

Initial Coin Offerings: Key indicators to succeed

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Biographical Note

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This work is the final task of he's master's programme.

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I dedicate this work.

Abstract

In our work we study the determinants of success of an Initial Coin Offer. Due to the exponential growing number of ICO's in the last 3 years we believe that this project is a major contribution to highlight the main determinants to the success of these operations.

We collected data from 198 ICO's that were finished during the year of 2018 and we gather information of 17 variables. With this data we build a binary model of the success of the operation which we define as the moment when the project is ready to be launched at the market after finishing the crowdfunding phase with or without achieving the pre-determined capitalization.

We found that there are 4 main variables that can determine the success of the operation, the whitepaper, a website dedicated to the operation, the placement of the operation in the GitHub platform and the negative effect of the possibility to invest with fiat money.

Some of our findings agree with the literature namely the effect of the whitepaper and the website but regarding the GitHub platform presence and the negative effect of investing with fiat money there are few references on the literature about the effects of these variables and the existing ones were studied under different scopes. Therefore, these are the contributes that this study can add to the literature.

Keywords: Initial Coin Offerings, ICO, Initial Crypto Asset Offerings, Cryptocurrencies, Crowdfunding, FinTech, Success.

JEL codes: E22; E26; G14.

Sumário

No nosso trabalho, nós estudamos os determinantes do sucesso de uma oferta inicial de moeda. Devido ao crescimento exponencial do número de ICO's nos últimos 3 anos, nós acreditamos que este projeto é uma contribuição importante para realçar os principais determinantes de sucesso destas operações.

Recolhemos dados de 198 ICO's que terminaram durante o ano de 2018 e recolhemos informação de 17 variáveis. Com estes dados construímos um modelo binário de sucesso da operação que definimos como o momento em que o projeto está pronto em ser lançado no mercado depois de terminada a fase de financiamento coletivo com ou sem atingir a capitalização pré-determinada.

Nós descobrimos que existem 4 principais variáveis que podem determinar o sucesso da operação, o whitepaper, um website dedicado à operação/projecto, a colocação do anúncio na plataforma GitHub e o efeito negativo da possibilidade de investir com moeda sem valor intrínseco.

Alguns dos nossos resultados estão de acordo com a literatura, nomeadamente o efeito do whitepaper e do website mas a respeito da presença na plataforma GitHub e do efeito negativo do investimento com moeda sem valor intrínseco existe menção na literatura dos efeitos destas variáveis mas estas foram estudadas de diferentes perspectivas. Desta forma, estes são os contributos que este trabalho poderá acrescentar à literatura.

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1. Introduction

Initial Coin Offerings, or ICO, are a recent form of raising capital that fundamentally work in a crowdfunding system. Due to the blockchain safety, security and credible mechanisms it is possible for a venture, blockchain-based, to sell digital assets, also named “tokens”, secured by cryptography means, as compensation for the investment made in that project.

An ICO is, in many aspects, a digital parallel of an Initial Public Offering (IPO).

The objective is to raise capital from an alternative financing source rather than the traditional financial institutions but in the ICO’s case, with a much more direct approach since there is no third party in these transactions and the investors are buying tokens, which are representative of their investment into the project.

The objective of this work is to study the most relevant variables that contribute to the success of the operation, that is defined in our study as the moment the project ends its crowdfunding phase and its launched into the market.

This new phenom uses peer-to-peer online transactions instead of using intermediaries as a bank or financial institution, the projects are supported by many FinTech companies, such as Ethereum for example, and it is integrated in the domain of alternative finance.

FinTech is the name of these innovations that started to influence the traditional system and result from the application of technology to finance.

Alternative Finance is a branch of modern finance dedicated to study and explore these new mechanisms, channels and instruments developing concurrently with the traditional system.

Moreover, alternative finance also study the changes in traditional procedures that do not represent an innovation itself but instead an alternative way, i.e., direct issues of bonds by companies to its consumers are not the standard procedure but this practice has been observed in several countries as Germany or UK.

Crowdfunding is already a useful mechanism of funds gathering with social investment, particularly useful to launch projects that need financial aid and prefer to avoid the well-

known debt system. Instead, these companies create an online profile for the business, normally in a crowdfunding platform such as Kickstarter for example, and try to raise investors via an agreement where it is established the investor's return in utility form, most of the times in terms of the new product or service that the company will create or provide.

The data collecting process was made by hand and each project that integrates the sample was individually analysed. Thereunto we crossed data from 7 different platforms and collected information of 17 variables.

We then selected projects that ended during the year of 2018 even due they may have started before.

Afterwards, we computed all the variables and estimated 2 models.

The first model was computed including all variables collected for the study while the second model was computed by using only the significant variables of the first model.

Despite the different conclusions in previous studies we verified the behaviour and contribute of specific variables such the disclosure of a document called whitepaper, that is a document with diverse information regarding the project, which contribution to the success of the operation was unclear due to diverging conclusions in the literature.

We also studied the impact of the possibility to invest with fiat money since it was suggested by a previous study that it would have negative impact despite not being a significant variable on that scope.

And our major contribution to the literature was the verification of the positive impact of our GitHub variable over the success of the operations in our sample. This variable was also mentioned in previous works, but it was not imputed as an independent variable as we did in our study.

This work is organized as follows: Chapter 2 will introduce the current literature regarding blockchain origin and purpose, cryptocurrencies expansion and growth, Initial Coin Offerings, procedure and goal, and the review of previous works that studied the variables that contributed to the success of these events.

Chapter 3 will summarize the theoretical model and the hypothesis formulated in this work.

Chapter 4 contains the methodology where we explain how we measure our variables and how we computed them into the model.

Chapter 5 contains the data and results where we give information regarding the statistics of our database and framework and econometrics parameters of our estimations and Chapter 6 that is the conclusion of our work.

