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B.Sc. ECONOMICS AND FINANCE

BACHELOR THESIS

The Coin Offering Boom, What Might Have Explained It And Future Expectations

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ABSTRACT

This study explores Initial Coin Offerings from what they are to how they work. Coin offerings are detailed on a regional level, as well as in an aggregated, or world level. The discussion analyzes some characteristics of these operations, as well as the regulation in different regions and some consumer and business efficiency aspects per country. Those aspects will be linked to the growth of Initial Coin Offerings through a panel data regression, showing that the change of some of those factors overtime, indeed had an effect in the number of coin offerings per country.

INTRODUCTION

The first chapter of this Bachelor Thesis provides a broad view on the topics that will be analyzed. Initially, it summarizes the core definitions used throughout this paper. For that matter, Blockchain, Initial Coin Offerings and its popularity, tokens and tokenizations are included. There is a general examination of Coin Offering regulations that have been set in place. Besides mentioning important statements concerning Coin Offerings from these institutions, the concept *Sandbox framework* is introduced. Then there is a discussion of the volume of Coin Offerings, both on a global level and at a country scale. The number of Offerings as well as the growth the offerings are discussed and presented with data. This first chapter helps understand the developments that have happened around these operations as well as their historical volume.

The second chapter contains the hypothesis and quantitative frame of the research. The aim is to find a model that can explain the historical Coin Offering volume developments from section 1. First, some potential variables that could explain the volume of Coin Offerings per country are presented. Second, comes the methodology to follow given that there is a panel data set. Finally, the estimations and results are presented and argued. The main tools used in this chapter were Excel and STATA.

Last chapter meets some final thoughts and it also exposes conclusions based on the qualitative analysis from section 1 as well as the quantitative analysis from section 2.

This final chapter also presents some limitations of the estimations from both the proposed hypothesis and the model estimations.

1. HISTORICAL BACKGROUND

1.1 Definitions

Blockchain is commonly known to consist in a distributed ledger technology (DLT) that allows data to be stored across many servers and to be updated in real time (Mearian, 2019). Therefore, it is a decentralized alternative to conduct operations. Many companies have developed the blockchain technology and use it to provide services to third parties. One of the most renown companies to do this is Ethereum. Furthermore, they have their one token, ETH, that freely trades with other cryptocurrencies in the secondary markets.

Initial Coin Offerings, also called ICOs, are a form of venture capital. An ICO bids one company's shares or participations in a specific project and are offered as tokens. Tokens are digital assets; their value can revalorize, such that it might generate some interests for those who trade them in secondary markets. They could be exchanged for fiat money or for other large volume cryptoassets, like Bitcoin or Ether. ICOs are based on Blockchain. The Ethereum platform is one popular Blockchain provider; and companies that wish to issue ICOs or incorporate Blockchain use Ethereum. Coin Offerings could be considered a middle point between Initial Public Offerings, the traditional share issuing of the company, and crowdfunding, the collective alternative to fund or finance companies. Some disadvantages of these type of operation is the speculation, fraud and lack of regulation around it. Initial Coin Offerings are designed to be an investment, and therefore are qualified as utility tokens. Investors hold utility tokens and can earn profits in financial markets, or as part of the company's compensation. One of the reasons behind those disadvantages is that it is a decentralized asset, only agreed on by two parties. The popularity of these type of operations is mainly concentrated in Asian countries and was rapidly restricted in other countries, like the United States.

The issuance of coin offerings has decreased in 2019 and 2020. In year 2018, the funding volume of ICOs reached its peak (PWC, 2020). Since then, very few have followed. Statistics show that one reason for this is investors' distrust, given that more than half of the announced coin offerings are scams, and from the group of true ones, only a limited percentage succeed.

On the other hand, Security Token Offerings, also known as STOs, have apparently started to increase since 2018. STOs, or so called *tokenizations,* consist of the transformation of an already regularized asset. To *tokenize* assets or securities, a document that contains the underlying security characteristics and conditions is created and uploaded into the Blockchain. This automatizes most of the assets' processes, such that the contract that can be carried out and updated automatically through the Blockchain platform and the smart contract technology. In this case, the products are security tokens.

1.2 Regulation

Each country has its own regulatory financial institutions, thus the regulations or comments on this topic varies meaningfully depending on each institution's system to create policy. Within the European Union national regulators follow the guidelines of European authorities or institutions. This section will broadly discuss the regulation of coin offerings in some countries of interest, like countries or regions where there has been a significant volume of these types of operations. The regulation itself is not of much interest to the purpose of this research. Contrarily, the effect of that regulation on companies or consumers might help make sense of why some regions have more volume and others do not.

The United States has no specific regulation upon coin offerings. The first ICOs conducted in the country were overlooked, and not considered securities. In 2018, the financial authority (SEC) used the Howley test, a precedent to distinguish financial contracts from the rest of products. Several lawsuits have taken place, in which the SEC alleges that the conducted operations should have abided by their regulations. Since then, it is necessary that the company presents the project prior to the offerings to be examined and assess whether they must be classified as securities. A report about the SEC and their

view around ICOs states that the institution keeps a *broad point of view* on its regulatory powers (Achilles et al., 2018).

