UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

AN ANALYSIS OF AN INITIAL COIN OFFERING PHENOMENON AND DETERMINANTS OF FUNDRAISING SUCCESS

Ljubljana, 3rd December 2018 URŠKA GOSTIŠA

AUTHORSHIP STATEMENT

The undersigned Urška Gostiša, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), author of this written final work of studies with the title An analysis of an initial coin offering phenomenon and determinants of fundraising success, prepared under supervision of Prof. Dr. Aleš Berk Skok

D E C L A R E

1. this written final work of studies to be based on the results of my own research;

2. the printed form of this written final work of studies to be identical to its electronic form;

3. the text of this written final work of studies to be language-edited and technically in adherence with the FELU's Technical Guidelines for Written Works, which means that I cited and / or quoted works and opinions of other authors in this written final work of studies in accordance with the FELU's Technical Guidelines for Written Works;

4. to be aware of the fact that plagiarism (in written or graphical form) is a criminal offence and can be prosecuted in accordance with the Criminal Code of the Republic of Slovenia;

5. to be aware of the consequences a proven plagiarism charge based on the this written final work could have for my status at the FELU in accordance with the relevant FELU Rules;

6. to have obtained all the necessary permits to use the data and works of other authors which are (in written or graphical form) referred to in this written final work of studies and to have clearly marked them;

7. to have acted in accordance with ethical principles during the preparation of this written final work of studies and to have, where necessary, obtained permission of the Ethics Committee;

8. my consent to use the electronic form of this written final work of studies for the detection of content similarity with other written works, using similarity detection software that is connected with the FELU Study Information System;

9. to transfer to the University of Ljubljana free of charge, non-exclusively, geographically and time-wise unlimited the right of saving this written final work of studies in the electronic form, the right of its reproduction, as well as the right of making this written final work of studies available to the public on the World Wide Web via the Repository of the University of Ljubljana;

10. my consent to publication of my personal data that are included in this written final work of studies and in this declaration, when this written final work of studies is published.

Ljubljana, December 3rd, 2018 Author's signature: _____

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

In recent years, traditional early-stage funding models have been supplemented with crowdfunding. The concept is inspired by micro-finance and crowdsourcing, which involves the crowd not only for financing, but to obtain ideas, feedback, marketing and create overall interest in the new product at an early stage of development.

Cryptocurrencies are defined as a peer-to-peer version of electronic cash that enables online payments between two parties without financial institution mediation. The protocol combines principles of cryptography to implement a distributed, decentralized and secured information economy (Chuen, 2015, p. 8). Cryptocurrencies are based on blockchain technology (Adhami, Giudici & Martinazzi, 2018). The dominant feature of blockchain technology is relying on consensus protocols used to create an appended-only log, used to create an auditable database (Casey, Crane, Gensler, Johnson & Narula, 2018).

Advances in cryptocurrency and blockchain technology, using crowdfunding principles have led to a new form of hybrid funding concept called Initial Coin Offering (thereinafter ICO). It evolves as a novel way to acquire capital at an early stage. While cryptocurrency and blockchain technology present potentially revolutionary monetary and technical innovations, ICO presents an innovation in entrepreneurial finance. ICO as a capital raising concept is a recent phenomenon with the first ICO conducted in 2013 and experiencing a boom in 2017 with the adoption of the Ethereum smart contract.

Following the novelty of the phenomenon, in literature ICO is called also the "wild west" of technology (Cheng, 2017), "wild west" of investing (Binham, 2017) and even "wild west" of capitalism (Prusak, 2017).

While ICO is attracting significant attention from ventures, investors and policy makers, very little is known about its dynamics and the decision-making process of investors. There appears to be a research gap of the indicators that would be useful for investors to make prudent decisions. As the amount of money raised is significant and the ICO industry is facing a boom, there is a need to study the ICO phenomenon. Furthermore, understanding the determinants of the ICO campaign's success is decisive for investors, government authorities and founders.

The goal of this master's thesis is first to address the specifics of the ICO phenomenon to entrepreneurial finance literature and blockchain background, present the evolution of the ICO market and to explore the determinants of fundraising success with econometric analysis. The whole ICO project, the degree of information disclosure, the founder's characteristics and marketing strategies differ a lot between projects; and exactly this diversity enables me to recognize and research the determinants of success.

The master's thesis is organized as follows. It consists of three main parts, the first one imposes a detailed institutional background of blockchain technology and cryptocurrencies as the building block, the second focuses on the ICO phenomenon and the last one introduces research questions and presents the findings of the econometric analysis of the determinants of ICO success.

The first part begins with a theoretical background based on scientific journals and working papers referring to digital currencies, cryptocurrencies, the blockchain technology and the crypto economy, and outlines crucial concepts to understand future development. The timeline review starts with the first white paper published by an unknown author titled: »Bitcoin: a peer-to-peer electronic cash system« that invented still the most powerful cryptocurrency: bitcoin. The historical timeline enables insight into short but technologically revolutionary development of cryptocurrencies and blockchain technology that were the main drivers for the rise of ICOs.

ICO is an evolving concept, therefore it is crucial to understand the background of the fundraising concept. The second part starts with the defining fundraising concept with a focus on crowdfunding with the aim to be able to further find potential similarities with the ICO. Although a few ICO tokens simply provide alternative cryptocurrencies, the great majority use the blockchain to intermediate new markets or make existent markets more efficient. The framework token classification based on the U.S Securities and Commission ruling and clear distinction utility and security token is presented in the next chapter. Further is presented the ICO process that includes the most common steps of an ICO token from its creation to listing on cryptocurrency exchanges and the principles of token economics based on macroeconomics aggregate supply and demand curves.

The relationship between ICO activity and regulation is a pressing issue worldwide. In the next chapter is presented the timeline review of ICO regulations as well as individual countries' regulations. The closest analogue to the ICO phenomenon is the Initial Public Offering (thereinafter IPO). In the next chapter there are presented crucial differences between processes. The theoretical framework is rounded up with a review of the ICO market, crypto exchanges and security challenges.

In the third part, the core question is examined: What are determinates of ICO success? The empirical analysis is inspired by researches of the effectiveness of different signals used by startup companies to attract investors in an equity crowdfunding and venture capital context. It is established around four main groups of ICO success determinants: ICO characteristics, financial details, founder's characteristics and marketing. Rather than formal hypothesis testing, the aim is to provide a wide perspective on the determinants of fundraising success by forming research questions.

Based on a stratified sample of 102 ICO events occurred in 2017, the econometric analysis recognized determinants of fundraising success. For the purpose of this research the ICO

project is labeled as successful, when the minimum funding goal to start operating is achieved. The results of the empirical analysis and commentary of contribution to research are in the following chapters. The master's thesis ends with the conclusion.

1 CRYPTOCURRENCY

1.1 Institutional background

1.1.1 Digital currencies

Cryptocurrency is a term used for cryptography secured digital or virtual currencies. In literature the terms digital and virtual are often used interchangeably in the context of currencies based on an electronic medium (Cong, Li & Wang, 2018). The Financial Action Task Force (thereinafter FATF) in the Virtual Currencies Key Definitions and Potential AML/CFT Risks report defined virtual currencies as follows: "A digital representation of value that can be digitally traded and functions as: (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status (i.e., when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction. It is not issued or guaranteed by any jurisdiction and fulfils the above functions only by agreement within the community of users of the virtual currency. Virtual currency is distinguished from fiat currency (a.k.a. "real currency," "real money," or "national currency"), which is the coin and paper money of a country that is designated as its legal tender; circulates; and is customarily used and accepted as a medium of exchange in the issuing country. It is distinct from e-money, which is a digital representation of fiat currency used to electronically transfer value denominated in fiat currency." (Financial Action Task Force, 2014).

1.1.2 Definition

David Lee Kuo Chuen, author of the Handbook of digital currency and founding investor of ZCash, Qtum and a few other blockchain companies, defines cryptocurrencies as a peer-to-peer version of electronic cash that enables online payments to be sent directly from one party to another without mediation by financial institution. Further, he defines cryptocurrency as a decentralized convertible digital currency based on math algorithms and protected with cryptography. The protocol combines principles of cryptography to implement a distributed, decentralized and secured information economy. The decentralized characteristic implies nonexistence of a central administrating authority (Chuen, 2015, p. 8).

Cryptocurrency leans on public and private keys that enable the transfer of value from one account to another. An individual or an entity is the owner of an account and possesses a private key as proof of ownership. Since keys are based on elliptic curve cryptography (also known as ECC), they are suitable for incorporation into the blockchain. Transactions are

combined into blocks that are cryptographically linked (Anderson, Holz, Ponomarev, Rimba & Weber, 2016). Each time a transaction occurs, it must be cryptographically signed and only the owner of the private key is able to create a valid signature (Chuen, 2015, p. 10).

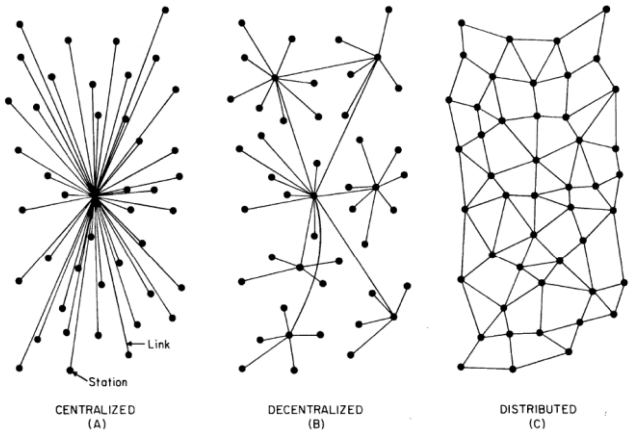
A network of mutually distrustful parties (also called miners) protects the network in exchange for a distributed fee and ensures the safety, integrity and balance of cryptocurrency ledgers. A major assumption is that all miners are motivated to act faithfully, due to the reward they receive for mining. As a reward a miner receives an opportunity to obtain predefined amounts of newly generated currency in the new block that is called a "block reward" or a transaction fee (Anderson, Holz, Ponomarev, Rimba & Weber, 2016).

1.1.3 Blockchain technology

The base for cryptocurrency is a relatively new technology referred to as blockchain technology or a synonym for distributed ledger technology (DLT thereinafter) to create a distributed system of information whenever a transaction occurs (Adhami, Giudici & Martinazzi, 2017). The core characteristic of blockchain is that it relies on the consensus protocol used to create an append-only log that is afterward used to create an auditable database. The database consists of a decentralized network of participants and is cryptographically secured (Casey, Crane, Gensler, Johnson & Narula, 2018).

In the past, the distributed principle was used to build a communication network that could operate smoothly in case of an attack on one node. This feature is applied with the game theory to create incentives for each node to independently and regularly maintain the network (Amsden & Schweizer, 2018). The composition of DLT is comparable with the Distributed Communication Network presented in Figure 1 (Baran, 1964).

Figure 1: Distributed Communication Network



Source: Baran (1964).

Blockchain technology is defined by the following features (Casey, Crane, Gensler, Johnson & Narula, 2018):

1. Every distributed ledger is done, shared and modified by multiple distrusting participants and none of them has a single possibility of control over it.
2. A constantly growing chain of distributed ledger entries connects the entire history and prevents any changes of the past record.
3. Digitally signed transactions denote a purpose of data modification or transfer of digital assets.

Decentralized nodes that maintain records of the blockchain through the mining process take the position instead of central authority. Every blockchain transaction consists of three components: sender's address (in spoken language also known as "wallet"), receiver's address (also a "wallet") and a transactional unit (Amsden & Schweizer, 2018).

Nowadays, the principle of blockchain technology is widely spread and appears in smart contracts, records of different item ownership and cryptocurrencies. Blockchain based applications are a part of the revolutionary idea to a create peer-to-peer financial system and reorganize the society into a model of decentralized networks (Cong, Li & Wang, 2018).

Bank of England governor Mark Carney admitted that blockchain technology advantages data management by improving flexibility by eliminating central points of failure, increases transparency and auditability (Casey, Crane, Gensler, Johnson & Narula, 2018). Furthermore, the interest to involve blockchain technology is recognized also in other countries, for example, Bank of Canada and Singapore Monetary Authority include blockchain for interbank payment systems; Deutsche Bundesbank is working on a prototype of blockchain based settlement systems for financial assets and People's bank of China is investing in the development of a digital currency system (Cong, Li & Wang, 2018).

Besides many variations of blockchain in use within an ICO context it is presented as an openly available, immutable ledger of the whole history of transactions that are recorded in consecutive blocks (Amsden & Schweizer, 2018).

1.1.4 Crypto economy

There is a wide range of possible implications of cryptocurrency including in global payment and remittance systems, decentralized exchanges, merchant solutions, online gaming and digital contracting systems. Cryptocurrency presents the opportunity to become a conduit for payment and funds (Chuen, 2015, p. 13).

As soon as cryptocurrencies and blockchain technology protocols were discovered as a medium of exchange for community networks, there rose an idea to use cryptocurrency to

raise finance. However, currency presents just one of the possible uses of blockchain technology; it is useful wherever trust decentralization is a critical value (Yadav, 2017).

1.2 Timeline review

1.2.1 Satoshi Nakamoto and Bitcoin

Interest in cryptocurrency revived in 2008 as a response to the global financial crisis (Chuen, 2015, p. 9). The concept of cryptocurrency was first described in 1998 by Wei Dai who presented the idea of a new form of money using cryptography to control its creation and transaction instead of central authority (Bitcoin project, 2014). Wie Dais's b-money concept became the first proposal of creating money through solving computational puzzles (Ethereum, 2015).

In 2008 the unknown author using name Satoshi Nakamoto published a revolutionary article titled "Bitcoin: a peer-to-peer electronic cash system" and presented the idea of establishing an electronic cash system. There was presented the problem of necessity of financial institutions being a trusted third party to process electronic payments. To learn from history, many inflationary and hyperinflationary periods in 20th century demonstrated that this is not an ideal state of affairs (Szabo, 2008). The major financial crisis, like the one in Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1991) show how the central banking structure could result in a problem of large scale financial meltdowns (Reinhart & Rogoff, 2008). The publication of the white paper is a major milestone in the history of blockchain technology and cryptocurrency. Since its publication, the document received considerable attention and was cited on Google Scholar over 3.000 times as of February 2018 (Google, 2018).

The identity of the idea and the author of the article remain unknown; despite many efforts it is not even known whether Satoshi is a group or a person (Chuen, 2015, p. 11). To make it clear, hereinafter the author will be referred to in the singular male pronoun.

Financial institutions as a mediator increase the transactional costs and cause payment uncertainties, which could only be avoided in person by using physical currency (Nakamoto, 2008). In his article, Nakamoto proposed a system for electronic transactions without relying on any trusted third party institution. He presented the use of an electronic payment system that was based on cryptographic proof instead of trust. The electronic system enables any two willing parties to make a transaction directly with each other without the need of any kind of trusted third party. Starting with the framework of coins made from digital signatures that provide strong control of ownership. The solution was a peer-to-peer network using proof-of-work to record the public history of transactions. The system ensures security as long as the honest group controls greater CPU power than the attacker (Nakamoto, 2008).

The invented cryptocurrency is called bitcoin and uses open-source software. It means that the source code is fully disclosed and publicly available so it enables any developer to review it or make their own modifications. Satoshi's unknown identity raises many concerns, especially regarding the open source nature of the network (Bitcoin project, 2014).

Bitcoin is the name of the network and digital currency, therefore, to make a clear distinction thereinafter, the word starting with the capital letter will refer to the network and the one starting with lower case to the digital currency.

Overall, it is a decentralized network and digital currency that uses a peer-to-peer system to verify and process transactions (Nakamoto, 2008). For the first time in history, bitcoin enables making a payment over the Internet without the control of a central authority or any third party as a trusted intermediary to verify the transaction (Bitcoin project, 2014).

Bitcoin could be generated by a mining process, solving a computational problem and receiving, in exchange, newly minted coins. The coins could be converted to fiat money through dedicated exchange platforms (Adhami, Giudici & Martinazzi, 2017).

1.2.2 First bitcoin transaction

After the article being published in 2008, the first transaction made with bitcoin occurred in January 2009 between Satoshi, a developer and Hal Finney, a cryptographic activist. In October, the same year, the New Liberty Standard established the first bitcoin trading platform with the initial exchange rate of 1,309.03 BTC to $1. In other words, one bitcoin was valued around eight hundredths of cents. The rate was defined by the cost of electricity used to generate the currency (Cong, Li & Wang 2018).

In February 2010 the first real word transaction occurred. In this time the value of the transaction was negotiable within the individuals on BitcoinTalk forum. The first payment was done to buy two pizzas at the price of 10.000 BTC delivered by Papa John's (BitcoinTalk, 2010). It was not the real transaction between the restaurant and the customer, but through the forum the customer found the other person who bought pizzas in USD and for the agreed amount deliver them to the final customer in exchange for the bitcoin. Nevertheless, the transaction is remarkable for cryptocurrency history; and bitcoin for the first time acted as a medium of exchange.

1.2.3 MtGox exchange

The next remarkable point was in July 2010, when over five sequential days beginning on the12th of July the exchange value of bitcoin increased ten times. The exchange value increased from the level of $0.008 per BTC to the level of $0.08 per BTC. At the same time a programmer Jed McCab in Shibuya in Tokyo established the MtGox currency exchange. Till 2014 it was the world's leading bitcoin exchange and managed over 70% of bitcoin

transactions. Although it has suffered many attacks and government investigations, it is still an icon in the bitcoin community (Norry, 2018).

In 2010 bitcoin start gaining more and more attention with the general public. The online publishing platform World Press was the first company that started accepting bitcoin payments. Right after, Overstock.com, Zynga and TrigerDirect followed (Adhami, Giudici & Martinazzi, 2017).

In November 2011, the market cap, calculated as a multiplication of the number of bitcoins in circulation by the last trade and the price ($0.05 per BTC) in MtGox exchange, exceeded $1 million (Bittrex, 2018).

1.2.4 Ethereum Genesis Block

After bitcoin, many distributed ledger networks as a digital currency that use cryptography for security were created. In August 2013, the MasterCoin project was introduced by J.R.Sweezy (later renamed into OMNI). The project was revolutionary, because unlike earlier ones, units of MasterCoin were produced by fundraisers; investors were able to buy them at a pre-defined exchange rate with bitcoins. The project collected around $500.000 in bitcoins that were later used for further development (Benedetti & Kostovetsky, 2018).

The most remarkable is the Ethereum project, which was created in August 2014 and raised over $5 million. In 2015, the blockchain platform Ethereum streamlined the ICO process and was called the standard for implementing tokens (Bittrex, 2018). The technical standard is referred to as the Ethereum Request for Comment 20 (also known as ERC20) (Momtaz, 2018).

Ethereum simplifies the process to set up an address and when it received cryptocurrency ether automatically generates tokens and sends them directly to sender's address. The platform further enables developers to build applications on the Ethereum blockchain. Therefore it becomes a uniform protocol for majority of future ICOs (Kaal & Dell'Erba, 2017).

To visualize how crucial Ethereum creation is for ICO development, before its creation, the ICO market as we know it today was essentially nonexistent. Before, fundraisers needed to conduct an ICO that would subsequently create its own blockchain. Fundraisers were sold a simple agreement for future tokens (thereinafter SAFTs) representing a kind of promised ownership of the coins, when the blockchain will be completed. The process is technically challenging, costly and time-consuming. With the creation of the ERC20 standard the process became so widely adopted that anyone can create it within an hour and the ICO market began growing exponentially. To summarize; in 2015 there were 9 ICO projects, 74 in 2016 and more than 1.000 in 2017 (Amsden & Schweizer, 2018).