2. Literature Review

This chapter is divided into three parts.

The first part is composed by a review over the blockchain and the cryptocurrencies. We explore the technological benefits for the financial sector to incorporate this technology, and we introduce the cryptocurrency origin, purpose and behaviour over the last decade. We also explore the peer-to-peer transactions and the possibility to use cryptocurrencies as an investment asset.

The second part is dedicated to Initial Coin Offers where we explain the process and the possible outcomes of the operation. We dedicated more time to explore the crowdfunding stage of the ICO than the market stage, since it is the first the scope of our work.

The third and last part of this chapter is dedicated to the literature dedicated to study the success of the ICOs. Even due some authors use a different definition of success; we not only explore all the definitions, but we also capture the individual contributes of each study.

2.1 The Blockchain and the Cryptocurrencies

The blockchain technology was presented as an alternative to electronic payments. According with Nakamoto (2008), the commerce over the Internet was dependent on financial institutions to intermediate the transactions between parties. This third element not only generates a limitation to the low volume transaction but is also responsible for the loss of the possibility to make non-reversible payments for non-reversible services. This mediation service was increasing costs to the transaction and suffered from a weakness of the trust-based model. While in a physical transaction between parties using physical currencies, the mediation costs and payment uncertainty can be avoided, there was no mechanism that could serve as trust party without increasing the costs of transaction. Therefore, there was a need of a new system, according to Nakamoto, an electronic payment system based on cryptographic proof instead of trust. With this new system it was possible for two independent parties to do transactions between each other without the need for a trusted third party that would be generation additional costs to the transactions.

A more recent study, Nofer et al. (2017), states that blockchain has a multiple industries utility, also concluded by Liu and Tsyvinski (2018), although the financial industry is normally seen has the primary use of the blockchain concept. Not only because blockchain is deeply connected with crypto currencies in general and with Bitcoin in particular, but also due to the significative process inefficiencies and massive cost base issue. Despite the arguments present before it is mentioned a problem related to identify the ownership, exposed during the financial crisis when the financial services could not guarantee the correct present owner of an asset, that lead to the JP Morgan Chase¹ situation.

A blockchain is data gathered in blocks (data packages) where each block contains information regarding multiple transactions. The blockchain is extended by the aggregation of addition blocks, has the number of transactions increase, and this

¹ In 2008, JP Morgan Chase acquired Bear Stearns, however the number of shares offered to the acquirer was larger than the number of shares outstanding in the books of Bear Stearns. Since it was not possible to clarify the accounting error, JP Morgan Chase had to bear the damage from the excess (digital) shares.

aggregation represents the ledger of the transaction history. Normally, these blocks are validated by cryptographic means and each one contains, in addition to the information regarding the transactions, a timestamp, it is the hash value of the previous block, also called “parent” and a random number for verifying the hash called nonce. This mechanism ensures the integrity of the blockchain from its first block, also called, “genesis block”, to the last one in the chain as shown by Zheng et al. (2018).

Another concept that complements this new methodology of online transactions is the notion of smart contracts approached by Szabo (1997), it is explained that it is possible to combine computer protocols with human interfaces to execute the terms of the contract. By combining the blockchain technology with the smart contracts there is no need for lawyers and banks to be involved in the transactions. Smart contracts apply not only to transactions but also to control ownership of properties, tangible or intangible as concluded by Fairfield (2014).

The works mention above agree that blockchain and smart contracts have a large range of utilization in many industries, Nofer et al. (2017) divides them into two groups, financial applications as crypto currencies and insurance, or non-financial applications as music industry, anti-counterfeit solutions or decentralized storage.

It also brings a value innovation characteristic to the network. Originally, the blockchain was designed to transfer only bitcoins, however, since it is open source, it can be redesigned to transfer other kind of assets. It is so versatile that many financial institutions have reshaped the technology in order to record, exchange and trade not only assets but also liabilities among themselves, Tapscott and Tapscott (2016).

It is a real concern for the financial industry that blockchain can replace some of their current services in terms, for example, in issues related with payment process. A payment for goods using a credit card today, is settled after a delay of days, while with blockchain it can be done in real time by adjusting the ledger.

Symbiotically with the acknowledgment of the blockchain technology, also the crypto currencies have been expanding in number and volume. Bitcoin, the first crypto, is a decentralized currency, it does not suffer from interventions of any government or legal entity, it cannot be redeemed by gold or any other commodity and it is digital. Its

framework is the peer-to-peer networks and it relies on cryptography for integrity, Nakamoto (2008). It is also highly liquid, has slow transaction costs, can be quickly transacted over the internet and works with micropayments, Grinberg (2011).

The process of creation of a new Bitcoin is called mining and they are created to reward computing power offered to the network. This mining process is an essential component of a cryptocurrency network and it consists in the offer of computing power from users to verify and record payments into the public ledger. However, it is needed specialized hardware with specific computing power. The aggregated Bitcoin network has a cumulative computing power resulting from the mining effort to verify and record the payments of its ledger. This process is highly competitive since a new Bitcoin may be found when the network receives a certain input of computing power, and since the input power that an individual can offer varies with hardware and efficiency in the mining process, no one knows when the next coin will be released, Hayes (2017), Biais et al. (2019) and Harvey (2016). However, it is important to understand that the mining generates a greenhouse-effect with increasing magnitude this means that the power consumption of the network tends to grow as miners input more computing power into the network Biais et al. (2019), in May 2018 the electricity consumed by the Bitcoin network was over the consumption of 6 million U.S. households and its effects tend to increase.

Regarding legal terms Grinberg (2011) concludes that Bitcoin operates in a “grey” area. According to the author the matter of legal depends on the consideration of Bitcoin as a security. If it is considered a security then it is under the jurisdiction that are applicable to securities however, since that it was not been classified as a security by most governments, if any, then there is no legal framework for Bitcoins or other cryptocurrencies.