Regarding the regulation in Europe, a formal common framework has not been introduced around ICOs. Nevertheless, the European Banking Association (EBA) and the European Securities and Markets' Authority (ESMA) have published statements around the crypto-asset regulation**. Some European countries have developed their own regulations following those guidelines, including United Kingdom, Switzerland, Denmark, and a few others. Whereas Austria and Lichtenstein have created regulation specifically for ICOs and STO operations.

Overall, most European countries started to implement the *Sandbox* frame a few years back. The *Sandbox* method enables regulators to supervise companies that try innovative technologies beyond the existing legal framework. Under *Sandbox*, companies innovate while being supervised by a financial entity, such that the regulations considered for that company are probably specific to that business's decisions and are implemented as the company develops. The Maltese government has also created their own regulation around electronic money, electronic financial instruments, and tokens. The Virtual Financial Assets Act is "a framework that supports the innovation and new technologies for financial services in the area of crypto-assets whilst ensuring effective investor protection, financial market integrity and financial stability" (Malta Financial Services Authority, 2018). If the activities are conducted in or within Malta, then those assets can be regulated by this act.

European initiatives that consist somehow of cryptoassets, have settled in the EU countries in which some type of regulation has been announced or set in place. Nash and Desico are two examples of companies that conducted tokenizations that collected millions of euros, in Lichtenstein and Lithuania respectively. Heterosphere and Aragon also collected millions of euros by issuing Coin Offerings in Austria and Switzerland, respectively. Even Germany, that is known for having very conservative consumers according to Accenture, Neufund successfully raised capital with a tokenization.

For the case of Spain, one example of a company that conducted an ICO is 2gether. The offering conducted had its financial asset launch in Malta to abide by the Virtual

Financial Asset act. For their banking activities, they abide by the Bank of Spain. Additionally, two STOs were carried out between 2018 and 2019. Both were bond *tokenizations*, the first one consisted of bonds issued by Santander and the other consisted of bonds issued by BBVA. The entity that regulates financial markets in Spain, CNMV, did follow and incorporated the general ESMA statements, but such framework does not regulate ICOs *per se*, it only argues in which cases should Coin Offerings be considered as regular Initial Public Offerings.

Additionally, it was only in 2020 when Spanish Authorities started to consider the need of creating a Sandbox framework themselves. Some Spanish companies that belong to the in Fintech and finance fields, had wished to implement such technologies in Spain, but were obligated to desist due to lack of regulation. Other Spanish initiatives, like Aragon, preferred to settle abroad.

Cayman Islands did not have an ICO-specific regulation, it did have an advantageous legal frame for securities issuance set in place. It must be said that most companies that issued coin offerings in this territory, do not operate there (Reeves, 2018). The official regulator, CIMA, was able to shape tokens into the existing and favorable legal framework. The compliance includes a fund investment license, anti-fraud regulation, and abide by other international standards. Only in 2020, has the Cayman Islands Authority issued the Virtual Asset Bill, specific for virtual offerings. Estonia is the next interesting country; it has been the focus of over three hundred coin offerings. The country did not have specific regulations around ICOs but is known to have a fast and simple "bureaucratic management" (Ferrer-Bonsoms, 2020). Companies must comply with similar requirements as in the Cayman Islands, as well as several European regulations. Estonia is preferred by start-ups due to its flexible cross-border management permits and tax advantages (Liive, 2018). Switzerland has no specific regulation, but the financial authority (FINMA) was one of the first to provide "guidelines" for ICOs.

1.3 Coin Offering Market

1.3.1 Global overview

Unfortunately, there is not an official database that gathers information for either ICOs, STOs, nor crowdfunding platforms. This is why the information was collected from different sources, including ICO websites, ICO trading platforms, and studies from several consulting agencies. The coin offering data was gathered from icobench.com, ico.tokens-economy.com. It might be interesting to start with an overview of the global ICO market.

The United States, Hong Kong, Russia, United Kingdom and Switzerland are some of the countries responsible for most of the coin offering volume worldwide. Still, icobench.com gathers information for ICOs conducted in any country.

The data analysis will be based on their worldwide ICO information. If coin offerings were classified by type of industry, the industry that conducts more ICOs would be platforms and service websites, followed by cryptocurrency platforms and other business services. Whereas the performance of the coin offerings registered to date will be displayed next. Figure 1 shows the accumulated number of ICOs between the years of 2016 and 2020, according to icobench.com. 2017 and 2018 seem to be the years in which there were a large number of published ICOs. The bright blue line represents the number of ICOs, from the total published ICOs, that successfully raised funds.

