With the odds ratio Exp(B) we can proclaim that source codes of successful ICOs have the odds of being successful that are 0.006 of the odds of the source codes of unsuccessful ICOs.

6.4.Robustness Check

When taking a closer look at the correlation matrix, one can observe a high correlation between the roadmap and product offering variable. This is an indication for multicollinearity. I have therefor proceeded with a robustness analysis in order to check for the effect of RM on PO by re-running the logit

Table 7: Logit regression results without RM

	B	S.E.	Exp(B)
PO	1.159	1.535	3.188
T	-6.212*	1.561	0.002
SC	-3.983*	1.068	0.019
FT	-0.443	0.948	0.642

*p<0.05

Table 8: Logit regression results without PO

	B	S.E.	Exp(B)
RM	-2.832	1.651	0.059
T	-4.320*	1.233	0.013
SC	-4.555*	1.368	0.011
FT	-0.775	0.928	0.461

*p<0.05

regression, however by leaving out RM in one and PO in the other model. The results are presented in tables 7 and 8.

Table 7 which excluded the roadmap variable shows that the beta coefficient of product offering has changed from a negative to a positive value (although statistically insignificant). The two significant variables: team and source, continue to hold beta coefficients with negative values. Considering the correlations between team and product offering, and source code and team are also high, I have opted to run further robustness checks. Tables 9 and 10 in the appendix similarly seek to identify any effect of leaving the team and source code variables out of the model. In table 9 I looked at the effect on product offering by excluding the team variable. Although only roadmap and source code turned out to be statistically significant, we can see how the beta coefficient of the product offering has turned negative. In table 10 I seek to check for the effect of the source code on team. Indeed team is the only statistically significant variable. Although the beta coefficient is still negative, as in table 6, the coefficients value has slightly increased to -4.793.

Table 11: Results of logit regression with a whitepaper index

	B	S.E.	Exp(B)
Index	.972*	0.179	2.642
Fintech	0.643	0.716	1.902

*p<0.05

Finally, table 11 represents a logit regression, where the scores of the independent variables: RM, PO, SC, and T were summed up, creating the index variable. The regression indicates the overall impact of the detailedness of the whitepaper on ICO success. As one can see, the beta coefficient is significant, in addition to holding a positive value. This indicates that ICOs with detailed whitepapers are more likely to succeed than ICOs with less detailed- or no whitepaper.

7.CONCLUSION

Initial Coin Offerings represent a new way for entrepreneurs to raise capital for a wide variety of projects. Taking into account the rapid increase in popularity of the blockchain space, it has remained a largely unstudied space. What can be seen from the market data, is that ICOs may succeed with large fundraises reaching into hundreds of millions of US dollars, but at the same time they may also fail. The ICO world may therefor be seen as an environment of extremes: One can make it big, but one can also not make it at all. This was strongly apparent in the example of Ethereum's Decentralized Autonomous

Organization (DAO) coin offering, which raised over US$ 160 million. However, a hacker breached the smart contract and stole over US$ 50 million worth of funds, bringing out the vulnerability of the DAO project.

Many scholars and columnists have pointed towards cryptocurrency and ICO investing being a purely emotional matter, lead by psychological investment drivers such as fear-of-missing-out and rumors, as opposed to more objectively-conducted investments. Due to the early stages of research on this matter, it is difficult to make such absolute statements. With my research, I intended to find indications towards rational investment behavior of investors. However, my research has found no statistically significant indication towards the positive effect of: the roadmap, product offering, team, and source code toward the success of an ICO. In terms of future research, it would therefor be interesting to conduct a study on psychological investment drivers, and their effect on crypto and ICO investing. One could additionally conduct a comparison on whether there is any overlap in these psychological factors in crypto and in more conventional asset class investing.

The results showcase that the overall mean scores of the independent variables of successful ICOs tend to be higher than those of unsuccessful ones. This further emphasizes the importance of a well structured, detailed, practically-oriented and technical whitepaper, which may increase the amount of interest generated towards investors, and hence the possibility of a successful coin offering.

Crypto investing has the potential to become as established of an investment category as conventional stocks. However, the lack of regulation in the cryptocurrency and ICO landscape is one of the main limiting factors for it to be considered by larger institutional investors. This is because the lack of regulation increases the risk and potential for volatility due to the increased possibility of market manipulation, which could result in higher levels of subjective bias, as explained by Shavel (2014).