2 INITIAL COIN OFFERING

2.1 Fundraising

2.1.1 Crowdfunding

In recent years, crowdfunding has emerged as a new way for entrepreneurial ventures seeking external financing without an intermediary. It was inspired by the concepts of micro-finance and crowdsourcing, which involves using the crowd to obtain not only financial funds, but also ideas, feedback and solutions to develop corporate activities (Belleflamme, Lambert & Schweinbacher, 2013). Funding needs not be the only goal of the crowdfunding effort; it has also been used for marketing purposes and creating an overall interest in new products at an early stage of development (Mollick, 2014).

The idea of crowdfunding is seeking finance from a large group of individuals rather than professional parties, such as banks, venture capitalists or business angels. Schweinbacher and Larralde defined crowdfunding as following: ”An open call, essentially through the Internet, for the provision of financial sources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes” (Schweinbacher & Larralde, 2010, p. 25).

Lack of collateral requirements, long procedures and unsound business plans are some of the reasons that micro and small enterprises are unwilling to take loans from any other intermediaries. Funding whereby money is pooled from a large number of small individual contributions is obtainable without collateral (Mollick, 2014).

2.1.2 Crowdfunding models

In contrast to the traditional form of venture financing, crowdfunding encompasses a wide range of potential projects, funding goals and relationships between funders and founders. Based on the founders’ goals and the type of reimbursements for investors, there are four main crowdfunding models. Models often overlap as projects may allow funders to achieve different goals simultaneously (Yadav, 2017).

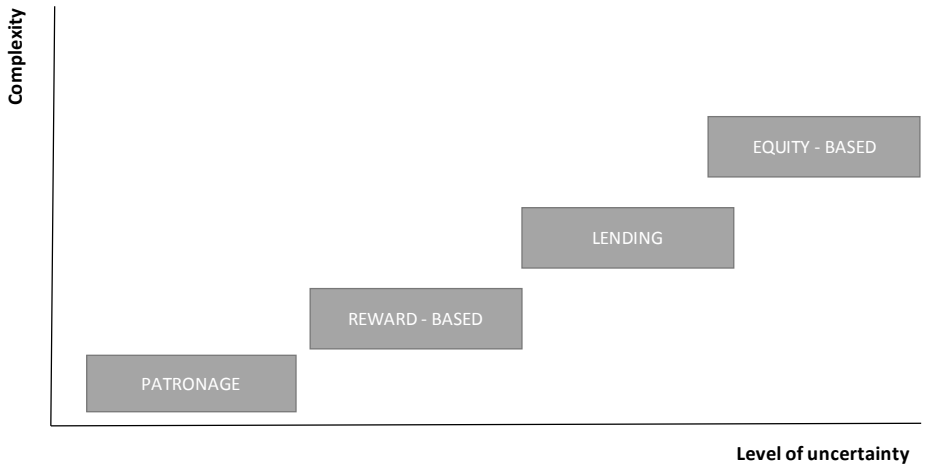
Major crowdfunding models are (Mollick, 2014):

1. **Patronage or donation based crowdfunding model** – funders act as philanthropists or sponsors and do not expect any direct return for a given donation. Individuals may be motivated to invest in order to support a cause that is found as important, to personally support the project founders, as a political statement or even as joke (example of joking effort to crowdfund the statue of Robocop in Detroit).

2. **Lending crowdfunding model** – funders offer funds as a loan where they receive fixed periodic income and exact repayment of principal. In case of microfinancing, the lender may not be interested in any return generated by the loan, but more in the social good promotion. In such cases, the lending model includes also elements of the patronage model.
3. **Reward-based crowdfunding model** – funders receive reward for financing a project in its early stage. Founders invite potential customers to pre-order the product for a promised monetary or non-monetary reward. A monetary reward is a price discrimination in relation with the regular customers and non-monetary could be access to the product at an earlier date, meeting the creators or receiving other special benefits. The reward-based model is more common for projects producing novel software, hardware or consumer products.
4. **Equity crowdfunding model** – funders are treated as investors and in exchange receive equity stakes or similar consideration in return for their funding. This model is subject to high level of regulations.

As presented in Figure 2, the degree of information asymmetry and the legal complexity significantly differ depending on the crowdfunding model. Donation based crowdfunding is the least complex from a legal point of view as well as the degree of uncertainty is less important, due to the fact that sponsors presumably already have a positive opinion of the organization. On the other hand, the equity-based model is the most complex from a legal point of view and with respect to information asymmetries. The equity based model is highly influenced by the country's legislation, because it involves sale of security (Ahlers, Cumming, Günther & Schweizer, 2015).

Figure 2: Degree of information asymmetry and legal complexity of crowdfunding models



Source: Adapted from Ahlers, Cumming, Günther & Schweizer (2015).

The funding process in most crowdfunding models and platforms is similar. It begins with a fundraiser's funding request that includes an explanation why money is needed and what, if

anything, is offered in exchange. Potential investors can evaluate the offer and if interested invest a small amount toward the target amount. The crowdfunding platform provides all the technical requirements, exchange of funds, voting rights, etc. (Ahlers, Cumming, Günther & Schweizer, 2015).

Theoretically an ICO could be structured as a perfect substitute for all other funding mechanisms. All the components and features of mentioned crowdfunding models for venture capital as well as security issuance are available (Amsden & Schweizer, 2018).

2.1.3 Signals for investing

General assumption of entrepreneurial finance literature is that individuals aim to invest in high quality ventures. When determining quality, there is an information asymmetry problem between entrepreneurs and funders. With the aim to reduce one way information asymmetry, founders should provide observable signals that help investors to perform due diligence (Mollick, 2014).

Signals given by a venture regarding different aspects of the company and the project are crucial to make prudent investment decisions. Small investors, who are often the targeted funders, are likely to lack resources and experiences of angel investors and venture capitalists. Therefore, for crowdfunding it is important to clearly signal the value of the company to small investors (Ahlers, Cumming, Günther & Schweizer, 2015).

ICOs are characterized by a particular lack of information, due to no legal disclosure requirements. Furthermore some primarily indicative signals such as venture history, biographies of founders or financial projections of ICO companies are rarely available (Fisch, 2018).

2.2 ICO process

2.2.1 Definition

An ICO is a token sale and represents a new phenomenon emerged from cryptocurrency, crowdfunding and blockchain technology. Due to the recency of the phenomenon, a generally accepted definition does not exist. Broadly explained it is a mechanism to raise external funding through emission of tokens to a crowd of investors (Momtaz, 2018). Through an ICO, usually more technologically oriented startups create and distribute decentralized platform's digital tokens in exchange for cryptocurrencies or fiat currencies with the aim to raise capital to fund their operations and product development (Li & Mann, 2018).

Cryptocurrency tokens are entries in a blockchain or digital ledger platform. The blockchain records all truncations made chronologically and publicly (Momtaz, 2018). The process of creating and distributing tokens is called the ICO process. Cryptocurrencies play an important role in the ICO process and are used as a payment for the founder's tokens. In principle, it evolves as a totally new distribution channel of assets (Sehra, Smith & Gomes, 2017).

The New York Times explained the ICO phenomenon as following: "If you're having trouble picturing it: Imagine that a friend is building a casino and asks you to invest. In exchange, you get chips that can be used at the casino's tables once it's finished. Now imagine that the value of the chips isn't fixed, and will instead fluctuate depending on the popularity of the casino, the number of other gamblers and the regulatory environment for casinos. Oh, and instead of a friend, imagine it's a stranger on the internet who might be using a fake name, who might not actually know how to build a casino, and whom you probably can't sue for fraud if he steals your money and uses it to buy a Porsche instead. That's an I.C.O." (Roose, 2017).

ICO attracts attention also because of its controversial aspect. Largely unregulated, it enables founders to raise large amounts of funding with minimum effort and costs, due to avoiding compliance and intermediaries. Due to the fact that tokens in many cases have no current counter-value and do not lead to any legal entitlement, investment risk is increased (Fisch, 2017).

ICOs are such a novelty, that in literature they are called the "wild west" of technology (Cheng, 2017), the "wild west" of investing (Binham, 2017) and even the "wild west" of capitalism (Prusak, 2017).

2.2.1.1 Smart contract concept

The introduction of Bitcoin in 2009 gave the tools and infrastructure to set up first, primitive digital tokens of value without third party intermediaries. In 2015 with the introduction of Ethereum a new concept of decentralized smart contracts was established (Sehra, Smith & Gomes, 2017).

The computer scientist Nick Szabo described a smart contract as following: "A computerized transaction protocol that executes terms of a contract. The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitrations and enforcement costs, and other transaction costs." (Szabo, 1996).

Using the smart contract concept enables creation and allocation of tokens, which could be further tradable. The ease with which tokens could be created using the smart contract concept was a main driver for the rise of ICO (Momtaz, 2018).

2.2.2 ICO investors

To understand funding through ICO, it is important to understand participating investor types. Institutional investors, such as pension funds and accredited investors dominate venture capital, while accredited investors are mostly interested in equity crowdfunding. Following the U.S Securities and Exchange Commission (thereinafter SEC) definition, accredited investors are categorized as either institutional or individuals whose net wealth exceeds $1 million and income exceeds $200.000 for each two last years (U.S Securities and Exchange Commission, 2017a). With the last changes in the Jobs Act Tittle III regulation, equity crowdfunding becomes available also to individual investors with the limitation from $2.000 to $10.000 depending on annual income and net worth (Ivanov & Knyazeva, 2017).

In contrast to traditional investing, investing in ICOs is available to institutional, accredited and individual investors. Investors are hardly regulated, due to the anonymity of the funding process. However, there are investors who are motivated to invest in ICOs exactly due to anonymity (Amsden & Schweizer, 2018).

General short term goal of all token investors is that tokens become tradable and liquid. Although the investor base is heterogeneous, they follow similar decision criteria to maximize risk-to-reward ratio (Amsden & Schweizer, 2018).

The ICO market is not transparent, because of the absence of regulation, misrepresentation, a lack of technological knowledge and even proven fraud (ICO scams). Misrepresentation is usually through social media and it increases information asymmetry (Ahlers, Cumming, Günther & Schweizer, 2015).

2.2.3 Investment process

ICO investors need to go through three steps to make an ICO investment. First an investor has to register at a secure exchange, which is connected to an established banking system and enables transfer of fiat currencies to cryptocurrencies. These exchanges have a higher level of security and minimal crypto options. Each exchange holds all funds of the investor in the same wallet (Amsden & Schweizer, 2018).

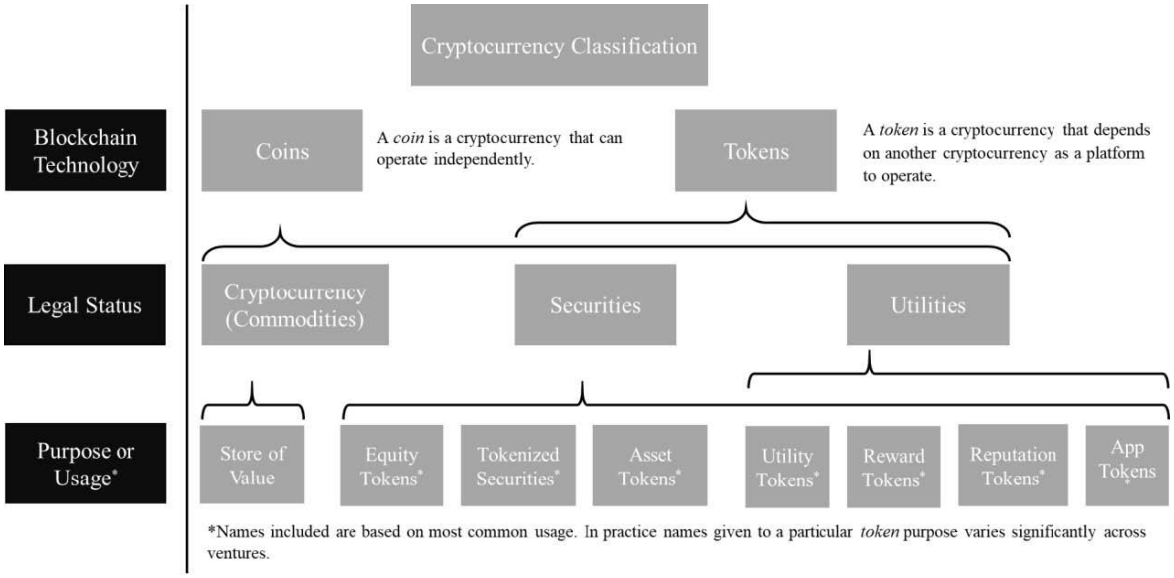
Second, the investor creates a separate wallet with the aim to send funds from an account on the secure exchange to a private wallet. Finally, the investor transfers primary cryptocurrency token funds from the private wallet to the token offering address (Amsden & Schweizer, 2018).

An investor who wants to exit the process after receiving tokens from an ICO event requires additional steps. Due to the fact that in most cases secure exchanges do not accept newly created tokens, an ICO token holder needs to transfer new tokens from a private wallet to a separate or intermediary exchange. In this exchange tokens are converted to primary cryptocurrency tokens that are subsequently sent back to the secure exchange. In the final step primary cryptocurrency tokens are traded back into fiat currency. The final step includes the transaction costs of converting (Amsden & Schweizer, 2018). Converting costs differ between exchanges; especially costly is exiting back to a fiat currency. Therefore there is a tendency to keep funds in the crypto ecosystem (Momtaz, 2018).

2.2.4 ICO issued token classification

Crypto economy and technology behind ICO is rapidly evolving and still developing, therefore there is no straightforward definition and classification of issued tokens. In the context of this master's thesis a tiered framework classification based on SEC ruling presented in Figure 3 will be used.

Figure 3: Cryptocurrency Classification



Source: Amsden & Schweizer (2018).

At the highest pyramid level are cryptocurrencies divided by whether they are based on their own blockchain platform (coins) or operate on top of an existing blockchain (tokens) (Amsden & Schweizer, 2018). To make a clear distinction, the purpose of coins is to meet the function of money: be a unit of accounting, storage of value and a medium of value transfer. On the other hand, tokens derive value from their utility in the network (Pietrewicz, 2017).

The second level implies distribution based on legal status that is extremely important, due to special regulations applied to coins and tokens. Based on this ruling, tokens cannot have legal status of commodity, however both tokens and coins can be used for either security or utility (Amsden & Schweizer, 2018).

2.2.4.1 Utility tokens

Utility tokens represent access to a product or service that already exists or one that will be established. Utility tokens are designed as a donation and reward based crowdfunding model. Buying utility tokens is comparable with purchasing a software license that gives you the right to access the product or service. Moreover, issued tokens are also transferable either between users or tradeable on cryptocurrency exchanges (Sehra, Smith & Gomes, 2017).

The transferring and trading properties of tokens assure liquidity and drive price volatility that is based on the market's perception of the project. Following the theory, utility tokens which provide access to a future product or service will be higher valued, when the product will be launched and usage starts. In such cases investors benefit through capital gains (Sehra, Smith & Gomes, 2017).

In literary appcoins, service tokens, secondary tokens and user tokens are used as synonyms. Investors in utility tokens lack voting rights and hence control. Regulatory oversight is minimal and investors do not need to fill any regulatory documents. Utility tokens present the significant price of ICO and are the general focus of this master’s thesis.

2.2.4.2 Security tokens

Security tokens derive their value from the company’s future cash flow and represent a share in equity, debt or participation in profit sharing. Typically funders with security tokens do not obtain voting rights or are limited (U.S Securities and Exchange Commission, 2017a). Furthermore, it gives founders access to additional capital by offering unsold tokens later in the future (Amsden & Schweizer, 2018).

Security tokens have a similar funding design as equity crowdfunding, lending crowdfunding and venture capital funding. The Howey test is the distinction whether the token falls under the legal definition of security and becomes a subject to securities regulation (Amsden & Schweizer, 2018).

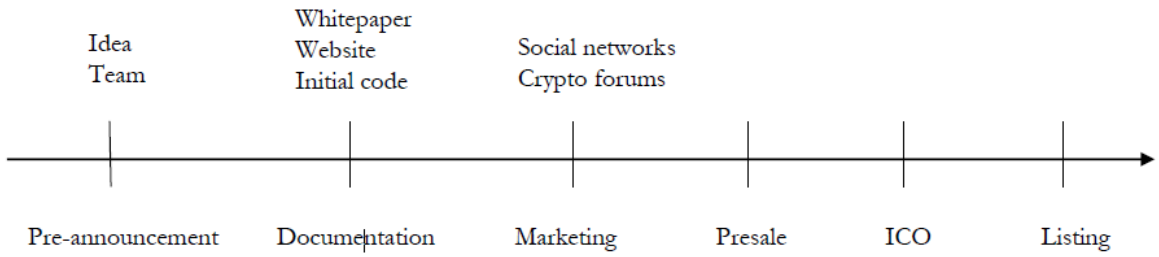
2.2.5 Steps to launch an ICO

2.2.5.1 Token feature

The ICO process is conducted through several stages that differ among ICO events. The whole process could last for months whereas some stages could be restricted to preferred users, angel investors, venture capitalists or accredited investors (Benedetti & Kostovetsky, 2018).

In general ICO follows the timeline presented in Figure 4.

Figure 4: ICO timeline



Source: Li & Mann (2018).

On the first step, the startup or already established company needs to make sure that the project is eligible for the crypto economy and ICO. The project needs to provide additional value to users, be authentic, provide transparency and be able to integrate with cryptocurrency. The project concept should be unique and in-demand (Sagipl, 2018).

An important step is defining the core team that will be working on the project. The team is the face of the project, therefore it should be skilled in their respective fields and appropriately qualified. Well known team members and advisors as well as transparent information about their past achievements build trust in investors (Sagipl, 2018).

Once the core team has defined the vision of the project, early marketing activity starts with pre-announcement. Usually it is a summary featuring the idea and the team to the cryptocurrency community with the aim to gather interest and obtain feedback. The token sale is usually announced on the BitcoinTalk.org forum. It is one of the favorite social websites for cryptocurrency enthusiasts that provide some constructive comments about the project and the idea (Li & Mann, 2018). Further marketing campaign includes building a professional website and a heavy use of social media and special platforms for presenting the ICO (such as Slack, Telegram, Medium, Steemit, Twitter etc) (Momtaz, 2018).

When founders start building the project, the concept needs to define fundraising conditions and how the funds will be used. With the aim to limit investor's risk, funders could define the minimum threshold amount of funds received that the project will need to start

operations. It is called a soft cap mechanism (also known as soft cap), where all funds are returned to investors, in case the sufficient level of funds is not raised (Amsden & Schweizer, 2018). On the other hand, there is also an upward limitation called "hard cap" that presents the maximum fundraising goal (Li & Mann, 2018).

Before the sale, an ICO defines the number of tokens available for public sale and the amount that remains inside (Leland and Pyle, 1977). Some projects also specify how many tokens are available for the bounty program. During the bounty program, the company offers compensation in the form of tokens for services provided by individuals out of the company such as marketing on social media, bug reporting, improving aspects of cryptocurrency framework or translating the promotional materials and whitepaper in different languages. Usually there is a small percentage of tokens intended for the bounty program (Li & Mann, 2018).