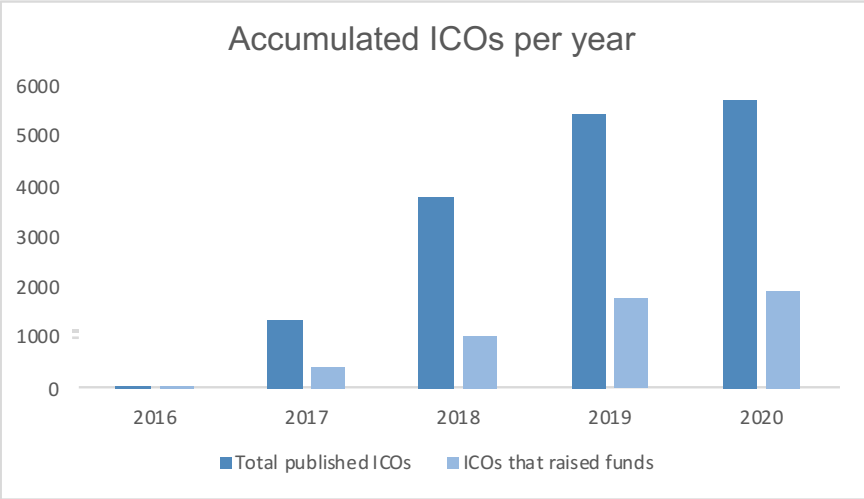

Figure 1. Source: own elaboration. Data gathered from averaging the ICOs information from icobench.com and ico.tokens-economy.com.

Whereas in Figure 2, shows the number of new ICOs that were published per year, between 2017 and 2020. 2018 appears to be the year with more published ICOs. But it is

also worth noticing that the newly published ICOs that successfully raised funds are at most, half of the new ICOs per year. In 2019 there is a decrease of published offerings, while in 2020 the volume of operations reached its minimum.

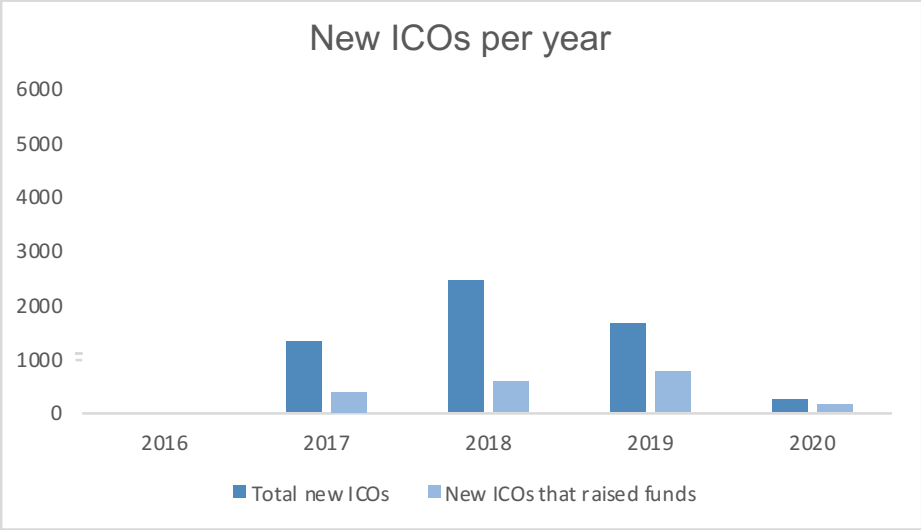

Figure 2. Source: own elaboration. Data gathered from averaging the ICOs information from icobench.com and ico.tokens-economy.com.

1.3.2 Data disaggregated by country

So far, the data was analyzed in an aggregated scenario, and having an overview of the global tendency is useful for a deeper understanding of the behavior of the market. But in reality, only few countries dominate the global tendencies given that they hold the largest percentage of these operations. This fact makes necessary looking for the volume of Coin Offerings per country.

Figure 5 and 6 present accumulated total and raised fund ICOs respectively for a few of the countries of interest. Notice that those images contain a sample of 10 countries, those countries are, according to Icobench, the ones with the largest volume of Offerings. In following sections, the sample will not be limited to only large volume countries; it will gather a total of 45 countries with different volumes. That way the sample will be diverse and contrastable.