8.LIMITATIONS

My results are based on an investigation into the white papers of ICOs. Due to the opaque nature of this new and developing technology, in addition to the limited amount of research available, it has been challenging to obtain the necessary data in order to conduct a meaningful analysis. However, my research gives a good overview as to whether or not investors act on a rational basis when considering a coin offering. Moreover, this study does not take into account -the above mentioned- psychological factors that may influence investor behavior, which would present itself as an opportunity for further research in this field of ICO investment. Finally, it was highly challenging to find data on unsuccessful ICOs considering many of the websites had been shut-down at the time if writing this paper. As a consequence not all the necessary data was always available, explaining the large gap in sample size between successful and unsuccessful coin offerings.

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10.APPENDIX

10.1.Further Explanation on Blockchain

10.1.1.Proof-of-Work

The concept of Proof-of Work (PoW) is one of the most popular ways in which a blockchain is maintained, an example for this concept in action, is the Bitcoin blockchain. The participants in the chain or technology contribute by verifying the transactions, whilst the "miners" do the heavy lifting in terms of the computational work behind the creation of the individual blocks consisting of transactions. I.e. miners create the new and validated blocks that are then added to the existing chain, form ing the digital open ledger. At this point two obvious questions arise:

1. Why would anyone spend their time "mining" or computing transactions for anyone else?

The key to the appeal of mining lies in the fact that miners thereby obtain the opportunity to participate in a "lottery". However, it is not just any lottery, but one where a miner can win and gain the right to add the next block to the chain. A noteworthy detail concerning the process of mining itself, is that it essentially consists of individuals that own and operate computer processors, which solve complex mathematical problems. As a result, of the increasing length of a chain after *x* amount of time, the problem sets become more and more difficult and time-consuming. Therefore, the general rule exists, where a higher computing power, I.e. more and faster processors, results into a higher chance of winning the so-called lottery.

2. What is in it for the miners, after they "win" the lottery and receive the right to place the next block into the chain?

The miners obtain a previously established amount of token or cryptocurrency that is connected to the very blockchain for which they mine for. In addition, they may also receive additional fees from transaction which they conduct for the users of the blockchain and specific token. These users often include such fees, in order to motivate the miners to prioritize their transaction in front of other users' transactions. In other words, the participants inquire the extra costs in order to create incentives for miners to include their transactions in the earliest possible block. The miners' efforts are then rewarded via incentives that come in the form of tokens such as a Bitcoin. As one can observe, this network motivates participants to maintain the blockchain by offering enough incentives for miners to conduct the computations.

Another important factor noted by Catalini and Gans (2017), is that the process of mining in a Proof-of-Work architecture, does not serve as a verifying-operation, but rather as a measure to defend the underlying blockchain from outside attacks by malicious actors. The idea behind this defense mechanism is that the more blocks have been added, the more computing power has been used, the more challenging it becomes for intruders to manipulate previous transactions and hence the chain. Quintessentially, this logic presents itself as a Game Theory premise. Considering that the blockchain becomes stronger the bigger it is, a malicious actor would have to realize two steps in order to successfully tamper with the transactions within the blocks:

1. The actor would have to outpace the growth of the blockchain itself, considering that the creation of new blocks will not stop during an unsuspicious attack.
2. The actor would have to re-compute all of the transactions that have occurred in the blocks following the one that he/she is trying to manipulate. Considering that in January 2018 the average transaction confirmation time for a single transaction stood at over 1,500 minutes (Steemit, 2018), it would take a very long time for such an actor to successfully intrude the chain. Especially when one takes into account that on the 1st of January 2018 the total number of transactions on that single day was at 241,757 (Blockchain, 2018).

That being said, the result of this sort of defense is that increased costs need to be incurred by the attacker, due to a large amount of resources that need to be invested in order to successfully attack the chain. This issue becomes even more evident when one considers that high-tech mining equipment needs to be used, such as ASICS. These are extremely durable computers specifically designed to mine in the blockchain.

The following steps demonstrate the cycle in which a blockchain is maintained:

1. A high amount of blockchain participants.
2. Leads to a higher token/cryptocurrency value.
3. Leads to a higher amount of miners in the ecosystem.
4. Finally resulting into a higher level of security.