Important information for future investors is escrow. It is a system that provides an intermediary service of transaction between two individuals or groups. These intermediaries are usually respected individuals, institutions from the cryptocurrency or project support community. In the case of smart contracts they are formed as scripts. In the ICO event escrow holds predefined amount of the user's funds for their customers until a certain deal is completed. The role is to ensure that the project proceeds as promised; otherwise funds are not released to the team (Tokenguru, 2018).

Quality projects will likely have a strict policy defining that tokens held will not be sold in one go or will be locked for a fixed period to ensure the controlled sale over the defined period of time. It prevents dumping token prices with sales in one go (McCann, 2017).

2.2.5.2 Documentation

Every company could decide for its own way of information disclosure. The publication of and preparing any ICO documentation is voluntary.

The white paper is comparable to a prospectus in traditional IPO or business plan and offering documentation in equity crowdfunding campaign. In equity crowdfunding, platform providers require the documents that follow a certain template and advisors, which ensure that standards are met. Unlike traditional funding models, in ICO markets no "platform provider" exists that will ensure venture quality. Therefore it is more complex to efficiently evaluate the quality of a whitepaper and the level of preparedness (Amsden & Schweizer, 2018).

The white paper is a document in which founders provide information for investors. In the white paper the project, network and its use cases are defined. It is crucial for potential investors that they understand the characteristics and functionality of the token, potential risks of development and the benefit of using the blockchain network by reading the white

paper. Therefore a quality document includes the description of the protocol used and the network, identification of a compelling reason for token existence, a detailed technical description of the project and clear expectations for total token supply and the distribution plan. Furthermore an independent expert review gives additional value to the white paper and the whole project as well (Bramanathan, 2016). In the white paper founders present the core team and its advisors. The founders lay out a timeline for project development and present the use of funds raised. (Li & Mann, 2018). The document does not follow any prescribed guidelines and is published voluntarily (Fisch, 2018).

The open-source nature of the blockchain project enables the company to publish a part of or the whole initial code that utilizes smart contracts (Li & Mann, 2018). In case of the ICO process using the smart contract concept, terms and functionality of a token are defined in the smart contract with program code (EY, 2018).

GitHub is one of the most common cryptocurrency platforms where founders could upload their code with the aim to enable potential investors with progressive technical knowledge to understand the project. The smart contract code contains also terms that are not explicitly disclosed to investors (EY, 2018).

2.2.5.3 Token creation

The project could use either an existing or custom new blockchain platform for token creation. In the case of creating a new blockchain platform, they need to create a network, attract miners and pay for transaction confirmation. Based on research done by EY in 2018, more than 80% of all ICO projects custom an existing platform, either Ethereum or Waves (EY, 2018)

For tokens built on the Ethereum blockchain platform ERC20 the process is very straightforward. On the first step the code needs to be obtained on the Ethereum website and on the next step adjusted along the dimension of parameters. At this step founders need to define the total amount of tokens, how fast one block gets mined and whether to impose the possibility to freeze contracts in case of an emergency (Momtaz, 2018).

Finally, the project creates an address to which the collected funds will be sent and define accepted currencies with which the token could be paired. Investors send funds to the defined address in primary cryptocurrency or fiat currency and receive an equivalent amount of tokens (Momtaz, 2018).

2.2.5.4 Pre-ICO

The pre-ICO event is a token sale event that founders run before an official crowdsale campaign and enables founders to collect different information from and about potential investors (Li & Mann, 2018). The focus of the campaign is to set a fair token price and total

funding amount that is possible to obtain. Founder benefits from a pre-ICO event through observing potential investors and their perception of the product. Different information can be used with the aim to increase effectiveness of the actual sales event (Momtaz, 2018).

However, the main motivation for the founders is to cover marketing expenses and ICO set up costs such as promotional ads cost, strategic hires and roadshow. Usually a pre-ICO has a lower desired fundraising goal and provides special initiatives for early adopters (Momtaz, 2018).

Usually, in pre-ICO events founders use a price differentiation initiative. Investors who purchase tokens in presale are motivated with preferential terms, in form of an "early birds" bonus or discount. With the bonus scheme founders compensate the higher risk that the early buyers bear (Li & Mann, 2018).

2.2.5.5 Listing

The crucial point after every successfully completed ICO is listing the token on a token exchange that enables trading. With trading the token becomes liquid. Every crypto trading platform introduced its own requirements for a project to get listed (Momtaz, 2018).

Most exchanges require an application and a listing fee; depending on each specific case, a listing can take from several days to several months. After the listing, secondary market trading starts (Li & Mann, 2018).

One of the prominent exchange platforms, Poloniex, states: "We don't have a definitive set of criteria as each project is unique. We listen to the community and select projects that we believe are unique, innovative, and that our users will be interested in trading. We also look for products that have strong (organic) market demand". Furthermore, they explicitly caution that security tokens could not be listed and the prior Howey Test needs to be done. Listing on Poloniex is free of charge (Poloniex, 2018).

On the other hand one of the biggest exchange platforms Bittrex introduced more stringent requirements. Before a token can be listed there are two main reviews done by Bittrex employees. Firstly there is an initial review of the project called the Preliminary Review and then follows the more in-depth review of the token called the Full Listing Review. As part of the reviews, a company should provide a legal memorandum or opinion from its U.S.-qualified outside counsel that the token is not a security and could not be subject to regulation under any law applicable to trading of commodities. In addition, they require a self-explanatory token name, a description of the project, trading symbol, logo, launch date, at least one team member's or shareholder's with more than 10% ownership identity verification, a GitHub link to the source code and some additional questions are required (maximum money supply, other exchanges you are listed on, official blockchain explorer,

results of the pre-mine, how money was raised and links to the company's social media) (Bittrex, 2018).

Beside the two most prominent exchanges, there are a growing number of small exchange platforms or in some cases already the coin itself is the exchange (for example coin Bancor). The process of listing and requirements vary significantly by exchange platforms (Coinist, 2018a).

In the case that the project is implemented successfully and there is a need for additional capital, the company may return to the ICO market for a seasoned offering (Li & Mann, 2018).

2.2.6 Token economics

2.2.6.1 Monetary policy

While there is no uniform nomenclature within the crypto ecosystem, there is a wide use of the term "monetary policy" for any type of coded software that limits the future supply of tokens (Casey, Crane, Gensler, Johnson & Narula, 2018). With monetary policy ICO founders directly manage the number of tokens in circulation. It is a model for supply release (how many tokens are issued and how often) and a limitation on the total token supply (what is the total number of issued tokens). The limited and controlled supply of tokens is an important factor impacting demand driven increase of token prices (Sehra, Smith & Gomes, 2017).

In principle, monetary policy should be predefined as part of the issuance strategy. The project founder is eligible to distribute only a certain fraction of available tokens to raise funds to execute the business plan. The non-distributed tokens are held in an "escrow" or treasury to finance different operational costs, for the team or different reserves (Sehra, Smith & Gomes, 2017).

2.2.6.2 Fiscal policy

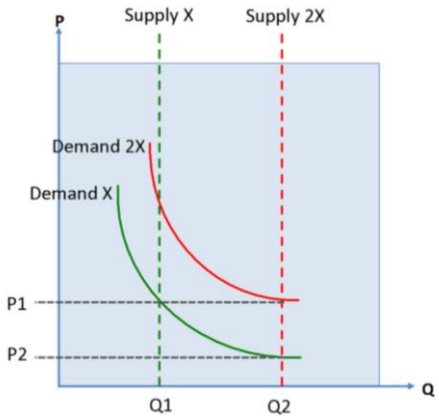
Fiscal policy defines commercial benefits for the funders beside the possible short term capital gains with trading. This is the way how founders could manage flow of issued tokens without interference in monetary policy, but through indirect economic incentives. An example of benefit from the fiscal policy mechanism is the ability of founders to increase commercial benefit (for example offering a discount for platform users) and consequently increase the token aggregate demand. Unpredictable flow management strategies could lead to market abuse (Sehra, Smith & Gomes, 2017).

Founders manage fiscal policy through spending, buying, freezing, discounting and burning utility tokens. In addition, it could be also regulated through payment to the team members. There are different options; the team could be paid in tokens with no vesting and risk the dump or in locked-up tokens, which in any case needs to be supplemented with some cash. To maintain a stable token pricing clear signals and communication with investors are required (McCann, 2017).

2.2.6.3 Supply and demand

To maintain long term token stability the balance of commercial benefit and supply scarcity factors is crucial. Economic analysis of the balance could be modeled using a macroeconomic aggregate supply and demand curves as presented in Figure 5 (Sehra, Smith & Gomes, 2017).

Figure 5: Aggregate supply and demand curves



Source: Sehra, Smith & Gomes (2017).

Through fiscal policy founders impact the token price and increase aggregate demand (in Figure 5 the curve Demand X moves to Demand 2X). In the case that such action is combined with increasing supply through monetary policy (in Figure 5 the curve Supply X moves to Supply 2X), in an equilibrium the market price will increase from P2 to P1 (Sehra, Smith & Gomes, 2017).

The token supply could be regulated in following ways (Howtotoken, 2018):

1. Token cap – the most straightforward way is to define the limit or a cap on the amount of available tokens and fix the supply.
2. Token buy back – founders could buy up tokens that are in circulation and destroy them with a smart contract. With this action, token supply will decrease, either in one shot or continuously over time to correct the value.
3. Token creation by a third party – founders could allow tokens to be mined or gained in other ways besides buying.

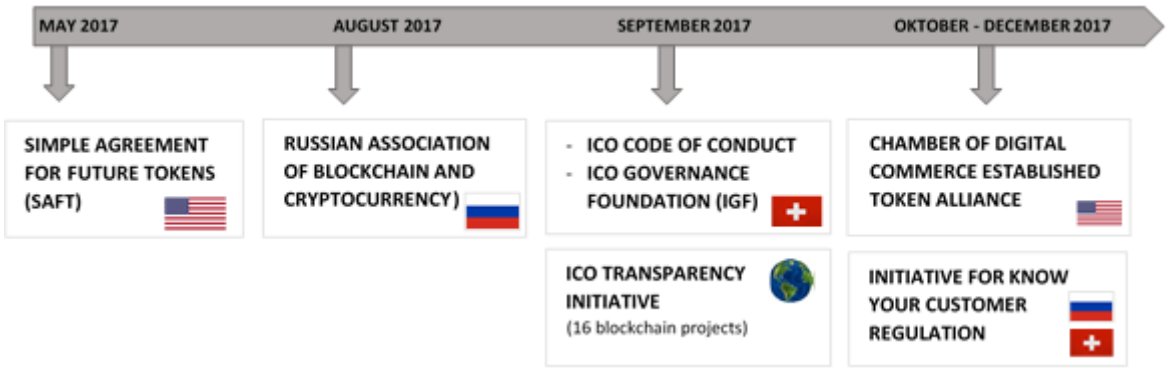
4. Token creation by the project – founders could choose to create more tokens.

On the other hand, token demand is based on token utility and depends on the project's business model. More users attracted by the offered service and paying with tokens will increase demand and consequently the token's value. Projects that cater to the crypto network or depend on demand of other crypto ecosystems generate more value. Furthermore, a crucial factor to ensure sufficient demand is market size. The main challenge is that currently there is no mass market adopted for cryptocurrency (Howtotoken, 2018).

2.2.7 Worldwide regulations

The relationship between ICO activity and regulations is a pressing issue worldwide. The Financial Stability Board (thereinafter FSB) in its open letter to G20 Finance Ministries and Central Bank Governors stated: "Given the global nature of these markets, further international coordination is warranted" (Financial Stability Board, 2018). Normally companies as well as entrepreneurs must issue a public prospectus that needs to be approved by market authorities before they want to tap into public retail investor's funds. The key doubtfulness is whether ICO pledgers subscribe to investment or not (Amsden & Schweizer, 2018).

Figure 6: Timeline review of ICO regulations



Source: Adapted from EY (2018).

Most regulators move from ignoring ICOs to regulating them in accordance with token classification types. Nevertheless, token classification interpretation which varies between countries is crucial (EY, 2018). Figure 6 presents a worldwide timeline review of ICO regulations.

The International Organization of Securities Commissions (thereinafter IOSCO) expressed its concern regarding ICOs stating: "ICOs are highly speculative investments in which investors are putting their entire invested capital at risk". IOSCO takes into account individual countries' regulation and release statements regarding ICOs, cryptocurrencies and

exchanges. On their website statements about ICOs from 40 countries are listed (European Security and Markets Authority, 2017).

2.2.7.1 United States

In the United States (U.S. hereafter) the Howey test is the dividing factor to assess, if an arrangement is a security. Under the Securities Act of 1933 Section 2 (a) (1) term security is defined as: "Any note, stock, treasury stock, security future, security-based swap, etc. or in general, any interest or instrument commonly known as a "security", or any certificate of interest or participation in, etc." (Stat. 74, Sec. 2, title I, Ch. 38). To summarize as the U.S. Supreme Court, Marine Bank v. Weaver, 455 U.S. 551 (1982) clarifies, the definition of security set by SEC is "quite broad" and means that not every contract involving an investment contract is a type of security (U.S. Supreme Court. Marine Bank v. Weaver. 455 U.S. 551, 1982).

By definition, an investment contract is an investment of money in a common enterprise with a reasonable expectation of profits to be derived from the entrepreneurial or managerial efforts of others (United States Securities and Exchange Commission, 2017a). In accordance with the U.S. federal securities law, every offer and sale of a security in the U.S. is obliged to be registered with the SEC or be qualified as a subject to an exemption from registration under the Securities Act of 1933. In addition, any entity or person engaged in the activities of an exchange must be registered as a national securities exchange or operate in accordance with the exemption from such registration (Stat. 74, Sec. 2, title I, Ch. 38).

The Howey test was established by the U.S. Supreme Court by SEC v. W. J. Howey. In the context of tokens based on blockchain technology, the test content is divided into three requirements that need to be met in order to clarify a token as a security (Bramanathan, 2017):

1. Investment of money,
2. Investment in common enterprise,
3. With an expectation of profits predominantly from the efforts of others.

As a response to different interpretation of the Security Act and appearance of new virtual capital raising entities that use distributed ledger or blockchain technology for capital raising, SEC in December 2017 released an investigative report cautioning that security tokens might be subject to registration. The SEC's Division of Enforcement has investigated whether The DAO project, as one example of a Decentralized Autonomous Organization violated the federal securities law. Following the report, DAO tokens were recognized as security tokens, due to the fact that investors invested money with a reasonable expectation of profit derived from managerial efforts (United States Securities and Exchange Commission, 2017b). Therefore the issuer had to register the offer with SEC. The sale of tokens that meet the

definition of security and a system that meets the definition of an Exchange had to register as a National Securities Exchange (Stat. 74, Sec. 2, title I, Ch. 38).

2.2.7.2 Europe

On the other hand, in the European Union, it is not as clear whether ICO-issued tokens fall within existing securities law definition. It is possible that ICO related tokens, which are tradeable on crypto exchanges fall under the definition of "transferable securities" by the European's Markets Financial Instruments Directive II (thereinafter MiFID II). The Directives 2014/65/EU, 2011/61/EUR and the amending Directive 2002/92/EC of the European Parliament and of the Council on financial markets held on 17th May 2014 stated: "transferable securities are those classes of securities, which are negotiable on capital markets with the exception of instruments of payment, such as…" (The European Parliament and the Council of the European Union, 2014).

The European Securities and Market Authority (thereinafter ESMA) released consolation seeking feedback on possible regulatory changes of cryptocurrency derivative contracts. This initiative may affect regulatory policy for cryptocurrency derivatives trading in Europe (De, 2018).

In Switzerland, the Swiss Financial Market Supervisory Authority (thereinafter FINMA) published guidelines on how to apply financial market legislation as an ICO organizer. It stated that each application would be treated on its own merit and focus on the economic function, purpose of the token and transferability. FINMA categorizes issued tokens into the following three categories and related legislation, where also hybrid forms are possible (Swiss Financial Market Supervisory Authority FINMA, 2018):

1. Payment tokens – synonymous with cryptocurrencies, with no further functions or links to other projects.
2. Utility tokens – intended to provide digital access to an application or service.
3. Asset ICOs – function as equities, bonds or derivatives and are assets in case of participations in real physical underlying, companies or earnings streams or an entitlement to dividends or interest payments.

The following requirements are defined for each category (Swiss Financial Market Supervisory Authority FINMA, 2018):

1. Payment tokens – tokens are not treated as securities, but require compliance with anti-money-laundering regulation.
2. Utility tokens – tokens are not treated as securities unless a utility token functions solely or partially as an investment in economic terms.
3. Asset ICOs – tokens are treated as securities and needs to be in line with securities law requirements for trading and civil law requirements under Swiss Code of Obligations.

2.3 Comparison with initial public offering

2.3.1 Institutional background

In 2017, the volume of funds raised in ICOs presented almost 18% of total finance raised in U.S. The U.S. IPO volume in 2017 was $33.5 billion taking into account companies with market capitalization more than $50 million and the estimated funds raised by ICOs in amount of $6 billion (Momtaz, 2018).

In an IPO, investors exchange money for equity shares and voting rights in an established company. The process is underwritten by investment banks and regulated by security regulations. A company starting an IPO is required to fulfill a registration statement that consists of different documents including a prospectus. Together, the underwriter and the company's management prepare a special event called a roadshow to meet potential investors, analysts and fund managers and present the program. Then, the underwriter with a book building process tries to determine the price at which to place an IPO. It accepts orders from institutional investors that indicate the number of shares they desire and what price are they willing to pay for them. When the price of the offer is determined, management conducts a final prospectus with the regulatory authority and shares are allocated to investors. The underwriter commits to making a liquid secondary market and offers support (Li & Mann, 2018).

Unlike the IPO, in an ICO process an investment bank institution does not exist to underwrite the token, conduct a book building and in any aspect support the secondary market trading. Furthermore, using the internet as a medium, tokens are available to investors around the world, regardless of where the company's headquarters are situated (Li & Mann, 2018).

Subrahmanyam and Sheridan in their paper argue that one of the motivations for a company to go public in an IPO is to learn the company's market value (Subrahmanyam & Sheridan, 1999). Comparably, an ICO could help founders create brand hype among consumers (Demers & Lewellen, 2003).

Furthermore, similarities are also recognized regarding the liquidity feature. Zingales proves that unlike venture capital, liquidity is also a reason why companies decide for an IPO (Zingales, 1995). However, within the ICO context there are two possible obstacles for investors; firstl,y some ICOs confine selling tokens with lock-up periods and secondly, liquidity is not always guaranteed. On the other hand, ICO investors could gain advantage from the temporary overvaluation that also exists in IPO markets (Pagano, Panetta & Zingales, 1998).

General differences between the ICO and IPO process at each stage of the fundraising process are presented in Table 1.

Table 1: Differences between the ICO and IPO process

	ICO	IPO
PRE-ANNOUNCEMENT	Announce a summary featuring the idea and team to the cryptocurrency community to gather interest and feedback	Hire an investment bank to underwrite the IPO
DOCUMENTATION	– Whitepaper – Website – Initial code	– Conduct security regulator – Registration statement – Prospectus
MARKETING	– Public relations campaign – Crypto forums – Social media network sites (Medium, Steemit, Reddit, Twitter)	– Road show – Meeting with potential investors – Book building by underwriter – Offer price set
SALE	Funders send cryptocurrencies and/or fiat currencies to founder's digital address	Shares are allocated to investors
LISTING	Tokens are listed on cryptocurrency exchange	Shares are listed on stock exchange

Source: Adapted from Li & Mann (2018).