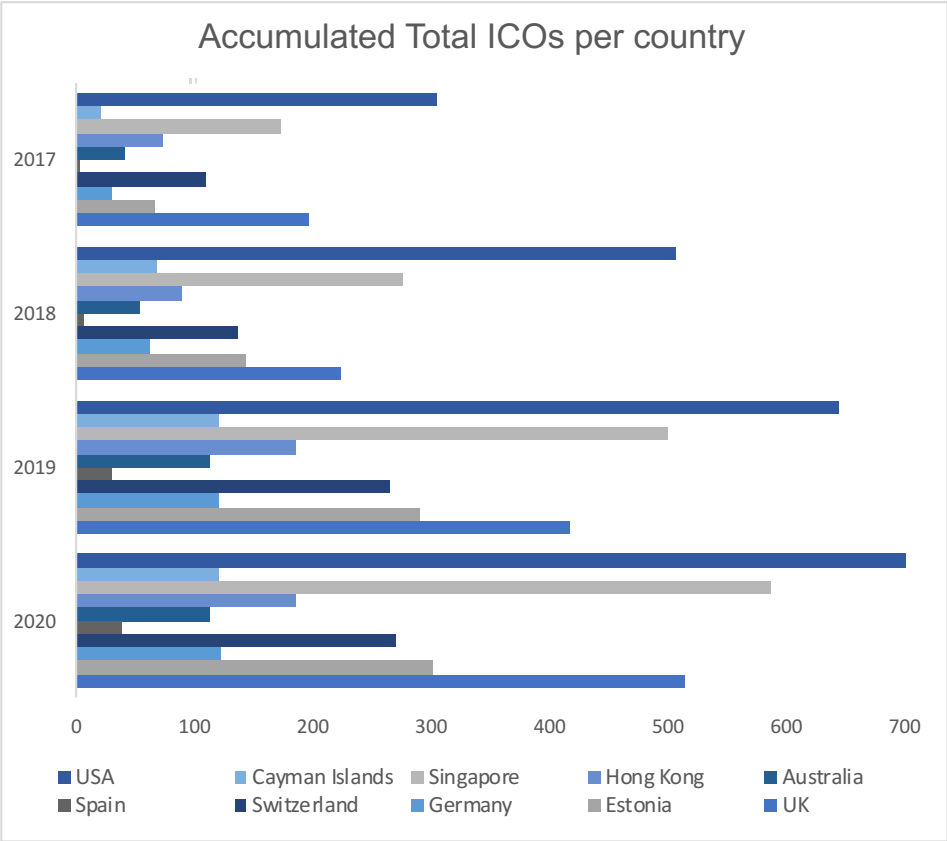

Figure 5. Source: own elaboration. Data gathered from icobench.com and ico.tokens-economy.com.

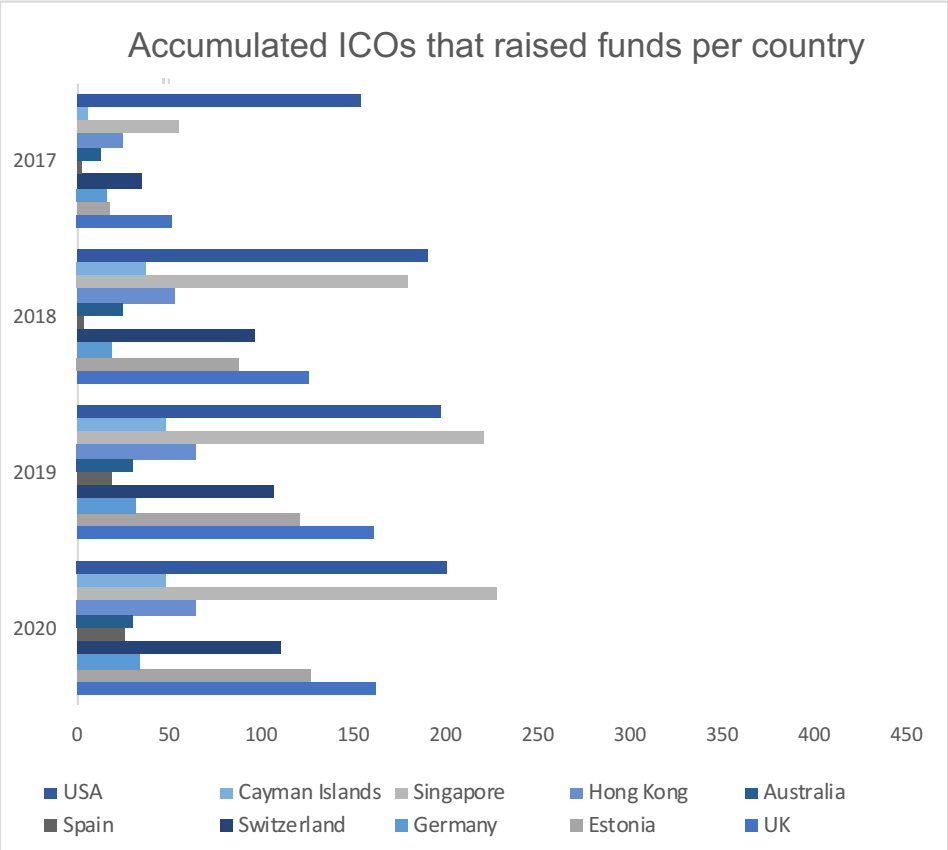

Figure 6. Source: own elaboration. Data gathered from icobench.com and ico.tokens-economy.com.

Table 1. Proportion of Coin Offerings that raised funds by country.

Country	2017	2018	2019	2020
UK	27%	56%	38%	32%
Estonia	26%	61%	42%	42%
Germany	53%	31%	27%	28%
Switzerland	32%	66%	40%	41%
Spain	67%	50%	66%	67%
Australia	33%	47%	27%	27%
Hong Kong	35%	59%	35%	35%
Singapore	32%	65%	44%	39%
Cayman Islands	30%	55%	40%	40%
USA	50%	38%	31%	28%

Source: own elaboration. Data gathered from icobench.com and ico.tokens-economy.com.