Altcoins, crypto currencies that derivate from Bitcoin source code (they use the same cryptographic technology but a different algorithm), have emerged since 2009. Bitcoin source code is publicly available at GitHub² since it was meant to be open sourced. These altcoins first purpose was to improve the Bitcoin fragilities such as the energy consumed by its Proof of Work mechanism or limited number of coin supply, Chuen et al. (2017).

² Bitcoin source code available at <https://github.com/bitcoin/bitcoin>

This phenomenon created a market for digital currencies with low settlement risk. Despite the original intention of decentralization, there was the creation of centralized crypto currencies that were also on the market. These currencies were normally created by companies and transacted on a platform, and they control the creation, transaction, bookkeeping and verification of the digital currencies. The handicap of these currencies is that they are used only inside the company's platform since they were designed to support the business of the institution.

The main attraction to this type of currencies was the transaction speed, safety and the exclusion of intermediaries in the process. However, there were works that linked the digital currencies to money laundering and the possibility to anonymously finance terrorism due to the anonymous transaction opportunity, Hett (2008).

Once crypto currencies exchanges were created, the price behavior of these currencies fluctuated irrationally due to the detachment from economic fundamentals, Katsiampa (2017).

Moreover, according to Koutmos (2018) bitcoin value represented a holding period return of 3000% between January 2, 2013 and September 20, 2017 when it went from 13 USD to 3931 USD. At the April 4, 2019 the cryptocurrency market was valued at \$168,036,953,415³.

Bitcoin is the biggest cryptocurrency followed by Ethereum, the third cryptocurrency is Ripple (a centralized cryptocurrency), the fourth is Litecoin and the fifth is an altcoin called Bitcoin Cash. In table 1 we observe their market capitalization, price and circulating supply.

³ According to Coinmarketcap.com

<i>Rank</i>	<i>Name</i>	<i>Market Cap</i>	<i>Price</i>	<i>Circulating Supply</i>
1	Bitcoin	\$ 207 133 229 490	\$ 11 627,79	17 813 637
2	Ethereum	\$ 29 193 213 285	\$ 273,17	106 868 946
3	XRP	\$ 14 546 743 838	\$ 0,3417	42 566 596 173
4	Litecoin	\$ 6 567 608 154	\$ 104,86	62 630 987
5	Bitcoin Cash	\$ 6 201 649 953	\$ 346,70	17 887 563

Table 1 - Top 5 cryptocurrencies with respective market capitalization, price and circulating supply

Since cryptocurrencies have irrational volatilities and behave differently from other assets, several studies were done to verify the market efficiency and the utilization of these currencies has an investment asset.

Primarily the studies were focused on Bitcoin itself, Hayes (2017) concluded that the ultimate goal of every producer operating in the market was to obtain bitcoins, Hayes states that miners will only tend to mine other altcoin if there is a greater profitability than mining Bitcoins directly. It is also concluded that, since the cost of production drives value, anything that serves to reduce the cost of production, the increment of hardware efficiency, worldwide electricity power or lower mining difficulty, will negatively pressure the price.

Koutmos (2018) work concluded that Bitcoin's prices are not explained based on economic factors, but it was able to establish a strong connection between returns and transaction activity.

Wei (2018) tested the market efficiency in a cross-section of cryptocurrencies. His work concludes that market efficiency is higher, and volatility lower, in liquid markets and that cryptocurrencies already established in the market tend to improve in terms of market efficiency while the new ones tend to struggle.

Elendner et al. (2016) conclude that crypto currencies have a size effect like stocks and from the investor point of view, the crypto currencies were interesting investments for diversifying portfolios since they display high expected returns with large volatilities and at the same time remarkably low correlations between each other and with standard financial assets, allowing for diversification benefits. Katsiampa (2017) reached the same

conclusion and stated that due to the difference between Bitcoin and other assets on the financial market, it can be a useful tool for portfolio and risk management.

Another study, Liu and Tsyvinski (2018), also conclude that cryptocurrency returns have low exposure to traditional assets (stocks, currencies and commodities). But they also conclude that cryptocurrency returns can be explained by two factors, momentum and investors' attention.

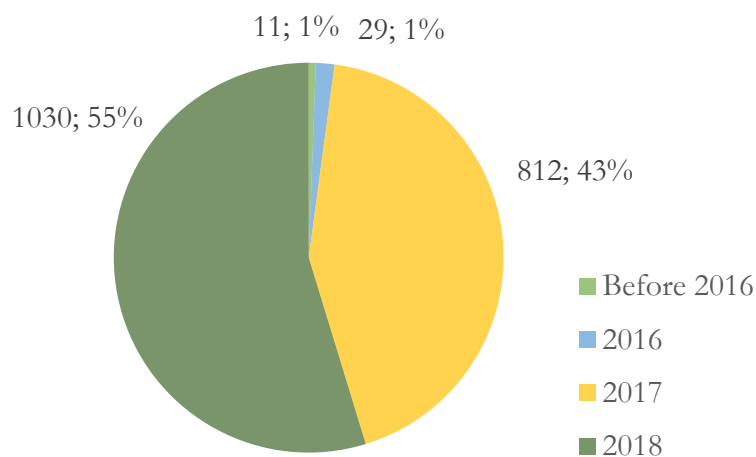
While the works mentioned above relate cryptocurrencies with traditional assets, Chuen et al. (2017), that was also investigating the possibility and performance of investing into cryptocurrencies as an alternative asset class, concludes that startups in the cryptocurrency sphere are financed to a process called Initial Coin Offer.