Furthermore, difference between ICO and IPO is that ICO investment is more liquid. In case of equity crowdfunding when with IPO investor obtain a financial stake in company it supports, it is difficult to later resells it due to lack of liquidity (Li & Mann, 2018).

2.3.2 Security tokens

An ICO issuing security tokens could be considered an IPO transferred to the cryptocurrency economy. While an IPO event in traditional economy is known as the first offering of shares or equities on a stock exchange, an ICO is a process of releasing a company's own tokens to the general public and becoming listed on a cryptocurrency exchange (Aitken, 2017).

The end result of an ICO is comparable to the end result of an IPO. In the case of an IPO, a company received capital that can be used to continue growing its technology, while the public gets access to shares of the company (BitcoinExchangeGuide, 2018).

Following regulation restrictions, currently there is no crypto exchange that can list security tokens. Furthermore, there is no clear visibility when or where the security tokens would be listed, which imposes security tokens as very illiquid investments. Due to the recency and negligible share of security tokens, this master's thesis focuses on utility tokens.

2.4 ICO market

2.4.1 Evolution

ICO as a crowdfunding method for blockchain related ventures is a recent phenomenon dating to year 2013 and gaining popularity in 2017 (Amsden & Schweizer, 2018).

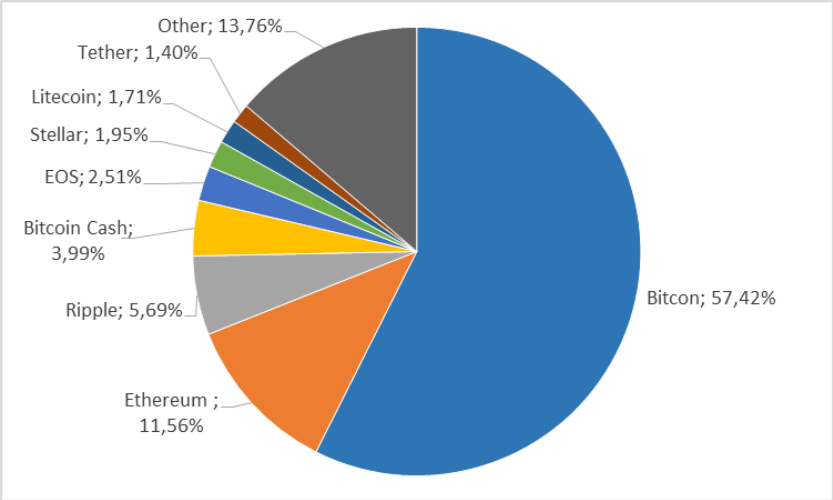
The first ICO was the Mastercoin project (now Omni) that appeared in 2013 and raised over $5 million in bitcoin with sales of its own Mastercoin tokens. Following the successful Mastercoin story, Ethereum was one of the biggest altcoins created through and ICO event in 2014 that raised $18 million. In 2016 the Wave project managed to raise $16 million (BitcoinExchangeGuide, 2018).

The largest ICO event in terms of amount raised was between November and December 2017; a Hyundai-backed payment platform that raised $258 million (Icodata, 2018). Another ICO event with an outstanding amount raised was Filecoin, a decentralized data storage solution project that raised $257 million. Filecoin raised more than $200 million only within the first hour of starting its ICO event. The next extreme case was a web browser ICO project Brave that raised about $35 million in the first 30 seconds (Coinist, 2018b).

As of the time of writing this master's thesis, the implied market capitalization of blockchain based tokens and coins is around $373 billion (CoinMarketCap, 2018). To picture the value in the space of one year: it would rank thirty-second as a country measured in GDP; on the other hand, it would be considered as the tenth most valuable corporation in the world (Amsden & Schweizer, 2018).

Figure 7 presents the market capitalization of blockchain based tokens. Based on the CoinDance statistics Bitcoin presents 57% of the cryptocurrencies market capitalization (CoinDance, 2018).

Figure 7: Market capitalization of blockchain based tokens as of 15th of Sept. 2018



Source: Adapted from CoinDance (2018).

Venture capitalists see ICO as a new and potentially more attractive way of financing start-ups. Four main reasons are recognized for the attractiveness and success of ICO projects (Amsden & Schweizer, 2018):

1. Little to no regulations,
2. Greater cost efficiency, because of the elimination of most of intermediary costs,
3. Large pools of investors (no restrictions on investment or marketing),
4. Rapid liquidity of investments upon successful listing.

The government of Venezuela became the first federal government that issued cryptocurrency oil-backed token as a payment mechanism for taxes, fees and other public needs (Cong, Li & Wang, 2018).

2.4.2 Crypto exchanges

To date, there have been over 3.000 crypto tokens issued (ICObench, 2018) and there are 200 crypto-exchanges operating that reported trading volume in the previous 24 hours. Two of them had daily volumes of more than $1 billion and 14 of them had daily volumes of more than $100 million. Four major exchanges based on trading volume are: Okex, Kraken, Bitfinex and GDAX. Despite crypto exchanges being located and operating worldwide, many of the largest by volume are originally from Asia (CoinMarketCap, 2018). Besides providing trading, crypto-exchanges also provide a wide range of marketing and advisory services.

However when reviewing exchange volumes figures caution is needed, due to the fact that data provided by crypto-exchanges is generally not audited or regulated. Based on a recent

study done by Sylvain Ribes, data suggests that OKex may be overstating the trading volume by up to 95% (Ribes, 2018).

Besides crypto exchanges, traditional exchanges also started looking at blockchain and crypto economy principles. Starting in 2015, Intercontinental Exchange (thereinafter ICE), the owner of the New York Stock Exchange, bought a stake in the company Coinbase. In December 2017, CME Group and CBOE Global Markets started trading Bitcoin futures. In January 2018, ICE announced starting with a cryptocurrency data service (Casey, Crane, Gensler, Johnson & Narula, 2018).

Furthermore, European exchanges also started to show an interest in cryptocurrencies. Deutche Börse, the largest exchange in Germany, committed to offering bitcoin futures on its Eurex derivatives Exchange (Kröner & Wallace, 2017). Moreover, the second largest German stock exchange, Börse Stuttgart, in April 2018 announced a cryptocurrency trading app called Bison (Haig, 2018).

2.4.3 Security and main attacks

2.4.3.1 Security

The speed of evolving and the size of the ICO market encourage hackers' attention. Furthermore, investors usually focus on attracting new investors and security is not prioritized. Based on the research made by EY in 2018 including 372 ICO projects, 10% of ICO projects' funds raised were lost as a result of attacks. Additional ease of hacker attacks is given by the rush, the absence of central authority, blockchain transaction irreversibility and informational chaos. The more hyped and large-scale an ICO is, the more attractive it is for attacks (EY, 2018).

Hackers are interested both in attacks on projects and investors. Beside direct financial loss, hacking also generates loss of reputation or sensitive data. The most common types of attacks are (EY, 2018):

1. Phishing — attackers pose as a reputable person or entity in emails or another communication channel.
2. Distributed denial service (DDoS) attack — hackers disable the original site and publish a phishing site address on web forums and social media platforms. Investors then send the funds to the incorrect address. The likelihood of a refund is close to zero.
3. Cyber-attacks through company employees — tricking employees into unknowingly revealing critical information or figuring out how to imitate actual staff.
4. Hacking exchanges and wallets.
5. Hacking of a website/web application.
6. Cyber-attacks on the IT infrastructure.

7. Cyber-attacks on investors.

The most widely used hacking tool for stealing funds is phishing, due to its simplicity and effectiveness. Hackers apply a scammer that either requests a fund transfer to their wallet or swindle private keys to investors' wallets (EY, 2018). Founders could easily avoid phishing with clearly communicating only one communication channel where the sale news will be posted. This is a beneficial approach, because crucial information are so broadcasted via one channel; it is more complicated for potential hackers to change, for example, a whole website than just send a convincing email announcement (Dale, 2018).

Hacking exchanges, beside the financial loss, also implies potential loss of sensitive traders' data. For token trading, most exchanges require a full ID verification, including ID and credit card photocopies, phone number and bank account details (Bittrex Support, 2018). Furthermore, most exchanges, especially smaller ones, do not disclose policies and controls over personal data storage and use (EY, 2018). Usually, the loss of personal data, which represents a great value on the black market, and chances of its misuse, presents an even bigger problem than only financial loss.

2.4.3.2 ICO fraud examples and consequences

Unlike traditional investing and stock offerings, which are carefully supervised and regulated, the ICO market is easily accessible for fraudsters and can attract criminals due to its upregulation. In 2017 SEC published the Investor Alert: Public companies making ICO-related claims and warning potential investors about the growing number of ICOs saying: "Fraudsters often try to use the lure of new and emerging technologies to convince potential victims to invest their money in scams" (United States Securities and Exchange Commission, 2017c).

In the Investor alert SEC points out fraudulent models such as "pump-and-dump" and market manipulation schemes involving publicly traded companies. "Pump-and-dump" schemes involve manipulating the stock's share price or trading volume by posting misleading statements, usually through the Internet. On the other hand, market manipulation includes spreading false and misleading information (United States Securities and Exchange Commission, 2017c).

In the case of companies publicly announcing an ICO or related events to affect the price of their common stock, the SEC is responsible to suspend trading of the particular stock, when they realize that intervention is needed to protect public interest. Recently, the following companies were suspended by SEC due to making claims regarding their investments in ICO or token/coin related news: First Bitcoin Capital Corp., CIAO Group, Strategic Global and Sunshine Capital (United States Securities and Exchange Commission, 2017b).

Dogecoin was one of the first and absurd ICO frauds. Mr Jackson Palmer was an early cryptocurrency fan and in 2013 created Dogecoin, a satirical mash-up combining Bitcoin with the Doge meme. He was following the investors' hype around Bitcoin and wanted to show the absurdity of wagering significant amounts of money on unstable ventures in a funny way. Investors did not get the message, bought Dogecoin and brought its market value up to $400 million (Roose, 2017). However, Dogecoin quickly became backed by a passionate community and in 2014 became known for using the coin in charitable acts. The most notable move was getting the Jamaica bobsled team to the Winter Olympic Games in 2014. The good story concluded when the Dogecoin exchange Moolah went down with the founder, Alex Green, running off with all the money (Faggart, 2016).

The most remarkable failure was an attack on Ethereum's DAO, the largest crowdfund with over $ 168 million. The DAO coin was announced in April 2016 and soon after a successful crowdfunding event, an attack happened on 18th of June 2016 and a vulnerability in the DAO smart token was exploited. The attackers used a flaw in DAO's code to steal approximately one-third of its assets and caused a loss exceeding $50 million. When news about the attack circulated traders dumped the token price (Faggart, 2016).

DAO as a "virtual" organization embodied in computer code and executed on a distributed ledger or blockchain was recognized by SEC in its Report of Investigation Pursuant to Section 21 (a) of the Securities Exchange Act of 1934: The DAO as an investment company. It is an important turning point, because it legally prescribes that those who would use virtual organizations for business operations funding projects such as DAO should consider their obligations under the Investment Company Act (United States Securities and Exchange Commission, 2017b).

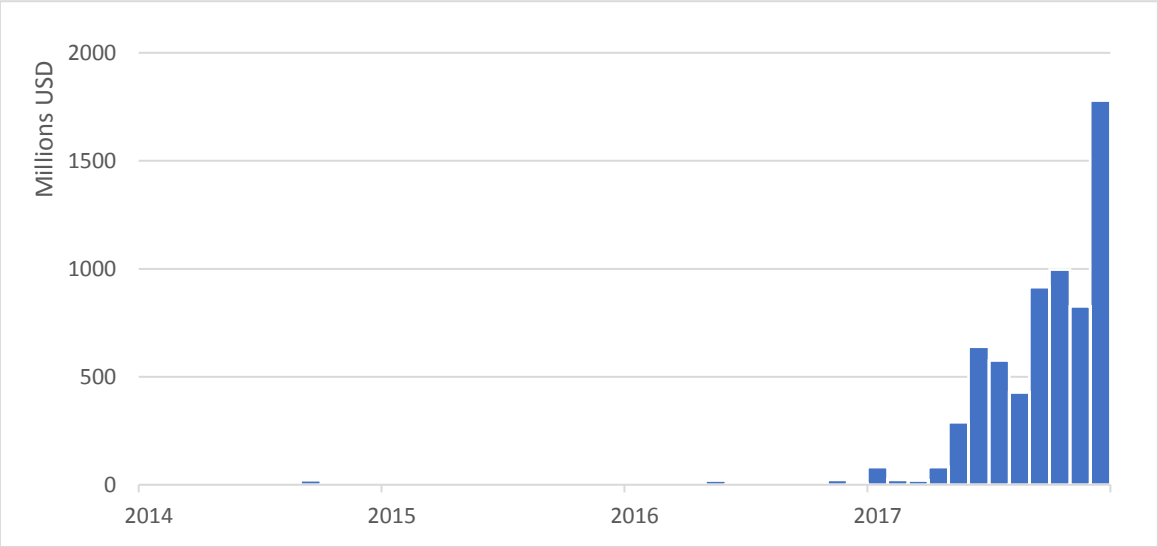
Beside the attacks on already listed ICO tokens, there were also examples where hackers altered the ICO website or other media and entered a false wallet address to which users sent the money to purchase tokens (example Enigma in July 2017, Bancor in June 2017, etc.) (Hays, Stoeferle & Valek, 2017). In this case, in the Investor bulletin: Initial coin offering, SEC argues: "Investing in an ICO may limit your recovery in the event of fraud or theft. While you may have rights under the federal securities laws, your ability to recover may be significantly limited" (United States Securities and Exchange Commission, 2017d).

2.4.4 Year 2017 review

In many ways, the year 2017 presented a turning point in the cryptocurrency market, especially because of the enormous boom of ICO events. It reached an outstanding growth in sales and in the amount of funds raised. To start with some historical data, in 2017 approximately 525 ICO sales that cumulatively raised over $ 6.5 billion have been completed; on average approximately $ 13 million per ICO event. In comparison with the year 2016 when all token sales raised $ 100 million, the scale of growth is clear (Downes, 2018a).

Figure 8 presents the USD amount raised in ICO token sales events in the last four years. Every column in the graph presents the amount of hundred thousand USD raised in a particular month. It is seen that in 2017 the trend is increasing with the maximum reached in December (Downes, 2018b).

Figure 8: USD raised in ICO token sales



Source: Adapted from Downes (2018a).

Almost 37% of the total amount raised in 2017 was made by only twenty ICOs. The five largest out of the twenty most successful prove that returns on investment can reach up to 870% within just a few months after the ICO. The common feature of all the top projects in 2017 was the project purpose to make blockchain and cryptocurrencies more suitable for common use (Kean, 2018).

Table 2: Top five ICOs based on the amount raised in 2017

	FILECOIN (FIL)	**TEZOS (XTZ)**	**BANCOR (BNT)**	**STATUS (SNT)**	**KIN (KIN)**
AMOUNT RAISED (mln $)	**257**	**232**	**153**	**100**	**98**
ICO PRICE	**5**	**0.47**	**3.92**	**0.037**	**0.001**
MAX. PRICE	29.37	11.21	8.17	0.65	0.001434
MIN. PRICE	5.89	1.76	1.52	0.02	0.000037
PRICE 07/01/2018	26.1	5.82	8.17	0.6	0.001123
% RETURN SINCE ICO	1130%	1138%	108%	1521%	1023%

Source: Adapted from Kean (2018).

In Table 2 the five largest ICOs are presented based on the amount raised in 2017 with the belonging ICO price, maximum, minimum and current price and percentage return since the ICO.

Tezos could be defined as one of the most promising ICOs in 2017, because its technology aims to simplify launches of new projects and is competing with Ethereum. The project's roadmap does not contain any exact deadlines and taking into account the activity of the founder Arthur Breitman regarding the technology posts, it seems that the platform would not be launched soon.

The review of all ICO projects in 2017 done by Sedgwick in cooperation with Bitcoin.com and Tokendata came to a realization that many Twitter accounts and Telegram groups were abandoned, websites were no longer hosted and communities no longer tended. There are some projects that raised a couple of thousand dollars and some that raised over $10 million and resulted in no minimum viable product (thereinafter MVP) and alpha release (Sedgwick, 2018).

2.4.5 Post ICO market

The two major problems of the Post-ICO market are overestimation and transparency. For investors it is crucial to have a relevant project evaluation before and after an ICO. Another reason is that founders could overestimate their project goals and deadlines with the aim to attract more investors (Kean, 2018).

Further on, the survey done by Sedgwick in cooperation with Bitcoin.com and Tokendata listed 902 ICO projects, out of which 142 failed at the funding stage and 276 failed after having successfully conducted the ICO process. The reason for failure was either taking the money and running or slowly fading away. Furthermore there are 113 ICO projects that are labeled as "semi-failed", either because their team stopped communicating on social media or the community is so small and the project has no chance of success. Till the end of February 2018, based on the analysis done, 46% of ICO projects realized in 2017 have already failed (Sedgwick, 2018).

2.4.6 Forecast and future market development

The frequency of ICOs and the amount of funds collected has been growing annually since the beginning in 2014. Based on the data obtained by Coinist, the amount of funds collected in the first quarter of 2018 (300 ICO projects and $7.4 billion raised) is nearly identical to the sum amount of funds collected over all previous years together (Farmbrough, 2018). The total amount of funds raised via ICOs in 2017 equals less than 1% of total cryptocurrency market capitalization, which could be interpreted as a potential for ICO market growth (ICObench, 2018).

Despite the overall fall in cryptocurrency market capitalization faced in 2018, the trend suggests the continuing of intensive growth in the ICO market. Taking into account the exponential growth of the ICO market since 2014 and applying the same factor, the amount of collected funds in the period from 2019 – 2020 may equal $50 billion or more annually (Zaitsev, 2018).

The ICO market forecasts should take into consideration its high volatility and the risk of a potential crash. The fluctuation in amount of funds raised is not as high as in the cryptocurrency market, but more sensitive to regulatory processes (Zaitsev, 2018). To visualize, the day when SEC published the report regarding DAO, the price of Ethereum, whose tokens are most commonly used to conduct ICOs, fell by 10% (ICObench, 2018). The market is highly dependent on the restrictions and bans that have been gradually introduced in some countries, ICO verification procedures (such as Know Your Customer or Anti Money Laundering) and government issued regulations. Furthermore, the potential introduction of taxes and fees on cryptocurrencies, ICO projects or either token trading needs to be noted (Zaitsev, 2018).

On the other hand, the evolution of the ICO market is often compared to a bubble and suggests a potential crash. Mr. Palmer, the Dogecoin creator, early cryptocurrency expert and one of the loudest voices warning of an ICO crash, in September 2017 commented the happening in theICO market: "What's happening to crypto now is what happened to Dogecoin". Furthermore, he compares the happening with the first dot-com boom, when investors poured money into new and risky ventures. Moreover, Jamie Dimon, the CEO of JPMorgan Chase compares the happenings with the 17th-century Dutch tulip bubble (Roose, 2017).