For now, 10 countries are enough for displaying purposes. The graphic legend is organized, such that the first country coincides with the first line, the second country coincides with the second line, and so on. The United States leads in number of offerings, followed by Singapore and the United Kingdom. The successful proportion of offerings stands around 30%, as shown in Table 1. Notice that 2018 was a year in which most of the countries has an increase in the raised-funds ICOs. Year 2018 was also the peak year for the Ether price and number of new published coin offerings worldwide.

Spain is included, not because Spanish offerings led the ICO market, but because there is an interest in understanding the development of such operations in the Spanish market, and perhaps in the limitations around the development of coin offerings in the country. Spanish companies entered the market later, being their first and only operation in 2017, and just over 25 of those have been successfully conducted. Although the number of operations is very low, the proportion that was able to raise funds was of at least 50% throughout the 2017-2020 period.

The following figures, Figure 7 and 8, indicate the percentage growth in coin offerings, from both the total coin offerings and the ones that raised capital. In Figure 8, it is shown that from 2017 to 2018, operations that raised funds went up around 100% per

country, on average, with the exception of Estonia and Cayman Islands, increasing 300% or more. This outcome follows the idea mentioned earlier that a higher growth of raised-funds coin offerings coincides with the Ether price boom. Spanish companies had a delayed entry in the market, so the growth in 2019 rose around 400%. In 2020 the growth is practically null; these operations seem to cease.

Cayman Islands has entered the list of popular countries to conduct and ICO in, and the increase of coin offerings between 2017 and 2018 was over 200%. The small territory is already known to be attractive by investment funds. As mentioned previously, although Cayman Islands did not have an ICO-specific regulation, it did have an advantageous legal frame for securities issuance set in place. It must be said most companies that issued coin offerings in this territory, do not operate there (Reeves, 2018).

Estonia, also lacking specific regulation, is preferred by start-ups due to its flexible cross-border management permits and tax advantages (Liive, 2018). Switzerland's Financial authority (FINMA) has only set some guidelines to be followed, and it is known for having rather liberal jurisdictions for companies. These last three territories' respective authorities were quick to categorize ICO tokens as utility tokens. From Table 1, it is shown that the 3 territories had at least 40% (except 2017) of raised-funds coin offerings.

The United Stated, the strict categorization of ICOs as securities drastically decreased the new ICOs in the country as seen in Figures 5 and 6. An article from the Cointelegraph stated that companies would prefer to conduct their offerings far from US investors, by issuing in different locations in order to avoid the SEC (Post, 2020).

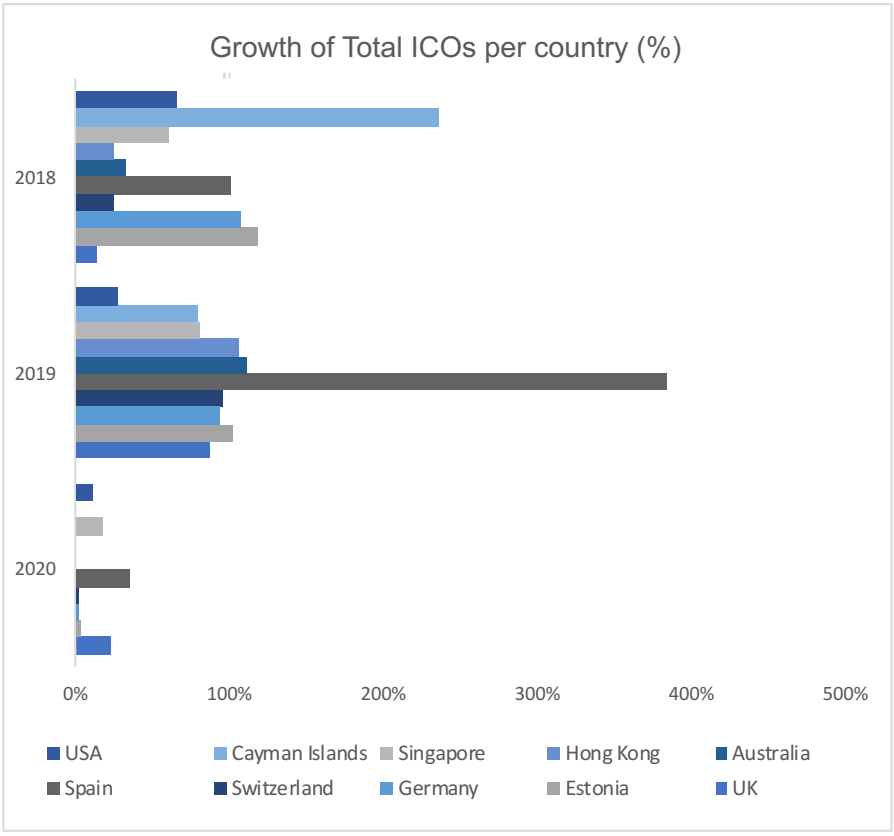

Figure 7. Source: own elaboration. Data gathered from icobench.com and ico.tokens-economy.com.