2.2 The characteristics of the ICO's

The Initial Coin Offers, also known as ICOs, are a recent and unregulated form of crowdfunding that raises funds using blockchain technology by selling venture related tokens or coins in exchange for capital, fiat money (money with no intrinsic value) or cryptocurrencies, Amsden and Schweizer (2018). These tokens are entries on a blockchain (or digital ledger). The owner of the token can create a new entry in the blockchain by reassigning the token ownership to someone else, Momtaz (2018).

These phenoms have been exponentially growing in the last 3 years possibly due to the exponential growth of value of the cryptocurrencies as suggested by Ante et al. (2018).

Graphic 1 reflects the exponential growth in number of events, before 2014 there were only six ICO registered, in the year of 2014 there were two projects listed, in 2015 there were listed three projects, in 2016 there was a significant increase in number of projects listed, there were twenty nine, however it is in 2017 that the number of registered ICOs rise exponentially to eight hundred and twelve, and 2018 is the year with more listed projects with 1 thousand and thirty projects.⁴



Graph 1 – Number of ICOs registered before 2016, 2016, 2017 and 2018 and respective representativity in the total number of ICO registered.

⁴ According to ICOdata.io

The first step for entrepreneurs that use ICO to fund raising is to write the whitepaper, Feng et al. (2018). This whitepaper is similar to an IPO prospectus and usually describes the project (it may contain a business plan or not, the blockchain technology that will be used, the background of the founding team and team members, the token distribution, pricing and token mechanisms and the use of the funds, Adhami et al. (2018). de Jong et al. (2018) bring attention that the whitepaper issued at the time of the ICO tend to be very technical and difficult to understand for most readers and has little impact on the fundraising success. Moreover, whitepapers are not audited or certificated by any authority and it may happen that they lack justification for using blockchain technology.

A founding team is composed by developers and members with previous experience with blockchain related projects and with members that have no experience in blockchain projects. Normally an advisory team is created either by founder's network or recruited online via the ICOs platform, Feng et al. (2018). There is set a marketing campaign to address possible investors that will play an important role in the success of the operation, de Jong et al. (2018). The work of Cumming et al. (2016) also supports the idea that by doing a marketing campaign before the beginning of the crowdfunding phase works as an insurance sign to investor in terms of possible fraudulent operation.

Subsequently, the project is launched into the crowdfunding phase. Since there is no regulation regarding these projects, namely in terms of ICO structure, there is absolute freedom in the structure of the campaign, de Jong et al. (2018), i.e., developers can choose to do a capped or uncapped sale, make use of minimum fundraising goals (soft cap) and/or maximum fundraising goals (hard cap) and even determine if the project will accept fiat money and/or cryptocurrencies.

At this point, pledgers can bid on the project via a dedicated website created by the company for that purpose and then transfer funds to the ICO's address or digital wallet, Feng et al. (2018).

Commonly at this stage, the social media network starts to disclose information to gather more investors Feng et al. (2018) and it is often commonly that ventures reward the early investors with free tokens or discounts, a process similar to the pre-ICO stage in case it had happen, de Jong et al. (2018).

The crowdfunding stage of the ICO is not limited in terms of time, it can take 1 day to 10 years to end, and there is not a specified criteria, unless written in the whitepaper, to clarify what is the capital target to end this phase. Works such as Catalini and Gans (2018) and de Jong et al. (2018) argue that the crowdfunding stage ends when the project reaches its minimum or maximum cap, previously determined and shared with the investors. However, there are cases where this requirement is not fulfilled and still the project enters the next stage. Adhami et al. (2018)

In 2013, there was a project called Ethereum that rose funds via an ICO. The project objective was to create a platform that could run smart contracts, decentralized computer programs that can automatically be executed upon predefined terms. These contracts allow crowd sale specific deals to be deployed on the blockchain and contain all crowdfunding details in form of a computer protocol, Ante et al. (2018). This platform was launched in 2015 and since then it is possible for investors to invest by the platform to the project they desire, this kind of platforms largely contributed to the exponential increment of ICO's over the last two years.

During this crowdfunding phase, the investors receive a quantity of tokens proportional to their investment. The quantity of tokens available, the minimum price of each token and the share of tokens that will be retained by the managing team is information that was previously disclosure by the team, normally in the white paper, Catalini and Gans (2018).

A token is a digital asset that acts like a digital currency and it is used to buy and sell goods and services or to held and store value, Catalini and Gans (2018). According to Amsden and Schweizer (2018), there are two broad types of tokens: utility tokens and security tokens.

On one hand, utility tokens give its owner the right to access a determined product or service, it is the most common type of token used in the ICO's and the study object of many papers, Howell et al. (2018). A good analogy to this type of tokens is buying the rights over an apartment before the building is build, if the rights over the apartment could be traded. In terms of ICO's it is normally used as a payment method in a new marketplace, i.e., the right over a product of service that the firm will produce after the implementation of the project. They are similar to donation and reward based crowdfunding projects, Amsden and Schweizer (2018).

On the other hand, security tokens represents a conventional security that is recorded and exchanged on a blockchain to reduce transactions costs and expect to generate some profit from the token price fluctuation, Howell et al. (2018).

The second stage of an ICO is the market stage. A project enters in the second stage when the company decide to close the crowdfunding phase and reveal the product quality to all uninformed agents. From this point on, only tokens are accepted has a medium of exchange products and buyers can trade tokens at a new market determined exchange rate, payoffs and profits are realized, Catalini and Gans (2018). If for any reason, the company decide not to launch the project all contributions are returned, the venture does not launch the project and the ICO ends.