One of the Ethereum developers, Charles Hoskinson said this for Bloomberg in July 2017: "People say ICOs are great for Ethereum because, look at the price, but it's a ticking time-bomb. There's an over-tokenization of things as companies are issuing tokens when the same tasks can be achieved with existing blockchain. People are blinded by fast and easy money". In July 2017 in an interview for Bloomberg, the CEO of Ripple, the third-largest cryptocurrency by market value, Brad Garlinghouse said: "ICOs operating in the Wild West of finance isn't sustainable" and "Regardless of regulation ICOs are here to stay, after it collapses they're going to pick up the pieces and say how we do things differently." (Russo, 2017).

Hoskinson and Garlinghouse pointed out that the main problem is raising money through ICOs with skipping safeguards that are required in traditional securities sales. However, they support the idea that even if there is a currency ICO bubble, when it will deflate, cryptocurrency will continue being used by companies to raise funds, but in a regular and more constrained environment (Russo, 2017).

To sum up, in the future regulation will be on one hand the biggest threat of ICOs and on the other hand the opportunity for ICO to become regulated and a safe fundraising concept.

3 EMPIRICAL ANALYSIS

3.1 Research problem

An unregulated market and fast evolution are one of the key ICO challenges. There are significant differences and variances between individual ICO projects. Generally speaking, an absence of a best practice framework is what distinguishes good projects from bad ones. Due to the level of novelty, there is very little known about the decision making process of ICO investors (Sehra, Smith & Gomes, 2017).

Following the potential importance and, on the other hand, novelty of the phenomenon, it is crucial to understand the factors that determine an ICO's success. Whether the criteria that determine the success of ICOs are similar to the ones supporting other forms of entrepreneurial investments or different, potentially less rational, is yet to be determined (Ahlers, Cumming, Günther & Schweizer, 2015).

The empirical analysis is based on the pioneering empirical research made by Ahlers, Cumming, Günther and Schweizer in 2015 presented it in their article: Signaling in Equity Crowdfunding. The article is based on an empirical examination of the effectiveness of different signals used by startup companies to attract investors in an equity crowdfunding context. The analysis empirically pointed out that the most important are project roadmaps (such as business plan, preplanned IPO or acquisition exit strategies), risk factors (such as amount of equity offered and whether financial forecasts are provided) and board members (experiences, number of people) (Ahlers, Cumming, Günther & Schweizer, 2015).

Furthermore, in 2017 Mohit Yadav in his research titled "Exploring signals for investing in an Initial Coin Offering" by conducting 6 semi-structured interviews found out the following main signals for investing in ICO (Yadav, 2017):

1. Promotion bounties and paid promotion;
2. The quality of information published in the white paper — a clear explanation of the problem, a concrete financial roadmap and acknowledgement of the technical risks;
3. Existence of the company before the ICO;
4. Liquidity of tokens post the ICO;
5. The sentiments of the crypto-community — community engagement and social media management.

Furthermore, also other recent research papers on crowdfunding and venture capital investments indicate that several campaign characteristics have an impact on its success (research done by Mollick in 2014 titled: The dynamics of crowdfunding; Cumming,

Fleming and Suchard in 2005 titled: Venture capitalist value added activities, fundraising and drawdowns; De Clercq and Dimov in 2008 titled: Internal knowledge development and external knowledge access in venture capital investment performance and others).

My empirical analysis is inspired by the mentioned research. To put the findings from equity crowdfunding and venture capital investments into the ICO framework concept, the main drivers of success are further formed into four groups related to the characteristics of ICO projects (project information), financial details (risk factors) and founders characteristics (board members). In addition, a group related to marketing activity due to importance of social media is also formed.

In contrast my empirical analysis extends previous researches and in general brings three main contributions. Firstly it contributes different literature describing main findings from equity crowdfunding and venture capital with possible similarities in the ICO context. The significance of parallels is further proven with an econometric analysis. Secondly this is, to the best of my knowledge, the first research that is based on a hand-collected and historically matched ICO database, which is the result of a one year observation and monitoring of ICO projects. It implies more precise and accurate data about each project than data obtained on listing pages. Finally, this research is unique with included insight into the importance of marketing activity and social media. Furthermore, it is also unique by including a broader range of variables from different perspectives.

3.2 Methodology

3.2.1 Dataset

The founder's ability to avoid central authority by directly reaching potential investors implies the challenge for empirical research of ICO projects. Typically, founders publish information about its planned ICO directly on its website and once the ICO is over change the focus from marketing to promoting the company's services. It results in removing the ICO relevant information. However, some projects also promote the ICO on listing websites, which list upcoming ICO projects with the aim to increase awareness. Fortunately, these websites archive information before and during the ICO and serve historical ICO data for completed projects (Amsden & Schweizer, 2018).

Although there are a number of websites that contain information about ICOs, there is no universal database. To obtain an accurate population, the largest possible dataset was compiled by manually collecting and cross-validating data from different ICO lists. Sufficient data quality is ensured with combining different websites and sources.

As presented in the Section 2.4.4, the year 2017 was in many aspects a turning point in ICO evolution. Therefore, the population was defined as a list of all ICO projects conducted in

the year 2017. The list consists of all ICO projects, those that successfully closed their crowdsale offering and the ones that failed to reach their minimum funding goal.

The ICO population was defined from different ICO listing websites that contain detailed information about ICO projects. The list was at the first step obtained on ICObench.com. This is a comprehensive and established data source cited by the New York Times and Economist. The next step was to update and match the collected data with the ICO projects from CoinSchedule, TokenMarket, Coindesk and ICO drops. To the best of my knowledge, this represents the most comprehensive ICO dataset created.

Along with the name and the symbol from the listing pages the following data was obtained:

1. Status (Completed or Failed),
2. Amount raised in USD,
3. Date of the ICO project (month),
4. Sale price.

To avoid the inclusion of scam projects, only projects with all this data available were included in the dataset.

The majority of the variables data came from ICObench.com and TokenMarket.com. If the variable data for an ICO was available only on one ICO listing website, it was included in the dataset. In case the data was available on both and it was different, it was further compared with alternative sources such as: other ICO tracking sites, project's websites, published documentation from the founders, social network profiles of the management team or social media channels. An important remark is that all data is historically matched with the period of the ICO crowdsale event. To demonstrate, for example, for an ICO with the crowdsale event in January 2017 all data used in the analysis the data available in January 2017.

The main discrepancy between different data sources was recognized with the data on the amount raised in USD. In my opinion the main reason is that different sources set up different reference points (starting, middle or ending ICO date) to transfer the amount raised from cryptocurrency to fiat currency (USD). Funding goals are usually set in fiat currency and after encoded into smart contract mechanism as units of cryptocurrencies with the assumed exchange rate. Fluctuation in cryptocurrency price can result in a difference between the actual amount raised and the defined funding goal. For the purpose of this research a 15% deviation between the amounts raised from different sources was accepted.

Every ICO-tracking site provides different types of information about ICO projects, but there is no single site that contains all the data used in this research.

3.2.2 Sample construction

From the population of 597 ICO projects that include all minimal information defined above, a stratified sample was randomly selected. Stratified random sampling method was selected to ensure that each subgroup of population is adequately represented in the sample.

The population was at the first step divided in two strata – successful and unsuccessful ICO projects. On the next steps two strata were divided by the month when the ICO occurred. For each month the same percentage of ICO projects that appear in the population was randomly selected into the sample.

The stratified random sample consists of 102 ICO projects.

3.2.3 Dependent variable

The variable *Status* was used as a dependent variable in further research. The dependent variable defines whether an ICO project successfully completed the crowdfunding. For the purpose of this research, the ICO project is labeled as successful when it collected the minimum funding goal defined to start operating.

Table 3 provides a description of dependent variable.

Table 3: Dependent variable

VARIABLE NAME	DESCRIPTION
Status	Dummy variable equals 1, if the ICO project collected minimum funding goal, and 0 otherwise

Source: Own work.

3.2.4 Independent variables

The selection of independent variables correlated with ICO success was based on findings of fundraising researches presented in the previous chapter. Independent variables are further divided into four groups: ICO characteristics, financial data, founder's characteristics and marketing.

3.2.4.1 ICO characteristics

ICO projects are characterized by strong information asymmetry and investors rely on a limited set of information. Different type of ICO characteristics implied greater transparency for investors to conduct due diligence, reduce investment uncertainty and impact ICO project's success (Amsden & Schweizer, 2018).

Table 4 gives a description of ICO characteristic variables used in research.

Table 4: ICO characteristic variables

VARIABLE NAME	DESCRIPTION
Pre-ICO event	Dummy variable called *"Pre-ICO"* equals 1 in case that ICO project had a pre-ICO event and in opposite case 0.
GitHub code	Dummy variable called *"GitHub"* takes 1 in case of existence of the code and in opposite case 0.
Ethereum blockchain platform	Dummy variable called *"Ethereum"* takes 1 in case the project is built on Ethereum platform and in opposite case 0.
White paper	Dummy variable called *"WP"* takes 1 in case the white paper exist and in opposite case 0.
White paper content	Dummy variable caller *"WP_content"* takes 1 in case the white paper include roadmap and fund allocation information and in opposite case 0.

Source: Own work.

Pre-ICO event

Pre-ICO event is associated with the participation of renowned investors; convincing this type of investors to participate might be seen as an endorsement for other investors. Furthermore it generates initial market interest and price discovery, which should positively affect the likelihood of reaching the minimum funding goal (Adhami, Giudici, & Martinazzi, 2017).

Adversely, the contribution of large renowned investors also imposes potential risk that they would be motivated to dump their tokens once they are tradeable, obtained through pre-ICO. On the other hand, pre-ICO events could be seen from a potential investor's point of view as lacking initial capital. If founders need a pre-ICO event to collect the funds needed to cover the ICO event and marketing, it could also mean the founders do not have enough funds to cover the costs by themselves (Amsden & Schweizer, 2018).

Furthermore, a pre-ICO event could indicate that even founders are unsure about the success of the project by not investing a lot of their own funds to cover the initial cost. It could also be used for testing of the existence of a potential market (Fisch, 2018).

GitHub code

GitHub is the developer company that in April 2008 launched the world's largest development platform GitHub.com. It is an online coding repository, where the programing code could be published, discussed and further developed. It incorporates social functionality that enables network visibility of developer's activity on the project. Interested public could follow improvements and award developer's activity with stars (GitHub, 2018).

Founders could provide partial or complete sets of a project's programming code and updates on the GitHub platform. Available code enables potential investors to audit the project and monitor the progress up to the token offering (Amsden & Schweizer, 2018).

Ethereum blockchain platform

Founders could either develop own blockchain platform or use an existing one. The most common is the Ethereum blockchain platform. It provides additional transparency for potential investors to do a due diligence on the offering. In contrast to own blockchain platform, using Ethereum might have several advantages, such as lower costs and knowledge spillovers. ICO projects built on Ethereum platform have a greater option of speed and convenience of listing on an exchange, because security standards are already met (Fisch, 2018).

The Ethereum platform enables greater ability to verify programmers' information. On the other side, it presents additional ease to make an investment for potential investors, because they can use a standard wallet.

White paper presence

The White paper is an important document for founders to show investors that they have a legitimate business idea with a potential to succeed and gain an appropriate level of credibility and trust. It reveals at least some information about the project and reduces regulatory risk (Amsden & Schweizer, 2018).

White paper content

In addition to the existence of a white paper, the content should also be important for potential investors. One of the information that signals the quality of the ICO project and the white paper is, if the team prepared a detailed roadmap as well as pre-defined fund allocation.

The roadmap is a detailed aspect of a blockchain project that gives a clear presentation of how the project will progress to potential investors. Furthermore, it defines the milestones during the project to be recorded as a success. Without a roadmap an investor does not have any information about how founders plan to realize the project. Some roadmaps also include a clear timeline of milestones (Tokenguru, 2018). A roadmap with an included timeline of development from the ideation stage to implementation connected with the funds needed for each step, signals a higher quality of the project.

Information when and how much funds are intended for each activity signals that founders research evolution process of project also from financial part. A good project has defined token distribution in detail and linked it to the roadmap, because each milestone of the project requires a certain amount of funding (Mulders, 2018).

Founders with a higher confidence in the ICO and token success will arguably be more forthcoming to share the technical details, project timeline and competitor analysis in the white paper (Amsden & Schweizer, 2018).

3.2.4.2 Financial details

The riskiness of any project is a highly valuable signal for potential investors. With a rational funding structure and certain financial details founders could impact the investment risk perceived by investors.

Table 5 provides a description of financial detail variables used in research.

Table 5: Financial detail variables

VARIABLE NAME	DESCRIPTION
Percentage of tokens distributed in ICO	Variable called *"Distributed"* presenting percentage of all tokens distributed in ICO
Soft cap	Dummy variable called *"Soft_cap"* takes 1 in case of existence of the soft cap and in opposite case 0.
Escrow	Dummy variable called *"Escrow"* takes 1 in case the project has escrow services and in opposite case 0.
Bonus scheme	Dummy variable called *"Bonus"* takes 1 in case the ICO project offer any type of bonus and in opposite case 0.
Number of accepted currencies	Variable caller *"Nmb_curr."* presenting number of different currencies accepted in ICO
Fiat Currencies	Dummy variable called *"Fiat"* takes 1 in case the ICO project accept Fiat currencies and in opposite case 0.

Source: Own work.

Percentage of tokens distributed in an ICO

The percentage of tokens distributed in an ICO event is comparable with IPO similarly as the number of equity shares sold or comparable with equity crowdfunding an equity offering. In this sense, Ahlers, Cumming, Günther and Schweizer (2015) in crowdfunding research argue that entrepreneurs can signal unobservable characteristics of their start-up by the amount of equity they retain after an offering. For entrepreneurs it is costly to retain ownership interest in the company and therefore they will be motivated to retain a stake only if they expect future cash flow higher than the current firm value (Ahlers, Cumming, Günther & Schweizer, 2015).

In an ICO context the founder's indirect investment through retention of ICO tokens is a strong signal, when evaluating financial part of the project (Amsden & Schweizer, 2018). The percentage of tokens distributed is a signal, which is actively set by founders and indicates their confidence about the project.

Existence of the soft cap

Two types of reward-based crowdfunding have emerged: All-Or-Nothing (thereinafter AON) and Keep-It-All (thereinafter KIA). The main difference is that the KIA model is used when a company sets a fundraising goal and keeps the entire amount raised, regardless if the goal is met. In this case, the risk when an underfunded project goes ahead is allocated to the crowd. By contrast, in the AON model the entrepreneur company keeps nothing unless the goal is achieved and thereby the entrepreneur retains the risk (Cumming, Leboeuf & Schwienbacher, 2015).

The AON crowdfunding model is similar to the existence of the soft cap mechanism in the ICO framework. It implies that in case sufficient funds are not raised, all funds are returned to investors. With a soft cap, founders signal commitment that they will start project only if enough funds are raised. It reduces investors' risk that undercapitalized projects will be undertaken (Benedetti & Kostovetsky, 2018).

Existence of an escrow

The main function of an escrow account is to protect investors' funds and maintain the integrity and reputation of the development team. For investors it implies some form of access and usage control, which ensure that tokens will not be sold in one go and dumped for the price (Sehra, Smith & Gomes, 2017).

Bonus scheme

A bonus scheme is intended to incentivize early investors to make a larger investment with size discounts, invest earlier with timing discounts or bring in new investors with referral bonuses. For early contributors the bonus scheme reduces investment risk (Amsden & Schweizer, 2018).

It should be pointed out that a bonus is a kind of double-edged sword. Higher bonuses will logically attract the attention of sophisticated investors, but on the other hand favorably obtained tokens could be immediately sold when tokens start trading and dump the price. This scenario would be a disadvantage for regular investors (Fisch, 2018).

Number of different cryptocurrencies accepted

ICOs raise funds from investors by sending an existing currency to a newly invented blockchain account. Founders could decide to accept only cryptocurrencies and limit the project for "crypto" contributors or additionally accept fiat currencies.

ICO projects that accept different currencies require significant blockchain expertise to integrate functionality among them. Therefore, the greater the number of different cryptocurrencies accepted, the higher the technical expertise of the founders and team to list tokens after the ICO is completed (Amsden & Schweizer, 2018).

Fiat currency acceptance

Accepting fiat currencies could have opposing signals to founders. Fiat currencies give a feeling of connection with the traditional banking system and might increase trustworthiness of cryptocurrency investors. In this manner, it could be seen as a lack of confidence to complete the project only by cryptocurrency investors. On the other hand, accepting fiat currencies implies the availability to a greater pool of investors beyond those owning cryptocurrencies (Amsden & Schweizer, 2018).

On the other hand, in the case of ICO projects with a soft cap that is not reached, fiat investors do not have any insurance of funds returning. Unlike cryptocurrency investors in case of contributing in fiat currencies there is no smart contract in place (Momtaz, 2018).

3.2.4.3 Founders' characteristics

According to research focused on venture quality signals from a venture capitalists point of view, Baum and Silverman (2004) argue that two the most significant characteristics for potential investors to get attention while evaluating project are human capital and social capital. Furthermore, it is well documented that venture capitalists' investment decisions are based on their assessment of the quality of board members (MacMillan, Siegel & Narasimha, 1985). Moreover, Da Rin, Hellman and Puri (2013) in their survey of entrepreneurial success determinants show that the team and board members are key determinants of project growth and performance (Da Rin, Hellman & Puri, 2013). In further research human capital and social capital are measured by the number of team members and number of advisors.

Table 6 gives description of variables related to founders' characteristics used in research.

Table 6: Founders' characteristic variables

VARIABLE NAME	DESCRIPTION
Human capital	Variable called *"human_capital"* presenting the number of people in core team
Social capital	Variable called *"social_capital"* presenting the number of advisors

Source: Own work.

Human capital

In finance literature higher human capital is aligned with better knowledge and capabilities to develop and implement a project's strategy. Ahlers, Cumming, Günther and Schweizer (2015) in their research argue that a high number of team members signal that founders have been able to convince more employees of the project's potential and positively impact the fundraising success (Ahlers, Cumming, Günther & Schweizer, 2015). Furthermore Cooper

and Bruno (1977) documented that the size of the top management team within high-tech companies positively correlated with the growth of a new venture (Cooper & Bruno, 1977).

Examples from the post ICO market include a significant price drop after an ICO event, because team members fail to meet set milestones or simply because there is not enough members to realize an idea (Momtaz, 2018). The preparation and the launch of an ICO project require a significant amount of work. Furthermore after the launch, in order to successfully list the token on an exchange, the project needs to show significant potential.

Social capital

Baum and Silverman (2004) argue that business connections and networking are crucial for success, because they improve a venture's legitimacy and signal quality of the venture (Baum & Silverman, 2004).

In the ICO framework advisors are some kind of "veterans" in the crypto economy or in general in the financial technology space. Many of them are recruited based on their previous success and experiences with ICO. Therefore, the presence of advisors beside the team members can help improve the project's image and bring additional credibility (Hall, 2017).

Furthermore, advisors need to fill the deficiencies of team members with technical skills as well as providing valuable access to their network to find potential investors. Advisors are beside team members the ones that believe in the project and are putting their reputation on the line (Amsden & Schweizer, 2018).

3.2.4.4 Marketing

Unlike traditional crowdfunding, in case of ICO official platforms that precisely list all fundraising campaigns and where founders could present investment opportunity proposals do not exist. In contrast there exist many different websites where ICO projects could be announced and promoted. Founders based on their perception of the target group decide where their project will be announced. The main marketing campaign is done digitally through ICO websites and social media network (Amsden & Schweizer, 2018).