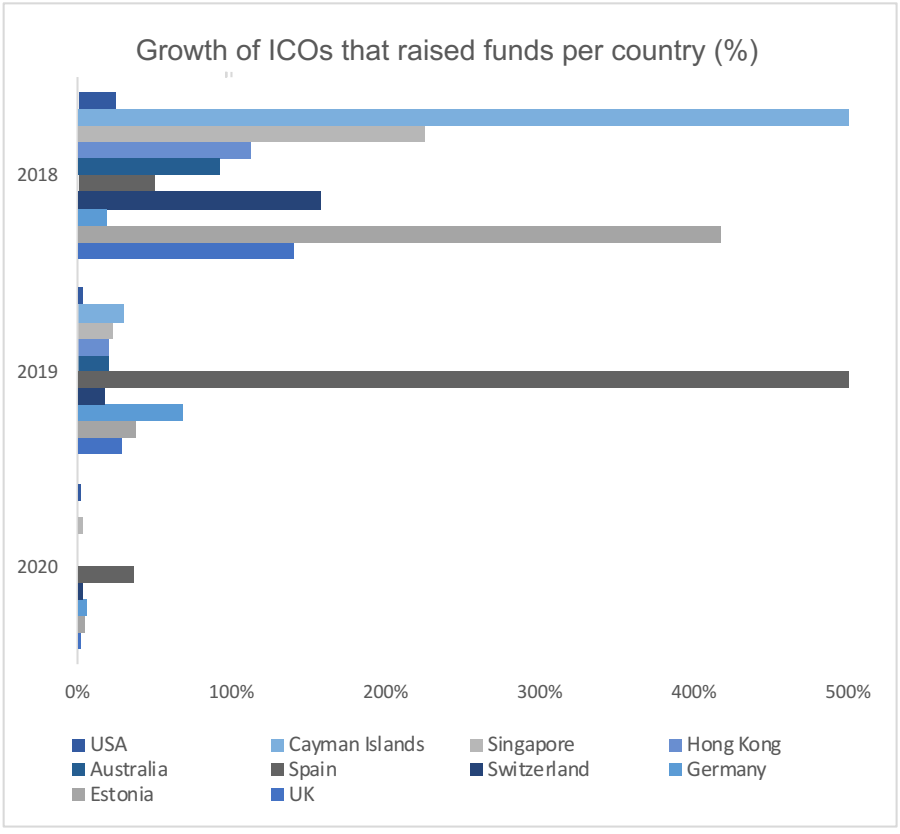

Figure 8. Source: own elaboration. Data gathered from icobench.com and ico.tokens-economy.com

2. METHODOLOGY

2.1 Hypothesis

So far, the global trend has been explained, as well as the trend of the most ICO popular countries. The regulation in some of the countries is almost non-existing, while countries that have set strict regulations showed a decrease in the volume of offerings. The aim of this new section is to find a quantifiable source for factors that might have affected the surge of coin offerings in each country. Not only will quantifiable variables for regulations will be looked for, but also quantifiable variables in markets, in consumer behavior per country and in business efficiency per country. And if those variables are found, would it be possible to find a reliable and significant model in which the coin offering growth is explained by such factors?

Up to this point, it has been shown that there was a curious behavior in these types of operations. Showing what could influence the popularity of coin offerings is relevant for several reasons. On one side, cryptocurrencies and crypto-assets appear to have had a surge in 2021. Bitcoin, Ether and other crypto have reached record trading prices. There seems to be an additional acceptance and interest, at least from consumers' point of view, in such assets. On the other hand, it is companies' interest to find the most competitive and independent financing for their projects. Having said this, this hypothesis and model seems to be more relevant now than ever. Could operations if this type potentially become a recognized way of financing for companies?

For this exploration section the results were gathered in Excel.

2.1.1 Ether price's correlation to the number of announced ICOs and investor behavior

At least 90% of all-time published Coin Offerings rely on Ether services to develop their tokens (Icobench, 2020). This section will try to show if there is a correlation between the Ether price and The Coin Offerings that could be worthwhile using in a

model. This correlation will be considered for observations of both variables between 2017 and 2020.

Ethereum is a company that develops blockchain technology and benefits from third parties that wish to apply the blockchain system in the development of their projects. Ethereum conducted its own coin offering in the early stages, offering Ether as their token, and collected around $5 million, that today are worth over $50 million in the market (Del Castillo, 2020). Not only is the value of ETH is traded in several markets and platforms; but it is also the token or tool for decentralized transactions in different platforms. For instance, trading platforms use the Ethereum technology, that consists in signing digital agreements, and allows users to keep a wallet of ETH to conduct such transactions. The decentralized transactions can range from a participation of a company, to exchanges to fiat money, to exchanges of other commodities. It is important to distinguish between a coin and a token. Coins are purely used as a source of payment, while tokens are tools used in smart contracts or digital agreements. Tokens that have been launched through ICOs are mainly exchanged for Ether.