Raising capital via ICO's is a recent phenom and according to Benedetti and Kostovetsky (2018), the closest analogue to the ICO is the Initial Public Offer (IPO) in equity however, there are key differences between these two operations, despite selling a different asset, the ICO firms are much younger and smaller and the ICO is done in a very precocious stage of the firm's life cycle and the ICO firms do not use an underwriter to help determine value and attract buyers, therefore it is still to understand how the IPO market characteristics of underpricing and post-IPO underperformance hold in the ICO universe.

And while IPOs are still an expensive operation, according to Conley (2017), they can cost about 7% of the capital raised and that is nor a practical solution for smaller companies. Therefore, ICOs are easy to do for blockchain startups, they raise money quickly and with few strings attached. According to the author, as long people are willing to invest on this kind of operations it is difficult to argue why companies would avoid it.

2.3 The success and determinants of the ICO's

Measuring success of an ICO is not a consensual process, due to the lack of regulation and supervision, some projects proceed to the market stage without reaching the pre-determined capitalization and there are examples of projects that still succeed despite not reaching the capitalization target. Adhami et al. (2018).

Amsden and Schweizer (2018) for example, measure ICO success using the total amount raised and trading, this definition is one of many used to measure crowdfunding projects Ahlers et al. (2015). Ante et al. (2018) uses the same measure.

On the other hand, de Jong et al. (2018) measure success as the ability to complete the crowdfunding stage and launch the project into the market stage, assuming that it has reached the capitalization target determined ex-ante (either soft cap, hard cap or a value between both). While Adhami et al. (2018), defines success of an ICO arguing that the project is successful if it is launched into the market independently of reaching the capitalization target.

Another definition of success is presented by Burns and Moro (2018), when they measure the success of an ICO by measuring the four-month return on investment (ROI) of the ICO.

Benedetti and Kostovetsky (2018) has another definition of success that inputs the price fluctuation of the token in the three months after it entering into the market stage, however the scope of this work was not to measure the success of an ICO but the returns of an ICO.

Despite the different concepts of success, the works mentioned above use similar variables nevertheless, the conclusions regarding the ICO variables are very distinct in some cases.

For example, in terms of the whitepaper, while Adhami et al. (2018), Ante et al. (2018) and Feng et al. (2018) agree that having a whitepaper has a positive impact over the success of the operation and also de Jong et al. (2018) agrees even due this work highlights the transparency factor of the whitepaper and not only the its existence, Amsden and Schweizer (2018) concluded that presenting a short whitepaper has a

negative impact over the success of the operation due to the venture uncertainty that it will generate over potential investors.

From Amsden and Schweizer (2018) conclusions venture uncertainty measured by the lack of presence on GitHub and Telegram, short whitepapers and a high percentage of tokens distributed, have a negative impact on the success of the operation. While the variables used to measure the venture quality, project CEOs with better LinkedIn profiles and larger team sizes, contribute positively to the success of the operation. This work also concludes that the decreasing attractiveness of the investor's opportunity set also impacts negatively the success of the ICO, namely the acceptance of fiat money.

Adhami et al. (2018) conclusions point in other direction in terms of whitepaper, this work concludes that the most important factor of a whitepaper is the code availability and not the size of the whitepaper. It also concludes that the existence of a pre-sale phase, the token services and profit are variables that positively impact the success of the operation.

Ante et al. (2018) conclusions support that the human capital of the project is crucial and has a significant impact over the impact of the success, the variables used were team network that measured the network of the founding team in terms of experience and social media influence (LinkedIn contacts) and the size of advisory team. The impact of the business plan is also highly significant and positive from the financial and utility perspective. The existence of the whitepaper is also a significant variable with positive impact over the success of the project. This study measured the impact of the project being associated with the financial sector and the results showed that it had a negative impact over the success of the operation.

Feng et al. (2018) concludes that the whitepaper is extremely important to the success of the operation since the credibility of the information contain in the document is important to protect the interests of the ICO investors. It also concludes that investors take into consideration the blockchain technology being used in the ICO project when making the investing decision.

The work of An et al. (2019) concludes that founding teams composed by individuals with business background, technology background and a larger social networks are able to raise larger amounts of capital in less time. The main contributed of this work is that

the disclosure of the founding team information and its collective human capital are positive correlated with the total amount of capital raised in the ICO.

Whereas de Jong et al. (2018) is the only paper measuring the GitHub repository as an independent variable with positive impact over the success of the operation. It also concludes that an ICO pre-sale, a campaign with shorted duration, a large team and not using bonus schemes during the crowdfunding campaign are positively related with the success of the project. It does also approach the information asymmetry problem and concludes that transparent projects with regular information disclosure can reduce the information gap and positively influence the result of the operation.

Burns and Moro (2018) analyse the success of the operation form the scope of signalling theory, human capital theory and investor sentiment and defined success via ROI nevertheless, they conclude that a higher initial token price negatively affect the success of the operation as the use of the Ethereum platform.

3. Theoretical Model and Hypothesis

Despite the different definitions of success found in the literature, this work defines success as the closer of the crowdfunding phase and consequently launch of the project into the market regardless the achievement of any pre-determined capitalization.

Our intention is to gather the most important variables in the literature and input some new variables that we believe are not present in the literature despite having a significant impact over the outcome of the operation.

With this new model we could verify the impact of relevant variables in previous studies and contribute to clarify the impact of these variables since the same variable can have different impacts in different studies, and additionally bring awareness of other variables that have not been approached from the scope we are studying them.

Due to the results obtained by Adhami et al. (2018) regarding the impact of the whitepaper over the outcome of the project, the work concluded that a short whitepaper has a negative impact over the success of the project, this findings suggest that, it is more profitable for the success of the project not to disclosure a whitepaper than to disclosure a short one. While other studies suggest that even if the whitepaper does not disclosure all the relevant information it is still a significant variable with positive to the success of the ICO, namely de Jong et al. (2018) and Amsden and Schweizer (2018).