Table 7: Marketing variables

VARIABLE NAME	DESCRIPTION
Bounty program	Dummy variable called *"Bounty"* that equals 1 in case that ICO project had the bounty program and in opposite case 0.
Percentage of funds prescribed for marketing	Variable called *"Marketing"* presenting the percentage of total fund prescribed for marketing and advertising.

Source: Own work.

In Table 7 variables measuring founder's marketing activity are presented.

Existence of the bounty program

In the digital world, the bounty program originates from online gaming platforms, where participants were offered rewards for participating in game development. Bounties are reward mechanisms offered by ICO founders to individuals in exchange for performing certain tasks. Company offered them either as a Pre-ICO or Post-ICO bounties; in general bounties are not done together with the ICO event (Glier, 2018).

Pre-ICO bounty programs are carried out before the ICO event and commonly consist of: social media campaign bounties, article writing bounties and BitcoinTalk signature bounties. On the other hand Post-ICO bounty programs aim to improve feedback from the project network community and relate to translation campaigns and bug reporting.

Percentage of funds prescribed for marketing

The success of an ICO project is highly correlated with the level of recognition of the project. Furthermore, the project will only be recognized with a wise marketing strategy including a creative website, advertising articles on cryptocurrency blogs such as Medium, Steemit, BitcoinTalk, good public relations and establishing a community on social media. A successful ICO marketing campaign consists of a number of different marketing channels, from more conventional to the very latest advanced techniques (Yavin, 2018).

To realize a quality market campaign founders need to predict a stake of the raised funds for marketing activity. The appropriate amount of the funds prescribed for marketing signals to which extent the founders are aware of the importance of marketing.

3.2.4.5 Control variables

In this research the variable number of all tokens offered in an ICO called *"All_tokens"* and the sale price of the token called *"Price"* are included as control variables.

Fundamentally, the number of all tokens offered in an ICO event should not affect the probability of its success. ICO tokens are dividable and for investors it should not differ whether they will buy a fraction of a token or more tokens for the same amount of money.

A further control variable used is sale price measured in USD in accordance with the exchange rate valid on the start date of the ICO event. The price could vary on an interval from a few pennies to more than a thousand USD per token. On most cryptocurrency exchanges, the minimum tick size is low; therefore the nominal price of the token should not have significant liquidity or microstructure effects on future trading and ICO success. Although, it could be important for attracting behavioral investors, who are attracted by a

low nominal price (Birru & Wang, 2016). Excluding behavioral finance principles, an ICO project's success should not be affected by the ICO token price.

In Table 8 descriptive statistics of used control variables are presented. Variable Price is available for all ICO projects. 97 ICO projects with available information on the number of all available tokens are in the sample.

Table 8: Descriptive statistics of control variables

VARIABLE	OBSERVATIONS	MEAN	MIN.	MAX.	STD. DEV.
Price	102	1	0.01	29.85	3.19
All_tokens	97	29,577,068,759	3,000	2,000,000,000,000	2,178,000

Source: Own work.

Any type of psychological perspective and mental accounting matters are excluded in this point.

3.3 RESEARCH HYPOTHESIS DEVELOPMENT

One of the specifics about ICO is that investment decisions are made in an unregulated environment and based on observable determinants of an ICO project, which are very limited, due to the projects early stage. However, based on the main findings in crowdfunding theory with applications from the ICO framework the explanatory empirical research on determinants of ICO success is done.

An explanatory empirical study is the appropriate approach when analyzing a novel phenomenon in the evolving field of entrepreneurship (Aldrich & Baker, 2000). Therefore rather than formal hypothesis testing, the aim is to provide a wide perspective on determinants of fundraising success by forming research questions.

3.3.1 Characteristics of an ICO project are important signals to funders and have a substantial effect on an ICO's success

Inspired by crowdfunding researches, which indicate that specific characteristics of a crowdfunding campaign increase its success, the first group of variables included in research relate to ICO characteristics. Certain characteristics of an ICO event are suitable for reducing investor's uncertainty and positively affect the likelihood of the project's success.

As described above, before the ICO event takes place, some projects start with pre-ICO event. The existence of a pre-ICO event should indicates the higher probability of success to specific groups of investors.

For potential investors it is important to clearly understand what the idea of the project is and the source of this information is the white paper. The presence of the white paper decreases information asymmetry and reduces regulatory risk. Therefore it should matter to potential investors and positively affects the probability of an ICO's success. In addition to the existence of a white paper, its content and quality of information should also positively impact the likelihood of the project reaching the minimum funding goal.

There are projects that provide partial or complete sets of programming codes. Logically, the poor quality projects will not post the programing code and will be less likely to succeed. Therefore, a published, even partial, programing code on GitHub positively effects the probability of an ICO's success.

In similar manner, an ICO projects that are based on the Ethereum blockchain platform are more transparent and standardized. Transparency reduces regulatory risk and therefore ICO projects based on the Ethereum platform should be more likely to succeed.

3.3.2 Financial details of an ICO event are correlated with an ICO's success

The founders' indirect investment in an ICO project signals confidence level and their involvement in achieving the settled goals. A higher level of founders' confidence is positively correlated with the amount of retained tokens. Therefore, it is expected that ICO projects that offer lower percentage of all issued tokens for the crowdsale are more likely to succeed.

Cumming, Leboeuf and Schwienbacher (2015) argue that the AON crowdfunding model guarantees investors that the entrepreneur does not start the project with unrealistically low funding. The potential to create a successful project strongly correlates with the amount of available funding. By implying the threshold amount of funds raised, founders decrease investor risk. Therefore, the predefined minimum amount of funds needed with a soft cap mechanism is expected to positively affect the probability of an ICO's success.

Monetary policy implies that direct managing of the token supply in circulation is an important factor to ensure long term sustainability. An escrow account enables investors at least some control over the supply of tokens and therefore the availability of an escrow account for non-distributed tokens should positively affect the probability of an ICO's success.

According to Cumming, Hornuf, Karami and Schweizer (2017) analysis on crowdfunding, price differentiating in crowdfunding campaigns is positively correlated with the funding success (Cumming, Hornuf, Karami & Schweizer, 2017). Applying the same principle in the ICO framework, it is expected that bonus schemes motivate potential investors and positively affect the probability of an ICO's success.

ICO projects that accept more different currencies within an ICO event signal higher technical expertise and blockchain knowledge of the team. Therefore, it is expected that an ICO project accepting more different types of currencies is more likely to succeed. Furthermore ICO projects that accept fiat currencies are available to a greater pool of potential investors and should be more likely to succeed.

3.3.3 Founders' characteristics affect the probability of an ICO's success.

Human capital is one of the key quality signals of the project and an unobservable ability of the team. In addition to the educational background of team members, which is almost impossible to verify in the ICO framework, straight head count is also an important signal. The larger the team size, the more likely it is that they will be able to accomplish the project objectives and realize the idea. A larger team size also signals overall confidence in the project and it is expected that an ICO project with more team members is more likely to succeed.

Business connections and networking are key ingredients for project success. Advisors are a type of interaction between human capital and social capital, because they add knowledge to the team on one side and on the other side expand the network. The appropriate choice of advisors should determine success of ICO projects. Thereby it is expected that the number of contributing advisors positively affects the probability of an ICO's success.

3.3.4 Higher level of marketing activity is positively correlated with an ICO's success.

Yavin (2018) argues that the difference between success and failure in an ICO event is often in marketing. It is stated in different cryptocurrency forums that nowadays marketing strategy may be even more important than the actual product, because the final product could be changed, but the public's perception of the team and project rarely survive a bad first impression (Yavin, 2018).

Therefore it is expected that the offer of a bounty program is positively correlated with the success of ICO projects. Furthermore, founders that are aware of the importance of marketing activity and its costs would predict more funds for future marketing activity. It is expected that ICO projects that foresee a larger portion of the total funds collected for marketing and advertising are more likely to succeed.

3.4 METHOD OF ANALYSIS AND DESCRIPTIVE STATISTICS

3.4.1 Method of analysis

In the first step the data analyzed with descriptive statistics in the program SPSS was obtained.

In the next step a quantitative dependent variable model for testing the established hypothesis is used and logistic regression is estimated. In the logistic regression model the dependent variable *Status* is compared with different determinants of fundraising success. The correlation and statistical significance of different determinants of the fundraising success of an ICO project is tested. With the statistical analysis I try to confirm the impact of a specific determinant on fundraising success.

In addition to the logistic regression model, as a control mechanism, the Pearson's chi-square test (also known as chi-square test of association) is performed. The Person's chi-square test is used to test whether there is a relationship between two categorical variables. In addition for each set of categorical variables a contingency table is prepared to visualize the correlation between variables.

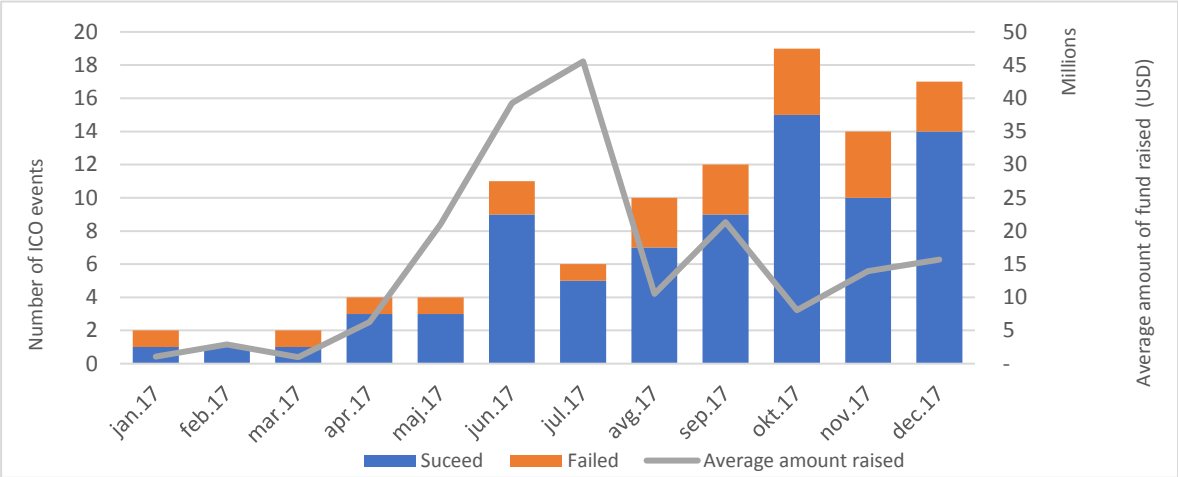
3.4.2 Descriptive statistics

3.4.2.1 Sample

The sample consist of 102 ICO projects that launched an ICO event in 2017, out of which 76% successfully closed the fundraising offering and 24% did not reach the minimum funding goal. ICO projects in the sample collected a total funding amount of $1.786 billion. The average value amount of funds raised is $17.512 million, but the distribution is positively skewed due to a small number of projects with a really high amount raised and the median value raised is $6.171 million. The largest ICO event included in the sample is Tezos (symbol: XZT) launched in July 2017 which collected $230.499 million.

In Figure 9, the distribution of selected ICO events per month in 2017 and the average amount of funds raised per project is presented. An increasing trend in the number of ICO projects is seen. The ICO wave started to build in May 2017, with significant growth in number as well as the amount raised. One of possible explanations is the increased general interest in cryptocurrencies, as a consequence of the high increase in Bitcoin and Ethereum values as well as the novelty of the ICO phenomenon and the ability for early adopters to raise millions of USD in a matter of seconds. Conversely, the total amount of funds raised per ICO project decreased from the peak reached in July 2017.

Figure 9: Time flow of ICO events in 2017 and average amount raised per ICO project



Source: Own work.

The majority defined a fairly low ICO sale price for their tokens, with the median value $ 0.17 making most tokens akin to penny stocks and the average sale price $1. The most expensive ICO token included in the sample was token Gnosis (symbol GNO) that costs $ 29.85 and was launched in April 2017. On the other hand the cheapest tokens were the ones from ICO projects Bitbounce (symbol CREDO), Poet (symbol POE), Kin (symbol KIN), Cindicator (symbol CND), Airtoken (symbol AIR), TokenStars (symbol ACE) and DropDeck (symbol DDD) that cost $ 0.01.

ICO projects in the sample could be grouped based on their industries of focus. Table 9 presents six industries out of 14 that are most frequent in the sample. The percentage of ICO projects in the total sample per industry and the sum amount of funds raised in each industry are presented. The majority of ICO projects in the sample belong to the financial industry (23%) and infrastructure (23%), which refers to web and blockchain infrastructure.

Table 9: ICO projects divided by industry

INDUSTRY	% IN TOTAL	AMOUNT OF FUNDS RAISED (IN M$)
Finance	23%	333.056
Infrastructure	23%	774.705
Trading & Investing	14%	166.853
Gaming	14%	150.810
Marketing & Advertising	6%	97.298
Communications	5%	43.213
Others	17%	220.266

Source: Own work.

3.4.2.2 ICO characteristics

The set of variables related to ICO characteristics consists of: Pre-ICO, GitHub, Ethereum, White paper, which are available for the whole sample and White paper content, which consist of 80 observations.

Table 10 shows that 49% of all ICO projects in the sample held a pre-ICO event. Out of all successful ICO projects, 57.7% organized a pre-ICO event.

With 78.4%, the majority of ICO projects had a white paper and 67.5% of white papers include information about fund allocation and a roadmap. The majority of all ICO projects that have published a white paper (65.7%) successfully reached the minimum funding requirement. However, it should be pointed out that there exists a considerable heterogeneity among the white papers, some included in the sample are very technically completed, others are in the form of classical business plans, financial outlooks, one page summaries or more than 100 pages long dissertations and professional brochures.

In the sample 44.1% of ICO events had an available GitHub code and 50.0% were successful. Furthermore, the majority of all projects in the sample were built on the Ethereum platform.

Table 10: Contingency table of ICO characteristics variables

VARIABLE		**STATUS**		
		Unsuccessful	Successful	Total
Pre-ICO	**Organized**	**5**	**45**	50
	% of Status	*20.8%*	*57.7%*	*49.0%*
	Not Organized	19	33	52
	% of Status	*79.2%*	*42.3%*	*51.0%*
WP	**Available**	**13**	**67**	80
	% of Status	*54.2%*	*85.9%*	*78.4%*
	Not available	**11**	**11**	22
	% of Status	*45.8%*	*14.1%*	*21.6%*
WP_content	**Available**	**7**	**47**	54
	% of Status	*53.8%*	*70.1%*	*67.5%*
	Not available	**6**	**20**	26
	% of Status	*46.2%*	*29.9%*	*32.5%*
GitHub	**Available**	**6**	**39**	45
	% of Status	*25.0%*	*50.0%*	*44.1%*
	Not available	**18**	**39**	57
	% of Status	*75.0%*	*50.0%*	*55.9%*
Ethereum	**Available**	**12**	**57**	69
	% of Status	*50.0%*	*73.0%*	*67.6%*
	Not available	**12**	**21**	33
	% of Status	*50.0%*	*26.9%*	*32.4%*
Total	**Total**	**24**	**78**	102
	% of Status	*100%*	*100%*	*100%*

Source: Own work.

3.4.2.3 Financial details

The financial details block includes the following variables: Percentage of token distribution, which consists of 98 observations, Escrow, Soft cap, Number of currencies accepted, Accepting fiat which are available for the whole sample and Bonus, which consist of 101 observations.

For continuous variables included in the analysis descriptive statistics are presented in Table 11.

Table 11: Descriptive statistics of financial details variables

VARIABLE	OBSERVATIONS	MEAN	MIN.	MAX.	STD. DEV.
%_distributed	98	0.59	0.10	1.00	0.22
Nmb_curr	102	1.75	1.00	4.00	0.89

Source: Own work.

In Table 12 frequencies and relative frequency of variables are presented. It shows that 35.3% of all ICO events in the sample offer an escrow service. Furthermore, out of all successful ICO projects 64.1% implied a soft cap, 51.3% offer a bonus scheme and 6.4% are available also for fiat investors.

Table 12: Contingency table of financial details variables

VARIABLE		STATUS		
		Unsuccessful	Successful	Total
Escrow	**Available**	**5**	**31**	36
	% of Status	*20.8%*	*39.7%*	*35.3%*
	Not available	**19**	**47**	66
	% of Status	*79.2%*	*60.3%*	*64.7%*
Soft_cap	**Available**	**8**	**50**	58
	% of Status	*33.3%*	*64.1%*	*56.9%*
	Not available	**16**	**28**	44
	% of Status	*66.7%*	*35.9%*	*43.1%*
Bonus	**Available**	**10**	**40**	50
	% of Status	*41.7%*	*51.3%*	*49.0 %*
	Not available	**14**	**38**	52
	% of Status	*58.3%*	*48.7%*	*51.0%*
Fiat	**Available**	**6**	**5**	11
	% of Status	*25.0%*	*6.4%*	*10.8%*
	Not available	**18**	**73**	91
	% of Status	*75.0%*	*93.6%*	*89.2%*
Total	**Total**	**24**	**78**	102
	% of Status	*100%*	*100%*	*100%*

Source: Own work.

3.4.2.4 Founder's characteristics

The explanatory variables used in the Founder's characteristics block are Human capital and Social capital. In Table 13 descriptive statistics of continuous variables are presented. The number of team members relates to human capital and is available for all ICO projects in the sample. The minimum number of team members is 1 and the ICO project with the biggest team counts 10 members. The social capital variable presents the number of advisors. Information about the number of advisors is available for 89 ICO projects in the sample. The mean value is 6.66 advisors.

Table 13: Descriptive statistics of Founder's characteristics variables

VARIABLE	OBSERVATIONS	MEAN	MIN.	MAX.	STD. DEV.
Human_capital	102	5.06	1	10	2.35
Social_capital	89	6.66	0	18	3.34

Source: Own work.

3.4.2.5 Marketing

Explanatory variables of marketing activity are Bounty and Marketing fund. The variable Bounty is available for 98 ICO projects in the sample and 86 projects revealed information about what percentage of all funds raised will be intended for marketing and advertising activities. Descriptive statistics are presented in Table 14.

Table 14: Descriptive statistics of marketing variables

VARIABLE	OBSERVATIONS	MEAN	MIN.	MAX.	STD. DEV.
Marketing_fund	86	0.13	0.00	0.50	0.14

Source: Own work.

Table 15 presents that 45.9% of all ICO projects in the sample organized marketing activity through a bounty program.

Table 15: Contingency table marketing variables

VARIABLE		STATUS		
		Unsuccessful	Successful	Total
Bounty	**Available**	**8**	**37**	45
	% of Status	*34.8 %*	*49.3%*	*45.9%*
	Not available	**15**	**38**	53
	% of Status	*65.2%*	*50.7%*	*54.1%*
Total	**Total**	**23**	**75**	98
	% of Status	*100%*	*100%*	*100%*

Source: Own work.

3.4.3 Correlation matrix

Table 16 presents the Pearson correlation coefficients in the form of a correlation matrix for all independent variables. The variables in bold indicate a statistical significance at $p<0.05$ or less.

Following a relatively small sample size there are some significant correlations. However, the values indicating multicollinearity should not affect obtained results to a larger extent. To conclude, there is no relevant issue of multicollinearity among independent variables.