The Coin Offering popularity or so called “ICO boom” might be thus related to the price of Ether, given that the value of Ether will increase as more and more tokens are designed using the Ethereum blockchain technology. C. Masiak et al. (2019) based their research in the relationship of ICOs with Bitcoin and Ether, although they focused on finding the market cycle relationship. The Figure 3 shows the performance of both the Ether price and the number of new published ICOs, and funds raised ICOs, every six months. Apparently, in the periods in which Ether price is higher, there is a larger volume of coin offerings, whereas when the Ether price is lower, firms are more motivated to publish such projects. Notice how in Figure 3 there seems to be a relationship in the left area, but if we notice the right area, the new coin offering scarce, while the Ether price picks up again. Could this relationship be different if we took the growth of both variables instead of the plain values?

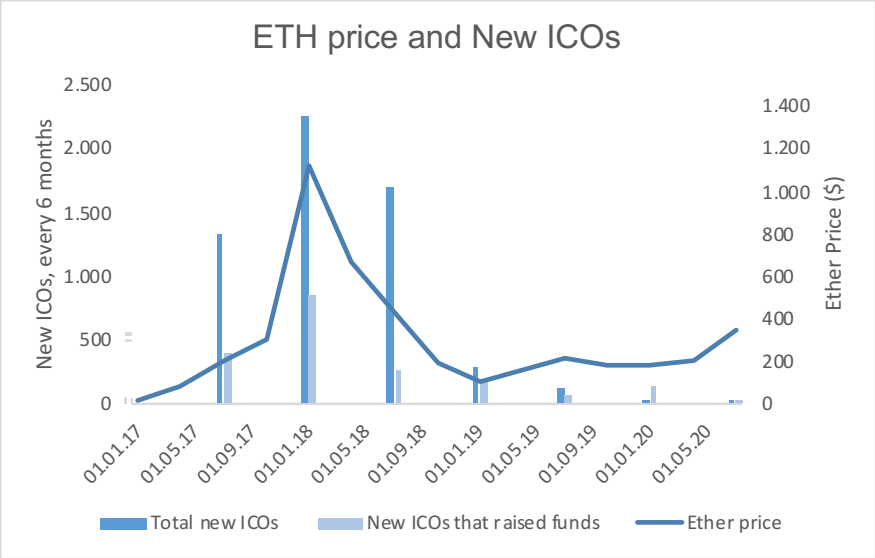

Figure 3. Source: own elaboration. Data gathered from icobench.com, ico.tokens-economy.com for the ICOs information and https://www.coindesk.com/ for the Ether price.

To have a better grasp of the relationship, scatter plots are presented in Figure 4.1. The left scatter plot shows the relationship between the Ether price is US dollars and new coin offerings that successfully raised funds. The right scatter plot shows the relationship between the Ether price and the total new published ICOs. Both results show that there is a positive relationship. More interestingly, there is a stronger relationship between the coin offerings that successfully raised funds with the Ether price, seen in the R^2. Recall that the R^2 is an indicator of how much will the number of offerings be explained by the Ether price. The R^2=71% from the left graph means that the successfully raised funds offerings are explained by the Ether price. One interpretation could be that investors are more like to put their funds into coin offerings when there is a boost in the Ether price, hence the completion of the published projects. In other words, this could happen due to the investor behavior. While for the scatter plot with the total number of new ICOs, the Ether price explains it in around 57%.

One downside of these correlation estimations is that, there is only limited verifiable and only few data points to fit a model. This said, it must be taken into account that the change of one single point could cause a change in the entire direction or in the goodness of fit of the model. It must be considered that this approach is limited due to the scarce frequency and reduced number of observations. Furthermore, this relationship considers the plain values, not the growth rates.

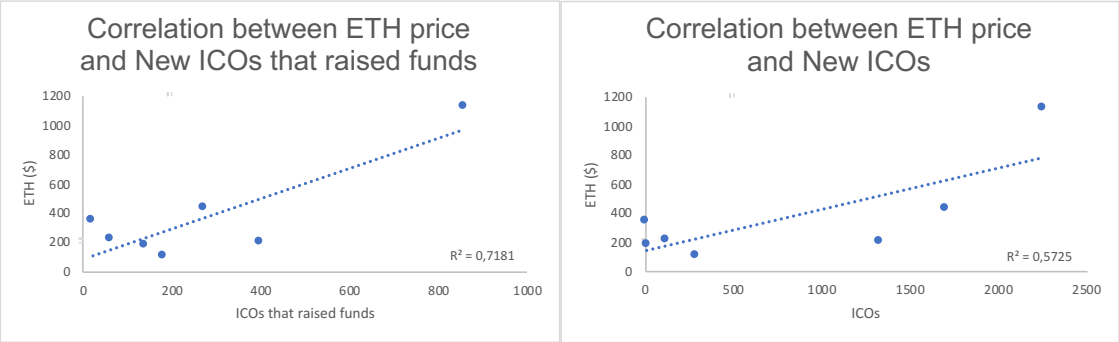

Figure 4.1. Source: own elaboration. Data gathered from icobench.com, ico.tokens-economy.com for the ICOs information and https://www.coindesk.com/ for the Ether price.