10.2.Additional Robustness Check Tables

Table 9: Logit regression results without T

	B	S.E.	Exp(B)
PO	-0.037	1.104	0.964
RM	-4.157*	1.545	0.016
SC	-4.700*	1.255	0.009
FT	-0.740	0.788	0.477

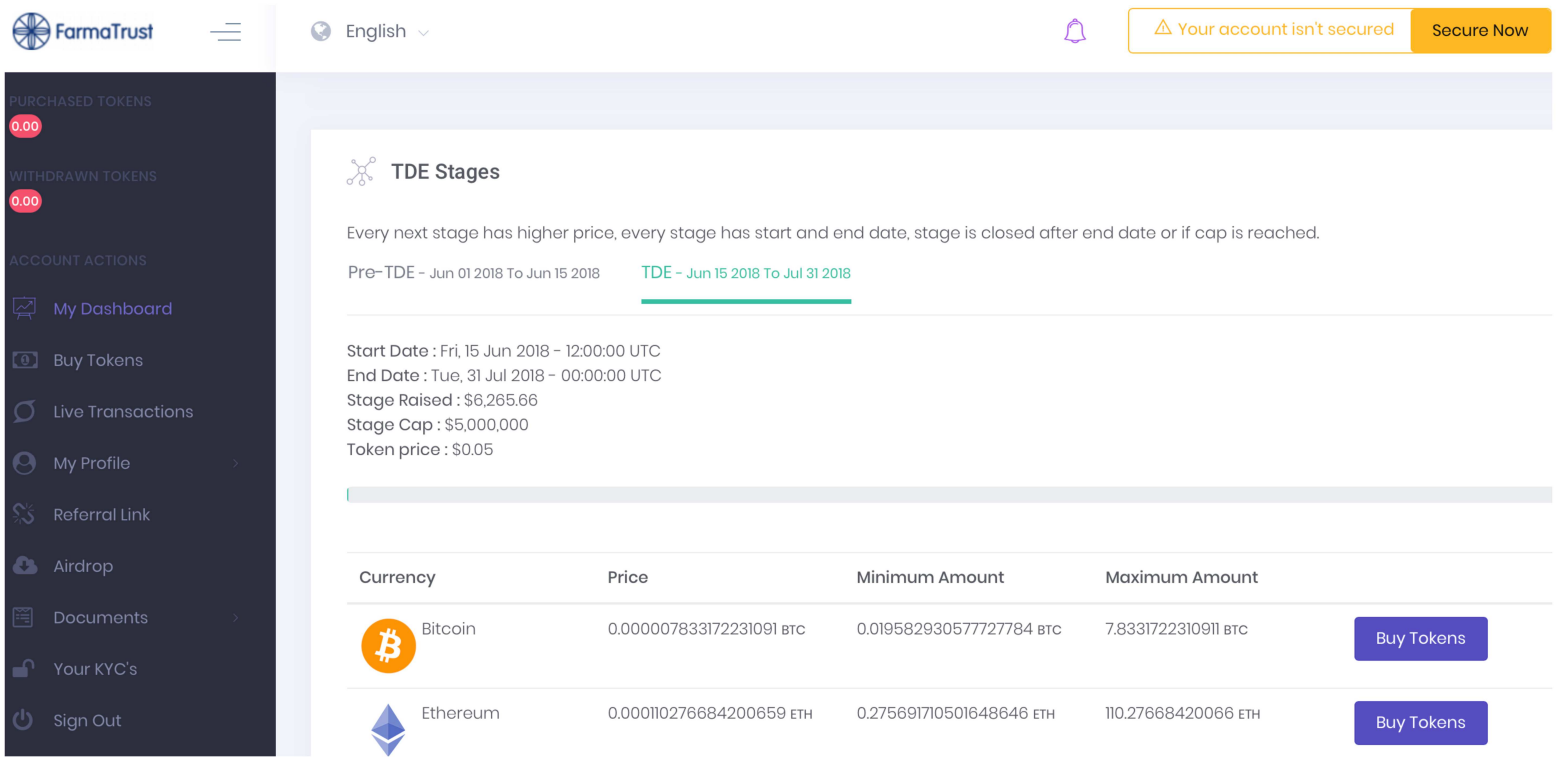
*p<0.05

Table 10: Logit regression results without SC

	B	S.E.	Exp(B)
RM	-1.893	1.266	0.151
PO	0.686	1.363	1.985
T	-4.793*	1.280	0.008
FT	-0.291	0.757	0.747

*p<0.05

10.3.ICO example:



10.4.Smart contract (introduction) code example:

```
contract token {
    mapping (address => uint) public coinBalanceOf;
    event CoinTransfer(address sender, address receiver, uint amount);

  /* Initializes contract with initial supply tokens to the creator of the contra
  function token(uint supply) {
        coinBalanceOf[msg.sender] = supply;
    }

  /* Very simple trade function */
    function sendCoin(address receiver, uint amount) returns(bool sufficient) {
        if (coinBalanceOf[msg.sender] < amount) return false;
        coinBalanceOf[msg.sender] -= amount;
        coinBalanceOf[receiver] += amount;
        CoinTransfer(msg.sender, receiver, amount);
        return true;
    }
}
```