Therefore, we hypothesize:

Hypothesis 1: The whitepaper disclosure has a positive impact over the success of an ICO.

While according to de Jong et al. (2018) the acceptance of investing with fiat money has a positive impact over the success of the ICOs, Amsden and Schweizer (2018) concluded differently and argued that the acceptance of fiat money had a negative impact over the success of the ICO. Furthermore, Grinberg (2011) concluded that investing with fiat money arise suspicion over the project since there has been many fraudulent ICOs that accepted any currency from investors.

Thereby, we hypothesize:

Hypothesis 2: The acceptance of fiat money has a negative impact over the success of the ICO.

Whereas, Adhami et al. (2018) concludes that the code availability is a significant and positively impacts the success of the ICO and de Jong et al. (2018) mention that the present at the GitHub repository in the pre-ICO positively impacts the success of the operation we believe that a different approach the GitHub variable was needed. Therefore, we hypothesize:

Hypothesis 3: The disclosure of technical information regarding the operation using the GitHub platform has a positive impact over the success of the operation.

By verifying these hypotheses, we will add more proves to the literature regarding the discussion of the determinants of success of an ICO (Hypothesis 1 and 2) and we will add a new scope over the GitHub repository that can contribute to future findings regarding this phenomenon.

4. Methodology

In our study, success will be the dependable variable and is define as a binary variable: (1) if the project reaches the market stage, with or without achieving the pre-determined cap, and (0) if it is not launch into the market.

As independent variables, we used seventeen (17) variables that can be organised into five (5) groups: Project Information, Team and Advisory, Token Information, ICO information and Technical Information.

Project information contains variables that are related with the information disclosure directly from the firm's different sources. We used whitepaper as a binary variable assuming the value of 1 if the company publish the document and 0 if it does not; Video explaining the business model and the product utility, is also a binary variable that assumes the value 1 if the company expose the video and 0 if it does not; a dedicated Website is also a binary variable that represents the existence of a company dedicated website to the launching, assumes value 1 if there is a website and 0 if there is not and Social media Channels is the number of social media where the company is present (this variable does not incorporate information regarding the GitHub platform since we wanted to input this information as a binary variable).

Team and Advisory contains information regarding the number of members that integrate the project team and the number of advisors to the project. We used: Team Members is the number of members that integrate the managing team and Advisors is the number of listed advisors to the project.

Token Information integrates the variables that are related with the future token that will be given to the investors or information regarding token disclosure in general. We used: Platform is a dummy variable that assumes the value 1 if the project is launched in the Ethereum platform and 0 if it is launched in any other platform; Tokens for Sale is a measure of exposure to the outsourcing investment, it was measured as a percentage of the total tokens existent and Initial Token Price that is the amount the investors will pay for each token they received.

ICO information contains the variables that were related with the crowdfunding stage of the project. We used: Duration is the number of days the ICO was open to

crowdfunding; Capitalization Gap is the difference between the soft cap and the hard cap defined for the project measure in thousand dollars; Currencies Accepted is the number of currencies that the project accepted, does not distinguish between fiat money and cryptocurrencies; Ethereum is a binary variable that assumes the value 1 if the project allows investors to invest using the Ethereum cryptocurrency and 0 if it does not; Bitcoin is a binary variable that takes the value 1 if the project allows investors to invest using the Bitcoin cryptocurrency and 0 if it does not; Fiat is a binary variable that takes the value 1 if the project allows investors to invest using fiat money and 0 if it does not and Pre-ICO is also a binary variable that takes the value 1 if the project had a public pre-sale and 0 if it had not.

Technical Information contains the information regarding the GitHub platform, it is a binary variable and takes the value 1 if the company is using GitHub to disclosure technical information regarding the project and 0 if it does not.

Therefore, our model was computed as following:

$$\begin{aligned}
 Success = & \alpha_0 + \alpha_1 Whitepaper_i + \alpha_2 Video_i + \alpha_3 Website_i \\
 & + \alpha_4 Social\ Media\ Channels_i + \alpha_5 Team\ members_i + \alpha_6 Advisors_i \\
 & + \alpha_7 Platform_i + \alpha_8 Tokens\ for\ sale_i + \alpha_9 Initial\ Token\ Price_i \\
 & + \alpha_{10} Duration_i + \alpha_{11} Capitalization\ Gap_i \\
 & + \alpha_{12} Currencies\ Accepted_i + \alpha_{13} Ethereum_i + \alpha_{14} Bitcoin_i \\
 & + \alpha_{15} Fiat_i + \alpha_{17} PreICO_i + \alpha_{17} GitHub_i + \mu
 \end{aligned}$$

5. Data and Results

Despite the exponential growth verified over the last 3 years, there is no standardize information disclosure neither an official data base for ICO projects neither a data base that covers all the ICO universe. Therefore, we used five data sources to gather information regarding the explanatory variables and two data sources related with Token market to verify if the project was ever launched on the market⁵.

Our sample was extracted from a list of 1030 ICO's that ended during the year of 2018 (750 projects were finalised in the first semester and 280 in the second semester). We collected information regarding 196 projects that ended over the year. Despite our sample size represent only 19% of the initial list it is important to explain that not all projects disclosure information regarding the variables in our study, leading to situation of lack or missing information, and some projects were accounted has ICO, but they were in fact pre-ICO of other projects.

Our sample incorporates project in a large array of activity sectors has presented in table 2. The most represented sectors are platform creation with representative of 28% in the sample, 18% are technology related projects and 11% with financial services and crypto markets.