Table 16: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Pre_ico	**1**														
2 WP	0.09	**1**													
3 WP_con.	0.07	n.a	**1**												
4 Github	-0.00	0.18	0.20	**1**											
5 Ethereum	0.13	**0.24**	0.13	0.15	**1**										
6 %_Distr.	**-0.22**	**0.24**	0.06	0.14	0.04	**1**									
7 Soft_cap	**0.22**	**0.24**	0.18	0.02	0.01	0.01	**1**								
8 Escrow	**0.22**	-0.11	-0.20	0.09	**0.29**	-0.17	**0.23**	**1**							
9 Bonus	0.09	**0.29**	**0.27**	0.01	0.14	0.04	-0.15	-0.16	**1**						
10 Nmb_c.	0.11	0.12	-0.01	0.08	-0.01	-0.08	-0.03	-0.02	-0.01	**1**					
11 Fiat	-0.09	**-0.28**	-0.15	-0.18	**-0.23**	0.07	0.11	0.01	**-0.35**	0.14	**1**				
12 Hum._c.	0.03	**0.28**	-0.03	**0.27**	-0.00	-0.12	0.20	-0.00	-0.09	-0.05	-0.09	**1**			
13 Soc._c.	-0.14	0.01	-0.10	-0.20	0.20	0.10	**-0.27**	0.04	0.14	0.16	-0.09	0.01	**1**		
14 Bounty	0.02	0.13	0.21	-0.09	0.14	-0.17	0.10	**-0.26**	0.18	0.06	-0.13	**0.28**	0.14	**1**	
15 Market.	0.10	0.09	0.21	-0.08	0.17	-0.05	-0.04	0.01	0.14	0.10	0.18	-0.05	0.04	0.11	**1**

Source: Own work.

3.5 EMPIRICAL RESULT

To explore the determinants of ICO success, several logistic regression models were estimated with *Success* as a dependent variable. In each section a different block of independent variables was tested.

3.5.1 Characteristics of an ICO event

Table 17 summarizes the estimation coefficients and robust standard errors of bivariate logistic regressions, where each determinant of fundraising success is applied separately to test its significance (i.e. bivariate analysis). In addition, for all categorical variables also a Pearson chi-square test is performed. Based on both tests the statistical significance for organizing a Pre-ICO event, publishing a white paper, posting GitHub code and launching a token offering based on Ethereum platform is found.

Table 17: Bivariate logistic regression and Pearson chi-square results for ICO characteristics

	LOGISTIC REGRESSION	PEARSON χ^2 TEST
Pre-ICO	**1.645*** (0.552)**	**9.98*** **
WP	**1.640*** (0.523)**	**10.923*** **
WP_content	0.700 (0.617)	1.319
GitHub	**1.099* (0.523)**	**4.653***
Ethereum	**0.999* (0.481)**	**4.466***

Source: Own work.

The results indicate a highly positive effect of white paper existence on the probability of an ICO's success ($p < 0.001$). This is a predicted finding, as the white paper is one of the few documents that most founders reveal during the ICO campaign and is therefore one of the key sources of information for a potential investor's due diligence.

In the next step a subsample logistic regression is performed including only ICO projects that have an available white paper, with the aim to test the significance of white paper content. Variable white paper content shows the importance of technical details and details about the business plan. Based on the result, the white paper content is not correlated with the probability of an ICO's success. This indicates that the content is not crucial for the investor's judgement of the project's quality and is not in line with previous research findings (research of Mohit Yadav in 2017). While it seems counterintuitive, investors might not have enough knowledge or do not consecrate additional attention. The finding might support the argument that investors in the ICO market may act more irrationally than those in traditional markets.

Publicly available GitHub code provides additional transparency over the technological capabilities of the project, enabling a better review of its quality. The results indicate a significant impact of available code on the probability of an ICO's success ($p < 0.05$), presumably due to indicating a better quality of the project. The findings are in line with the prediction.

Finally, the results are in line with the prediction and indicate that potential investors value Ethereum-based tokens and that it has a positive impact on the probability of an ICO's success ($p < 0.05$). Building a project on an established platform decreases risk and enables a scaling effect comparable with creating a completely new blockchain platform. Furthermore, this correlation already indicates that Ethereum acts as a reputation indicator in the ICO framework, though the standard was only developed in 2015.

However, when including all variables simultaneously, some lose their statistical significance and only organizing a Pre-ICO event and the availability of a white paper remained significantly positively correlated with the ICO's success. The variable WP_content is omitted from the analysis, because it is available only when the variable WP is available and in this case WP became a constant term.

Tables 18 presents the results of logistic regression including all ICO characteristics variables simultaneously.

Table 18: Logistic regression results including ICO characteristics simultaneously

	LOGISTIC REGRESSION
Pre-ICO	**1.722*** (0.552)**
WP	**1.450* (0.598)**
GitHub	1.016 (0.585)
Ethereum	0.374 (0.569)

Source: Own work.

3.5.2 Financial details

Based on bivariate logistic regression and the Pearson chi-square test results presented in Table 19, four variables that statistically significantly related to the probability of an ICO's success are the percentage of tokens distributed through an ICO event, existence of a soft cap, the number of currencies accepted and acceptance of fiat currencies.

Table 19: Bivariate logistic regression and Pearson chi-square results for Financial details

	LOGISTIC REGRESSION	**PEARSON χ^2 TEST**
%_distributed	**-2.918* (1.276)**	**n.a**
Soft_cap	**1.273* (0.493)**	**7.084***
Escrow	0.919 (0.553)	2.874
Bonus	0.414 (0.473)	0.774
Nmb_curr	**0.654* (0.324)**	**n.a**
Fiat	**-1.582* (0.660)**	**6.592***

Source: Own work.

Based on the result support is found for the notion that indirect investments done by founders by retaining a part of tokens is correlated with an ICO's success. Distributing a higher percentage of all tokens in an ICO event may be a signal of less convenience of founders in a project and is significantly negatively correlated with an ICO's success ($p < 0.05$). Finding is in line with the research done for equity crowdfunding and set prediction (Ahlers, Cumming, Günther & Schweizer, 2015).

Furthermore, it is proven that the soft cap mechanism is important for investors, which is in line with the notion that additional assurance that undercapitalized projects will not be realized is valued. The existence of a soft cap mechanism is significant and positively correlated with the probability of an ICO's success ($p < 0.05$).

A bonus structure is important to convince early investors and unlike equity crowdfunding there is no evidence that it is related to an ICO project's success. Based on the performed regression it has no significant positive correlation with the probability of an ICO's success. However, it could not be concluded that there is no relationship between a bonus and the probability of an ICO's success. With the dummy variable only the existence of a bonus is measured, but it could be the case that investors appreciate more the structure of a bonus than its existence.

Furthermore, no significant effect emerges with the availability of escrow. A possible explanation is, that investors are not aware of the importance of monetary policy and the token flow effect, when the trading starts.

ICO projects that accept more cryptocurrencies need to have well experienced blockchain experts in the team that manage to integrate them. The results of logistic regression prove that there is a significantly positive correlation between the number of cryptocurrencies accepted and the probability of an ICO's success. ICO projects that accept more types of cryptocurrencies are more likely to succeed.

Fiat investment in ICO projects presumably establishes a relationship with the traditional banking system. Logistic regression results show a significant negative correlation between accepting fiat currencies and the probability of an ICO's success ($p < 0.05$). Results prove that the relationship with the traditional banking system in the ICO market is not appreciated by investors. Additionally, the opportunity to invest in fiat currency could signal the founder's insecureness to raise the required level of funds from only cryptocurrency investors.

Finally, when all variables were simultaneously added into the regression model, all variables previously found remained significant. The result is displayed in Table 20 and underlines the robustness of the previous model and the significance of variables.

Table 20: Logistic regression results including Financial details simultaneously

	LOGISTIC REGRESSION
% distributed	**-3.078*** **(1.539)**
Soft_cap	**1.919*** ** **(0.644)**
Escrow	0.485 (0.662)
Bonus	0.605 (0.648)
Nmb_curr	**0.884*** **(0.408)**
Fiat	**-2.539*** ** **(0.945)**

Source: Own work.

3.5.3 Founder's characteristics

Table 21 presents the estimation coefficients and robust standard errors of bivariate logistic regressions, where each founder's characteristic is applied separately to test the significance. Based on the analysis a statistically significant correlation between human capital and fundraising success is found.

Table 21: Bivariate logistic regression result for founder's characteristics

	LOGISTIC REGRESSION
Human_capital	**0.310** ** **(0.114)**
Social_capital	0.130 (0.085)

Source: Own work.

Based on the regression model it is found that human capital is correlated with fundraising success. It is in line with the idea that human capital as a factor of venture quality, measured with the number of team members is positively related with its success.

While previous research based on crowdfunding projects found that the social alliance is a crucial determinant of success (Davidsson & Honig, 2003; Robb & Robinson, 2014), I have not found any significant correlation between social capital and fundraising success. One possible explanation could be that the headcount of advisors is a poor variable to measure social alliance, because more important variables such as LinkedIn connections, the size of the Twitter community or other social media networks are not considered. Unfortunately, the social media network at the time of an ICO event is hard to measure and therefore I cannot provide solid empirical evidence of the relationship between social capital and fundraising success.

However, by considering both explanatory variables simultaneously, human capital slightly loses statistical significance, but remains significantly positive. Table 22 displayed the results.

Table 22: Logistic regression results including founder's characteristics simultaneously

	LOGISTIC REGRESSION
Human_capital	**0.251*** **(0.124)**
Social_capital	0.140 (0.089)

Source: Own work.

3.5.4 Marketing

Table 23 presents the estimation coefficients and robust standard errors of bivariate logistic regressions, where each variable related to marketing activity is applied separately to test the significance. Based on the performed logistic regression and the Pearson chi-square test, only the percentage of funds prescribed for marketing is significant and positively correlated with the probability of an ICO's success.

Table 23: Bivariate logistic regression and Pearson chi-square results for marketing

	LOGISTIC REGRESSION	**PEARSON χ^2 TEST**
Bounty	0.602 (0.495)	1.501
Marketing	**4.583*** **(2.255)**	**n.a**

Source: Own work.

Founders offer a bounty program with the aim to increase the awareness of an ICO project and as a reward for individuals to perform certain either Pre-ICO or Post-ICO tasks. However, presented results suggest that offering a bounty program does not increase the probability of an ICO's success. Offering a bounty program and free tokens for individuals in exchange for certain tasks, may impose the probability of dumping the price. This could be a reason why investors do not additionally appreciate it.

In the sample, 86 out of 102 projects revealed information what percentage of raised funds they will use for marketing and advertising activities. The information was available either in the white paper or on the web page. Founders that prescribed a higher percentage of raised funds for future marketing are aware of the importance of marketing activity and also advertise the ICO project even before the ICO event. Supporting this notion, the results indicate a significantly positive correlation of percentage purposed for marketing and an ICO's success. It suggests that projects with a higher percentage of funds purposed for marketing increase the probability of an ICO's success.

However, when including both variables simultaneously they lose their statistical significance. Result is presented in Table 24.

Table 24: Logistic regression results including marketing simultaneously

	LOGISTIC REGRESSION
Bounty	0.600 (0.520)
Marketing	4.537 (0.383)

Source: Own work.

3.5.5 Model including all significant variables

Finally, in one model all variables that are found as significant in separate logistic regression models are merged. It includes the following variables: Pre-ICO, WP, GitHub, %_distributed, Soft_cap, Nmb_curr, Fiat and Human_capital. The result is presented in Table 25.

Table 25: Logistic regression results including all significant and control variables

	LOGISTIC REGRESSION
Pre-ICO	1.187 (0.739)
WP	**2.309**** **(0.930)**
%_distributed	-1.681 (1.773)
Soft_cap	**2.149**** **(0.884)**
Nmb_curr	**1.042*** **(0.495)**
Fiat	**-2.048*** **(1.069)**
Human_capital	**0.239*** **(0.147)**
All_tokens	0.000 (0,141)
Price	0.127 (0.141)

Source: Own work.

I have not found the same empirical support for the relationship between the existence of a Pre-ICO event and fundraising success. Furthermore, there is no evidence that a certain percentage of token distribution is correlated with fundraising success.

The model sheds a light on the positive influence of the presence of a white paper and a soft cap mechanism from an ICO characteristic block of variables. Within the Financial details set, a positive impact of more currencies accepted within an ICO event is supporter and on

the other hand, a negative impact of accepting fiat currencies is evident. Furthermore the model confirms that investors value Founder's characteristics. A larger team acts as an important signal and is found as a determinant of fundraising success.

Furthermore, as presented in Table 25, logistic regression model indicates no significant correlation between control variables and fundraising success

CONCLUSION

The Initial Coin Offering, a means of crowdfunding for blockchain-technology companies, has the potential to change the way how startup companies raise money, provide liquidity to investors and give additional investment opportunities to early adopters.

In contrast to existing research, this master's thesis extends previous findings and in general brings three main contributions. Firstly, it presents a different literature perspective describing the main findings from equity crowdfunding and venture capital that have possible similarities with the ICO. The significance of such parallels is further proven by an econometric analysis. Secondly, this is, to the best of my knowledge, the first research based on a hand-collected and historically matched ICO database, which implies additional accuracy compared to data obtained on listing pages. Finally, this research is unique by including an insight into the importance of marketing activity and social media, as well as including a broader range of variables from different perspectives.

In this master's thesis, the performed econometric analysis uncovered the characteristics and determinants of fundraising success. Following the potential importance and on the other hand novelty of the phenomenon, it is crucial to understand the factors that determine the success of an ICO. The research framework was established on empirical examination of the effectiveness of different signals in equity crowdfunding and venture capital investments. The main drives of success are formed into four groups: ICO characteristics (project roadmaps), financial details (risk factors), founder's characteristics (board members) and marketing. Some determinants resemble those in the venture capital and crowdfunding context, while others are unique to the context of blockchain technology.

Determinants were explored on the stratified sample of 102 ICO projects launched in 2017. Although there are number of websites containing information about ICOs, there is no single site containing all information included in the analysis.

The performed econometric analysis testing ICO characteristics reveals the positive effect of the availability of a Pre-ICO event, white paper presence, published GitHub code and the use of the Ethereum platform on an ICO's success. Fundamentally, determinants are similar to the ones in crowdfunding theory related to venture uncertainty. The pre-ICO event, white paper and GitHub code alleviates strong information asymmetry characterized with ICO projects and so decrease venture uncertainty. Furthermore, the Ethereum platform becomes

a reputation in an ICO context and decreases venture uncertainty. Within financial details set of variables a positive correlation with the soft cap mechanism is found, which is in line with the research findings related to the All-or-Nothing crowdfunding model. Furthermore, it is proven that the indirect founder's investment through token retention is negatively correlated with an ICO's success. The set of variables closely related to venture quality are human capital and social capital, whereas based on the econometric results it is supported that a larger team size contributes to success.

To sum up, the findings strongly support that ICO investors follow valued and well-established practices and determinants of success in fundraising, even without any legal regulation.

Besides the determinants present in traditional funding mechanisms, my empirical analysis includes also variables specific to blockchain and the ICO context. ICOs accepting a higher number of currencies signal a greater proficiency of blockchain experts. A higher percentage of funds prescribed for marketing indicates awareness of marketing importance and positively correlates with success. However, the ICO projects that also offer a contribution to fiat investors signal potential distrust in the crypto market as well as a connection with traditional banking and negatively affect the success of an ICO.

However, the empirical analysis also pointed out some limitations. For example, the finding that the content of a white paper does not have any impact on success seems counterintuitive. On one hand it could support the notion that ICO investors act more irrationally than investors in the traditional market or the result is a consequence of either not appropriate measure of the quality of a white paper or small sample size. Furthermore, the finding that bonus schemes have no correlation with an ICO's success could be a signal that the dummy variable is not the optimal measurement. Additional limitations were in the small sample size and the problem with data accessibility and the manual coordination of data from different sources.

To conclude it is empirically shown which determinants a successful ICO should take into consideration: founders need to organize a Pre-ICO event, transparently spread information to potential investors through a white paper and by sharing a GitHub code, base the ICO token on a reputable Ethereum platform, have a strong team in place with appropriate indirect investment, offer a soft cap mechanism and organizes a marketing campaign that assures token recognition.

In addition to the presentation of the ICO phenomenon as a crowdfunding mechanism, the findings have several practical implications. Firstly, the insights that ICO investors in the decision making process follow traditional funding principles could help with designing efficient regulations in the way to protect investors and still enable founders to use ICO as an innovative funding method. Secondly, the results are beneficial for potential investors to understand which factors are important and need to attract their attention to make a prudent

decision. Presented determinants enable investors to assess ICO projects in a more structured and thorough way. Lastly, it could help founders to efficiently manage the ICO process.

Fruitful avenues for future research should also include an insight into the further development of ICO projects including a comparison of product output with stated goals. The inclusion of detailed information on the team, advisors and their network will prove additional value of future research. Another important extension that should be included is an investment behavior analysis.

To conclude, Ethereum developer, Charles Hoskinson as well as Ripple CEO, Brad Garlinghouse pointed out that the main problem with ICOs is skipping the safeguards required in traditional securities sales. In my opinion, future regulations will be on one hand the biggest threat of ICOs and on the other hand the opportunity to become a well-trusted and safe fundraising concept.

REFERENCE LIST

1. Adhami, S., Giudici, G. & Martinazzi, S. (2017). Why Do Business Go Crypto? An Empirical Analysis of Initial Coin Offerings. *Journal of Economics and Business*, *97*(1), 1–12.
2. Ahlers, G. K. C., Cumming, D. J., Günther, C. & Schweizer, D. (2015). Signaling in Equity Crowdfunding. *Entrepreneurship Theory and Practice*, *39*(4), 955–980.
3. Aitken, R. (2017). *Investment Guide to "Crypto" Coin Offerings rating blockchain startups.* Retrieved March 10, 2018 from: https://www.forbes.com/sites/rogeraitken/2017/01/06/investment-guide-to-crypto-coin-offerings-rating-blockchain-startups/#19f92fdf121b
4. Aldrich, H. & Baker, T. (2000). Blinded by cites? Has there been progress in entrepreneurship research? In D.L. Sexton & R.W. Smilor (Eds), *Entrepreneurship 2000* (pp. 377–400). Chicago: Upstart Publishing.
5. Amsden, R. & Schweizer, D. (2018). Are blockchain crowdsales the new "gold rush"? Success determinants of Initial Coin Offerings. *Concordia University working paper No.6*. Retrieved September 15, 2018 from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3163849
6. Anderson, L., Holz, R., Ponomarev, A., Rimba, P. & Weber, I. (2016). New kids on block: an analysis of modern blockchain. *Cornell University working paper arXiv: 1606.06530*. Retrieved December 15, 2017 from: https://allquantor.at/blockchainbib/pdf/anderson2016new.pdf
7. Baran, P. (1964). On Distributed Communications Networks. *IEE Transactions on Communications Systems*, *12*(1), 1–9.
8. Baum, J. A. & Silvermann, B. S. (2004). Picking winners or building them? Alliance, intellectual and human capital as selection criteria in venture financing and performance of biotechnology startups. *Journal of Business Venturing*, *19*(3), 411–436.