⁵ Database accessed: www.icobench.com ; www.icorating.com ; www.trackico.io ; www.coinmarketcap.com ; www.icomarks.com ; www.icodrops.com ; www.icodata.io

Activity	Number of Projects	Representativity
Advertising	2	1%
Agriculture	2	1%
AI	1	1%
Applications	11	6%
Art	1	1%
Crypto Market	22	11%
Database	1	1%
Delivery System	1	1%
E-Commerce	3	2%
Energy	2	1%
Financial Services	22	11%
Gambling	1	1%
Gaming	10	5%
Healthcare	3	2%
Marketing	1	1%
Marketplace	4	2%
Network	5	3%
Parking	1	1%
Platform	54	28%
Real Estate	2	1%
Retail	1	1%
Security	2	1%
Social Media	2	1%
Social Organization	1	1%
Sport	1	1%
Supply and Logistics	1	1%
Technology	36	18%
Transports	2	1%
Turism	1	1%

Table 2 - Sample activity sector, number of projects and representativity

Table 3 presents the descriptive statistics of the variables in the sample.

Among all the projects in our sample there were 77 (39,29%) cases of unsuccess and 119 (60,71%) cases of success, which means that 119 projects were able to launch their projects.

The whitepaper was disclosure in 66% of the projects in our sample and 84% had a dedicated website while 90% had a video about the project and the business plan.

On average, each project was presented in 7 social media channels and the managing teams were composed by 12 elements while the advisory team was composed, on average, by 5 elements.

The average number of currencies accepted was 2. Bitcoin was accepted as a currency in 56% of the projects, Ethereum was accepted in 96% and fiat money was accepted in only 13% of the ICOs in our sample.

The average duration of the projects was 111 days and the mean capitalization gap was \$28,121,806.

The initial token price had a mean of \$0.42 and the average percentage of token for sale was 52%.

Ethereum was the platform chosen by 85% of the projects and 53% had a pre-ICO stage.

GitHub repository was used by 69% of the projects.

Variable	Observations	Mean	Maximum	Minimum	Median	Std. Dev.
<i>Dependent Variable</i>						
Success	196	0.6071	1.0000	0.0000	1.0000	0.4896
<i>Independent Variables</i>						
Whitepaper	196	0.6582	1.0000	0.0000	1.0000	0.4755
Website	196	0.8418	1.0000	0.0000	1.0000	0.3658
Video	196	0.9082	1.0000	0.0000	1.0000	0.2895
Social Media Channels	196	7.1582	11.0000	0.0000	7.0000	1.7804
Team Members	196	12.015	60.0000	1.0000	11.0000	7.6060
Advisors	196	5.3418	20.0000	0.0000	5.0000	4.1288
Currencies Accepted	196	2.0561	12.0000	1.0000	1.0000	1.5955
Bitcoin	196	0.4643	1.0000	0.0000	0.0000	0.5000
Ethereum	196	0.9643	1.0000	0.0000	1.0000	0.1861
Fiat	196	0.1378	1.0000	0.0000	0.0000	0.3455
Duration	196	111.0408	164.0000	26.0000	114.0000	27.8704
Capitalization Gap	196	28 121 806	3.50E+08	0.0000	18 000 000	40 176 131
Initial Token Price	196	0.4235	21.0000	0.0004	0.0800	1.7063
Percentage Token Sale	196	0.5156	1.0000	0.0000	0.5000	0.2149
Platform (<i>dummy</i>)	196	0.8571	1.0000	0.0000	1.0000	0.3508
Pre-ICO	196	0.5357	1.0000	0.0000	1.0000	0.5000
GitHub	196	0.6990	1.0000	0.0000	1.0000	0.4599

Table 3 - Descriptive statistics of the variables in the sample

First, we estimated model 1 that contains all the information of all variables in our study. We checked the global significance of the model and we verified that there exists statistical evidence that the success of the operation is not constant, and it is significantly influenced by the explanatory variables present in our model. Afterwards we calculated the joint significance of the statistically significant variables and we verified that there was statistical evidence that the probability of success of an ICO was significantly influenced by the join factors in our estimation of Model 1. Then we calculated the marginal effects of each statistically significant variable.

Table 4 contains the estimation outputs of our model and through model 1, we verified that whitepaper is a significant variable and the marginal effect (42.23 percentage points) positively impacts the success of the operation confirming H1, this results are in

agreement with Amsden and Schweizer (2018) and de Jong et al. (2018) and go against the conclusions of Adhami et al. (2018).

We also verified that the website variable is statistically different from 0 but also has a larger marginal effect (52.69 percentage points) over the success of the operation than the effect of whitepaper. Although the positive effect was suggested in previous studies there was no evidence that its contribution could be as significant as in our sample.

The variables video and social media channels are not statistically different from 0, however the team members variable is a significant variable with a low marginal effect (1.38 percentage points) over the success of the operation.

The variables advisors, currencies accepted, bitcoin and Ethereum were not statistically different from 0 in our regression however, the fiat variable was statistically different from 0 and had a negative marginal effect (-43.32 percentage points) over the success of the operation. This result confirms H2 and is in agreement with what is suggested by Amsden and Schweizer (2018) and disagrees with the results of de Jong et al. (2018).

The variables duration, capitalization gap, initial token price, percentages of tokens for sale, platform and pre-ICO were not statistically different from 0.

On the other hand the variable GitHub was statistically different from 0 and had a positive marginal effect of (27.54 percentage points), this finding is our major contribution to the literature since this variable was only addressed by de Jong et al. (2018) from the perspective of social media and in terms of code availability for Adhami et al. (2018). However, none of the works mentioned used a similar scope as our work.

Hereafter, we decided to estimate model 2 inputting only the statistically significant variables of model 1, whitepaper, website, team members, fiat and GitHub. In this model, the significance of the variable GitHub was higher than in model 1 while the Website variable obtained a lower significance. However, the estimation generates a decrease in explanatory power of the model which leads us to conclude that even due to the variables present in model 1 that were not statistically different from 0 still contribute to increase the explanatory power of the model.