9. Belleflamme, P., Lambert, T. & Schweinbacher, A. (2013). Crowdfunding: Tapping the right crowd. *Journal of Business Venturing, 29*(5), 585–609.
10. Benedetti, H. & Kostovetsky, L. (2018). *Digital Tulips? Returns to Investors in Initial Coin Offerings.* Retrieved April 15, 2018 from: https://www.finyear.com/attachment/1045303/
11. Binham, C. (2017). *ICO regulation inconsistent as cryptocurrency bubble fears grow.* Retrieved July 15, 2018 from: https://www.ft.com/content/32315636-cb01-11e7-ab18-7a9fb7d6163e
12. Birru, J. & Wang, B. (2016). Nominal price illusion, *Journal of Financial Economics, 119*(3), 578–598.
13. BitcoinExchangeGuide. (2018). *Initial Coin Offering – Alternative ICO Cryptocurrency Token Guide.* Retrieved March 15, 2018 from: https://bitcoinexchangeguide.com/initial-coin-offering/
14. Bitcoin project. (2014). *Frequently asked questions.* Retrieved February 10, 2018 from : https://bitcoin.org/en/faq
15. BitcoinTalk. (2010). *Pizza for Bitcoins?* [published on forum]. Retrieved February 10, 2018 from: https://bitcointalk.org/index.php?topic=137.0
16. Bittrex INC. (2018). *How do I submit a token to Bittrex for listing?* Retrieved August 30, 2018 from: https://support.bittrex.com/hc/en-us/articles/360000475411-How-do-I-submit-a-token-to-Bittrex-for-listing
17. Bramanathan, R. (2016). A Securities Law Framework for Blockchain Tokens. *Debevoise & Plimptone LLP Research Paper.* Retrieved March 8, 2018 from: https://www.coinbase.com/legal/securities-law-framework.pdf
18. Casey, M., Crane, J., Gensler, G., Johnson, S. & Narula, N. (2018). The Impact of Blockchain Technology on Finance: A Catalyst for Change. *Geneva Reports on the World Economy, 21*(1), 1–30.
19. Cheng, E. (2017). *The people behind the hype-filled ICO craze are trying to regulate themselves*. Retrieved June 15, 2015 from: https://www.cnbc.com/2017/10/03/people-behind-the-hype-filled-ico-craze-aretrying-to-regulate-themselves.html
20. Chuen, D. L. K. (2015). *Handbook of digital currency: Bitcoin, Innovation, Financial Instruments, and Big Data* (1st ed.). London: Academic Press.
21. Coin Dance. (2018). *Market capitalization statistics*. Retrieved September 15, 2018 from: https://coin.dance/stats/marketcaptoday
22. Coinist. (2018a). *How to get your token listed on an exchange*. Retrieved June 20, 2018 from: https://www.coinist.io/how-to-get-your-digital-token-listed-on-an-exchange/
23. Coinist. (2018b). *50 Biggest ICOs.* Retrieved September 20, 2018 from: https://www.coinist.io/biggest-icos-chart/
24. CoinMarketCap. (2018). *24 Hour Volume Rankings (Exchange).* Retrieved September 15, 2018 from: https://coinmarketcap.com/exchanges/volume/24-hour/
25. Cong, L. W., Li, Y. & Wang, N. (2018). Tokenomics: Dynamic Adoption and Valuation. *Becker Friedman Institute for Economics at University of Chicago working paper No. 2018-49*. Retrieved March 28, 2018 from:

https://bfi.uchicago.edu/sites/default/files/file_uploads/WP_2018-49.pdf
26. Cooper, A. C. & Bruno, A. V. (1977). Success among high-technology firms. *Business Horizons, 20*(2), 16–22.
27. Cumming, D. J., Fleming, G. & Suchard, J. A. (2005). Venture capitalist value added activities, fundraising and drawdowns. *Journal of Banking and Finance, 29*(2), 295–331.
28. Cumming, D. J., Hornuf, L., Karami, M. & Schweizer, D. (2017). Disentangling Crowdfunding from Fraudfundin. *Max Planck Institute for Innovation and Competition Research Paper No. 16-09.* Retrieved March 28, 2018 from: https://www.hec.ca/finance/Fichier/Schweizer2017.pdf
29. Cumming, D. J., Leboeuf, G. & Schwienbacher, A. (2015). Crowdfunding Models: Keep-It-All vs. All-Or-Nothing. *Paris December 2014 Finance meeting EUROFIDAI-AFFI Paper*. Retrieved September 15, 2018 from: http://leeds-faculty.colorado.edu/bhagat/CrowdfundingModels-KeppItAll-AllorNothing.pdf
30. Dale, B. (2018). *How ICO can protect buyers from phising attacks.* Retrieved July 30, 2018 from: https://www.coindesk.com/icos-can-protect-followers-phishing-attacks/
31. Da Rin, M., Hellman, T. & Puri, M. (2013). *Handbook of the economics of finance* (2nd ed.). Amsterdam: North Holland.
32. Davidsson, P. & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing, 18*(3), 301–331.
33. De, N. (2018). *ESMA Seeks Public Input on Cryptocurrency Derivatives Policy.* Retrieved August 18, 2018 from: https://www.coindesk.com/esma-calls-for-public-input-on-crypto-based-derivatives-contracts/
34. De Clercq, D. & Dimov, D. (2008). Internal knowledge development and external knowledge access in venture capital investment performance. *Journal of Management Studies, 45*(3), 585–612.
35. Demers, E. & Lewellen, K. (2003). The marketing role of IPOs: Evidence from internet stocks. *Journal of Financial Economics, 68*(3), 413–437.
36. Downes, B. (2018a). *2017 Token Sales in Review (Part I).* Retrieved March 10, 2018 from: https://www.smithandcrown.com/2017-year-review-part/
37. Downes, B. (2018b). *2017 Token Sales in Review (part II).* Retrieved March 10, 2018 from: https://www.smithandcrown.com/2017-token-sales-review-part-ii/
38. Ethereum Switzerland GmbH. (2015). *Ethereum White paper.* Retrieved February 16, 2018 from: https://www.ethereum.org/
39. European Security and Markets Authority. (2017). ESMA alerts investors to the high risks of Initial Coin Offerings (ICOs). *ESMA statement 50-157-829.* Retrieved July 15, 2018 from: https://www.esma.europa.eu/sites/default/files/library/esma50-157-829_ico_statement_investors.pdf
40. EY. (2018). *EY research: Initial Coin Offerings (ICOs).* Retrieved July 15, 2018 from: https://www.ey.com/Publication/vwLUAssets/ey-research-initial-coin-offerings-icos/$File/ey-research-initial-coin-offerings-icos.pdf
41. Faggart, E. (2016). *The top 5 cryptocurrency failures of all time.* Retrieved September 15, 2018 from: https://bitcoinist.com/cryptocurrency-failures-all-time/

42. Farmbrough, H. (2018). *Investors shying away from ICOs in positive shakeout*. Retrieved September 22, 2018 from: https://www.forbes.com/sites/heatherfarmbrough/2018/07/20/public-investors-shying-away-from-icos-weekly-figures-suggest/#6b5777d62fc3
43. Financial Action Task Force. (2014). *FATF Report: Virtual Currencies, Key Definitions and Potential AML/CFT Risks.* Retrieved December 30, 2017 from: http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf
44. Financial Stability Board. (2018). *To G20 Finance Ministers and Central Bank Governors.* Retrieved March 25, 2018 from: http://www.fsb.org/wp-content/uploads/P180318.pdf
45. Fisch, C. (2018). Initial coin offerings (ICOs) to finance new ventures: an explanatory study. *Journal of Business Venturing, 34*(1), 1–22.
46. GitHub. (2018). *GitHub Facts.* Retrieved October 15, 2018 from: https://github.com/about/facts
47. Glier, G. C. (2018). *What are ICO & Token sale bounty programs?* Retrieved August 15, 2018 from: https://medium.com/blocktoken/what-are-ico-token-sale-bounty-programs-9d1c39fa3685
48. Google. (n.d). *Google Scholar Citations: Number of citations.* Retrieved February 2, 2018 from: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=satoshi+nakamoto&btnG=.
49. Haig, S. (2018). *German Stock Exchange Subsidiary announces crypto trading app Bison.* Retrieved September 8, 2018 from: https://news.bitcoin.com/german-stock-exchange-subsidairy-announces-crypto-trading-app-bison/.
50. Hall, T. M. (2017). *How to run an ICO – Advisors*. Retrieved July 15, 2018 from: https://tencapital.group/how-to-run-an-ico-advisors/
51. Hays, D. K., Stoeferle, R. P. & Valek, M. J. (2017). Crypto research report. *Incrementum AG No. II.* Retrieved February 2, 2018 from: https://cryptoresearch.report/wp-content/uploads/2017/12/Incrementum-Crypto-Research-Report-Edition-1-English-Version.pdf
52. HowToToken. (2018). *How to: Judge if the token will rise in value after ICO.* Retrieved August 30, 2018 from: https://howtotoken.com/for-traders/token-value-rise-ico/
53. ICObench. (2018). *Published ICOs.* Retrieved September 15, 2018 from: https://icobench.com/stats#stats-countries
54. Icodata. (2018). *The largest ICO event*. Retrieved September 20, 2018 from: https://www.icodata.io/ICO/ended
55. Ivanov, V. & Knyazeva, A. (2017). U.S securities-based crowdfunding under Title III of the JOBS Act. *The U.S Securities and Commission DERA White Paper*. Retrieved July 30, 2018 from: https://www.sec.gov/dera/staff-papers/white-papers/RegCF_WhitePaper.pdf

56. Kaal, W. A. & Dell'Erba, M. (2017). Initial Coin Offerings: Emerging Practices, Risk Factors, and Red Flags. In Florian Möslein & Sebastian Omlor (Eds.), *Forthcoming, Fintech Handbook* (pp. 17–25). Minnesotra: University of St. Thomas.
57. Kean, B. (2018). *Post-ICO Review: What happens to the tokens of the largest ICOs*. Retrieved September 15, 2018 from: https://cointelegraph.com/news/post-ico-review-what-happens-to-the-tokens-of-the-largest-icos
58. Kröner, A. & Wallace, C. (2017). *German market weighs Bitcoin futures.* Retrieved July 15, 2018 from : https://www.handelsblatt.com/today/eurex-exchange-german-market-weighs-bitcoin-futures/23573400.html?ticket=ST-14806183-nfHq13ZaqDGwxN5Fe4Or-ap3
59. Leland, H. E. & Pyle, H. D. (1977). Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance, 32*(1), 371–387.
60. Li, J., Mann, W. (2018). Initial Coin Offering and Platform Building. *Accounting Research, 54*(2), 525–622.
61. McCann, C. (2017). *Guide to launching an Initial Coin Offerings (ICOs).* Retrieved July 15, 2018 from: https://medium.com/@mccannatron/guide-to-launching-an-initial-coin-offering-ico-94587af2c8d5
62. MacMillan, I. C., Siegel, R. & Narasimha, P. S. (1985). Criteria Used by Venture Capitalists to Evaluate New Venture Proposals. *Journal of Business Venturing, 1*(1), 119–128.
63. Mollick, E. (2014). The dynamics of crowdfunding: An explanatory study. *Journal of Business Venturing, 29*(1), 1–16.
64. Momtaz, P. P. (2018). Initial Coin Offering. *Hamburg Financial Research Center e.V. Working Paper Series No. 31*. Retrieved August 15, 2018 from: https://www.hhfrc.de/fileadmin/user_upload/Website/Forschung/Working_Paper/HHFRC_No31.pdf
65. Mulders, M. (2018). *10 keys for evaluating Initial Coin Offering (ICO) investments.* Retrieved March 15, 2018 from: https://cryptopotato.com/10-keys-evaluating-initial-coin-offering-ico-investments/
66. Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System.* Retrieved March 15, 2018 from: https://bitcoin.org/bitcoin.pdf
67. Norry, A. (2018). *The History of the Mt Gox Hack: Bitcoin's Biggest Heist.* Retrieved July 10, 2018 from: https://blockonomi.com/mt-gox-hack/
68. Pagano, M., Panetta, F. & Zingales, L. (1998). Why do companies go public? An empirical analysis. *The Journal of Finance, 53*(1), 27–64.
69. Pietrewicz, L. (2017). Emerging trends in entrepreneurial finance: The rise of ICOs. *Institute of Economics, Polish Academy of Science discussion paper*. Retrieved August 10, 2018 from: https://www.researchgate.net/profile/Leslaw_Pietrewicz/publication/322197042_Emerging_trends_in_entrepreneurial_finance_The_rise_of_ICOs/links/5a4ab049aca272d294646e6b/Emerging-trends-in-entrepreneurial-finance-The-rise-of-ICOs.pdf

70. Poloniex LLC. (2018). *How can I get a coin listed on Poloniex?* Retrieved August 15, 2018 from: https://poloniex.freshdesk.com/support/solutions/articles/1000229325-how-can-i-get-a-coin-listed-on-poloniex
71. Prusak, M. (2017). *ICOs, Dumb Money, and Ethereum's (Eth)ical dilemma*. Retrieved June 15, 2018 from: https://www.coindesk.com/icos-dumb-money-ethereums-ethical-dilemma/
72. Reinhart, C. & Rogoff, K. (2008). Is the 2007 U.S. Sub-Prime financial crisis so different? An International Historical Comparison. *American Economic Review, 98*(2), 339–444.
73. Ribes, S. (2018). *Chasing fake volume: a crypto-plague.* Retrieved September 17, 2018 from: https://medium.com/@sylvainartplayribes/chasing-fake-volume-a-crypto-plague-ea1a3c1e0b5e
74. Roose, K. (2017). *Is There a Cryptocurrency Bubble? Just Ask Doge.* Retrieved September 15, 2018 from: https://www.nytimes.com/2017/09/15/business/cryptocurrency-bubble-doge.html
75. Robb, A. M. & Robinson, D. T. (2014). The capital structure decisions of new firms. *Review of Financial Studies, 27*(1), 153–179.
76. Russo, C. (2017). *Ethereum Co-Founder says crypto coin market is a time-bomb.* Retrieved October 18, 2018 from: https://www.bloomberg.com/news/articles/2017-07-18/ethereum-co-founder-says-crypto-coin-market-is-ticking-time-bomb
77. Sagipl. (2018). *How to create your own an ICO? And how to launch a successful ICO?* [published on blog]. Retrieved June 20, 2018 from: https://blog.sagipl.com/how-to-create-an-ico/
78. Schwienbacher, A. & Larralde, B. (2010). *Handbook of Entrepreneurial Finance: Crowdfunding of Small Entrepreneurial Ventures* (1st ed.). London: Oxford University Press.
79. Sedgwick, K. (2018). *46% of last year ICOs have failed already.* Retrieved September 20, 2018 from: https://news.bitcoin.com/46-last-years-icos-failed-already/
80. Sehra, A., Smith, P. & Gomes, P. (2017). *Economics of Initial coin offerings.* Retrieved March 15, 2018 from: http://www.allenovery.com/SiteCollectionDocuments/ICO-Article-Nivaura-20170822-0951%20%20-%20Final%20Draft.pdf
81. Subrahmanyam, A. & Sheridan T. (1999). The going-public decision and the development of financial markets. *The Journal of Finance, 54*(3), 1045–1082.
82. Szabo, N. (1996). Smart Contracts: building Blocks for Digital Markets. *Extropy Magazine number 16.* Retrieved July 15, 2018 from: http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html
83. Szabo, N. (2008). *Bit Gold.* [published on blog]. Retrieved December 30, 2017 from: http://unenumerated.blogspot.com/2005/12/bit-gold.html

84. Swiss Financial Market Supervisory Authority FINMA. (2018). *Guidelines for enquiries regarding the regulatory framework of initial coin offerings (ICOs).* Retrieved August 17, 2018 from: https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/
85. The European Parliament and the Council of the European Union. (2014). Directive 2014/65/EU of the European Parliament and of the Council of 15th of May 2014 on markets and financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU. *Official Journal of the European Union* Num. 173/349.
86. Tokenguru. (2018). *What is ICO escrow and why it is important?* Retrieved June 30, 2018 from: https://tokenguru.net/articles/what-is-ico-escrow-and-why-it-is-important/
87. U.S. Supreme Court. (1982). *U.S. Supreme Court. Marine Bank v. Weaver. 455 U.S. 551 No. 80-1562*. Retrieved July 15, 2018 from: https://supreme.justia.com/cases/federal/us/455/551/
88. United States Securities and Exchange Commission. (2017a). *Investor Bulletin: Accredited Investors.* Retrieved July 20, 2018 from: https://www.investor.gov/additional-resources/news-alerts/alerts-bulletins/investor-bulletin-accredited-investors
89. United States Securities and Exchange Commission. (2017b). *Report of Investigation Pursuant to Section 21 (a) of the Securities Exchange Act of 1934: The DAO*. Retrieved October 15, 2018 from:https://www.sec.gov/litigation/investreport/34-81207.pdf
90. United States Securities and Exchange Commission. (2017c) *Investor Alert: Public companies making ICO-related claims.* Retrieved July 20, 2018 from: https://www.investor.gov/additional-resources/news-alerts/alerts-bulletins/investor-alert-public-companies-making-ico-related
91. United States Securities and Exchange Commission (2017d). *Investor Bulletin: Initial coin offerings.* Retrieved July 20, 2018 from: https://www.investor.gov/additional-resources/news-alerts/alerts-bulletins/investor-bulletin-initial-coin-offerings
92. Yadav, M. (2017). *Exploring signals for Investing in an Initial Coin Offering (ICO).* Retrieved July 20, 2018 from: https://ssrn.com/abstract=3037106
93. Yavin, O. (2018). *How to create the perfect ICO marketing strategy*. Retrieved July 25, 2018 from: https://www.cointelligence.com/content/ico-marketing-strategy/
94. Zaitsev, D. (2018). *Overview of the ICO market and forecast amount of funds to be collected in 2018-2020.* Retrieved July 28, 2018 from: https://www.fxstreet.com/cryptocurrencies/news/overview-review-of-the-ico-market-and-forecast-amount-of-funds-to-be-collected-in-2018-2020-201805071425
95. Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies, 62*(3), 425–488.

APPENDICES

Appendix 1: Povzetek (Summary in Slovene language)

V magistrskem delu z naslovom Analiza fenomena zbiranja kapitala z začetno ponudbo kovancev (v nadaljevanju ICO) in dejavnikov uspeha, teoretično predstavim ICO pojav in na podlagi ekonometrične analize opredelim determinante, ki vplivajo na uspešnost ICO dogodka.

V teoretičnem delu s pomočjo časovnice povzamem temeljne točke razvoja blockchain tehnologije in kriptovalut, ki predstavljajo osnovo fenomena zbiranja kapitala z začetno ponudbo kovancev. Pri opredelitvi ICO dogodka dodam ključne ugotovitve analiz s področja skupinskega zbiranja kapitala (t.i. »*crowdfunding*«) in tveganega kapitala (t.i. »*venture capital*«). Zbiranje kapitala preko ICO dogodka je nov in s strani državnih institucij nereguliran pojav, zato predstavlja poseben izziv za zakonodajalce tako v Sloveniji kot po svetu. S pregledom trenutnega stanja regulativ in priporočil držav ter razvoja ICO trga v prihodnosti zaključim teoretični del.

V empiričnem delu na podlagi vseh ICO dogodkov v letu 2017 oblikujem reprezentativen vzorec in analiziram vpliv štirih skupin determinant na uspešnost ICO dogodka. Ob tem predstavim vzporednice z ugotovitvami analiz, ki temeljijo na tradicionalnih načinih zbiranja kapitala. V zadnjem delu predstavim ključne ugotovitve analize, uporabnost in možnosti za nadaljnjo raziskovalno delo.