Variable	(1)	(2)
Whitepaper	1.8157*** (0.4809)	1.7435*** (0.4383)
Website	2.4100*** (0.7889)	2.0327*** (0.7284)
Video	0.5347 (0.6602)	-
Social Media Channels	0.2515 (0.1419)	-
Team Members	0.05382* (0.0281)	0.0503** (0.0255)
Advisors	-0.0679 (0.0514)	-
Currencies Accepted	-0.1903 (0.2101)	-
Bitcoin	-0.0070 (0.5883)	-
Ethereum	0.2878 (1.1512)	-
Fiat	-1.8746* (0.6188)	-1.8986*** (0.5250)
Duration	0.0002 (0.0081)	-
Capitalization Gap	-4.56E-9 (0.2101)	-
Initial Token Price	-0.2444 (0.2004)	-
Percentage Token Sale	-1.7935 (0.2764)	-
Platform (dummy)	-0.5020 (0.7057)	-
Pre-ICO	-0.3928 (0.4579)	-
GitHub	1.1468** (0.4795)	1.3710*** (0.4094)
Constant	-3,9860 (1.9522)	-3.6732 (0.8170)
Pseudo R2	36.96%	31.70%
Wald Chi2	40.34***	47.30***

Table 4 - Logit regression results. Standard errors in parentheses. *, **, and ***=significantly different from zero at the 90%, 95%, and 99% levels.

Afterwards, we decided to test the cumulative probability of our binary significant variables (Whitepaper, Website, Fiat and GitHub) by pairing them two by two, on both models. This study assumes that the paired variable assumed the value of 1 while the other variables assumed the value of 0.

The results are showed in tables 5 and 6, referring to model 1 and 2 respectively.

The higher cumulative probability of the paired variables in model 1 was in pair Whitepaper-Website with the result of 98,56%, this allow us to conclude that 98,56% of the projects that had disclosure a whitepaper and created a dedicated website to the operation and do not have the possibility to invest with fiat money nor the presence in the GitHub platform succeed. While in projects that do not disclosure the whitepaper and do not have a website dedicated to the operations even due, they have the possibility to invest with fiat money and the presence in the GitHub platform, only 32,56% succeed.

Model 1	Whitepaper	Webiste	Fiat	GitHub
Whitepaper				
Webiste	98,56%			
Fiat	48,52%	63,07%		
GitHub	95,09%	97,22%	32,56%	

Table 5 - Cumulative probability of binary significant variables in model 1 paired two by two

In terms of model 2 we can verify a change in the paired variables, even due the pair with higher cumulative probability was the pair Whitepaper-Website with a probability of 97,76%. While the pair with lower cumulative probability was Fiat-GitHub with 37,10%.

Model 2	Whitepaper	Webiste	Fiat	GitHub
Whitepaper				
Webiste	97,76%			
Fiat	46,13%	53,34%		
GitHub	95,74%	96,78%	37,10%	

Table 6 - Cumulative probability of binary significant variables in model 2 paired two by two

Nevertheless, we verified that the pair Whitepaper-GitHub in model 2 has a higher probability than in model 1 ($95,74\% > 95,09\%$), the same happens with the pair GitHub-Fiat ($37,10\% > 32,56\%$). However, it does not happen with the pair of variables Website-GitHub, since in model 1 this pair has a higher probability than in model 2 ($97,22\% > 96,78\%$).

This suggests that excluding the nonsignificant variables, model 2, and in statistical terms, the probability of success of the projects that were in the platform GitHub increases and the probability of success of the projects that had a dedicated website decrease.

6. Conclusion

The purpose of our study was to identify the key factors that influence the success of an ICO. Despite the definition of success diversify between studies, we defined our own concept having in consideration the scope of this work. In fact, there is still some uncertainty regarding the core variables that influence the success of an operation of this nature. However, we believe that our study is relevant since we bring another perspective for some variables that have not been considered important in previous works that may be considered in future research regarding this fascinating topic.

The data used in this work was collect by hand from seven different platforms, it is extremely hard and a time-consuming task to collect information of many events without a standardized platform and without a standardized procedure to disclosure information. Nevertheless, we were able to collect information of 17 variables of 198 projects that ended during the year of 2018, which is the year with more operations registered. About 119 projects succeed while 77 could not reach the market stage.

With this information we were able to estimate 2 models and we conclude that despite we find only 5 statistically significant variables, the disclosure of the whitepaper that has a positive contribute to the success of the operation, the existence of a website dedicated to the project that has revealed as a significant variable with positive impact over the outcome of the operation, the team composition in terms of size also has a positive impact over the success of the operation, the possibility to invest with fiat money is the only significant statistic that has a negative influence over the result of the operation and the presence in the GitHub repository platform that also has a positive relation with the success of the ICO. These results are consistent with the results obtain in other works even due there is evidence that some variables impact is still unclear.

This work has two important contributes to the literature, first the GitHub platform results is undeniable significant and should be included in any further study with a similar objective. This variable is not present in previous literature and due to the results obtained it should be studied in a broader sample. Our findings still suggest that GitHub platform significance increases when we reduce the number of variables in our model.

The second contribute is regarding the possibility to invest with fiat money. The results obtain with this variable brings awareness for a negative effect between the fintech and the traditional currencies, it is still to conclude if it only effects ICO or if other method of raising capital using fintech.

The limitations of this work are undeniably the sample size used. Due to the difficulty of collecting information regarding the events we highlight the need of organise and centralize the information regarding ICO's in a unique database. This way further studies could reach a larger array of cases and take more solid conclusions regarding the topic.

Future investigations can follow the scope of this work by increasing the sample size and changing the variables in order to estimate a more robust model and possibly, understand and standardize the variables that should be consider succeeding in an ICO project.

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