To a certain extent, it seems like the volatility of the Ether is translated to the volumes of the total ICOs published, as well as the portion of successful ones. It could be expected that the volatility of this type of operations will continue, and that there might be other ICO booms whenever ETH has had a steady increase over several periods. Still, cryptocurrencies are known to be rather unstable. A steady growth from the ICO initiatives is hardly certain, but its diminishing popularity does not seem conclusive. Figure 4.2 was computed with the information from ico.tokens-economy.com. The information was only available for the total number of ICOs and not for the ICOs that successfully raised funds. The observations are monthly, between January 2017 and January 2020. The frequency from this source will provide a larger, more reliable number of observations. The correlation is again barely positive, although now it is shown that the Ether price only explains around 33% of the number of total ICOs per month.

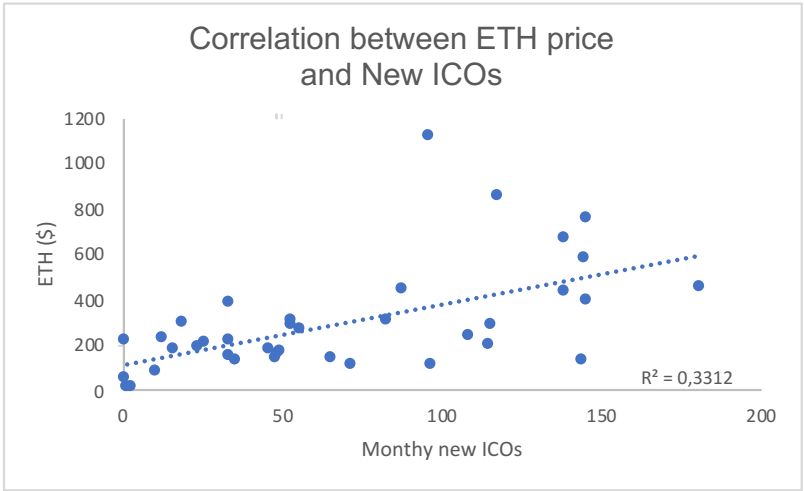

Figure 4.2. Source: own elaboration. Data gathered from ico.tokens-economy.com for the ICOs information and from https://www.coindesk.com/ for the Ether price.

Nevertheless, these results keep having only few observations. In following sections, the relationship between Ether and ICOs will be analyzed in more detail. Instead of studying the aggregated values, the growth behavior of both will be considered. By doing so, one could conclude later on if these charts' output are mere chance, or if there is really an underlying positive relationship.

2.1.2 Costumer analysis

Could a theory about consumer behavior being one factor for the ICO popularity per country be correct? And consequently, do countries with more consumer awareness on fintech resulted in a larger number of coin offerings? The Global Competitiveness Index from 2017 – 2018, was used to gather information about the consumer behavior in each country. Some of the variables of interest taken from the Index were Internet usage (as a % of adults), cellular telephone subscriptions 100 habitants and sophistication. Sophistication measures on what basis their purchasing decision, being 1 solely price and 7 performance attributes. From The Global Alternative Finance Market Benchmarking Report, the banking status of borrowers per country was gathered. The banking status was separated by unbanked, underbanked, and banked.

The data is collected from the group of total countries that have had at least one Coin Offering. Forty-five countries from that group have been selected randomly. Table 2 contains the information mentioned. From this table, several conclusions can be drawn. For instance, the countries in which there is a larger proportion of internet users as a percent of the population, coincides with the countries that have had a higher number of coin offerings. United Kingdom and Switzerland are 2 of those countries. Same argument can be used for the cellular telephone subscriptions every 100 citizens. Hong Kong leads the index, as well as Singapore. Consumer sophistication has high values for the United States and Hong Kong, followed by the other countries that have been popular for launching ICOs.

The banking status data was found for regions, not individual countries, for this reason, the values would be the same for countries located in a given region. Overall, the

majority of banked costumers are in Europe, whereas in Asia there is a larger proportion of underbanked consumers.

Initially, it could be thought that developed countries lead the ICO market. Table 2 holds information that allows a deeper understanding of why a country could be more successful in this market, besides their development. In Norway, Sweden, and Finland, only few coin offerings have been announced. The customer sophistication does not reach a score of 5 out of 7. Having said this, consumers from the Nordic might be inclined towards more traditional or simple products. The same occurs in Canada, France, and other countries. On the other hand, the number of cellular subscriptions and percentage of internet users could be an indicator to tell if residents of a country have access to online platforms that trade tokens. Put together, all measures play a significant role in understanding consumer behavior.

Not just users that have access to internet should be considered, but users with internet, sophisticated purchasing choices and countries in which consumers are receptive towards innovative businesses. The final aspect to be considered should be that most of the platforms that launch coin offerings have an international scope, thus, people from many countries can participate in them, not only the residents of the country where it is launched. For this reason, the consumer behavior can be thought of as relevant but not determining in the success of the ICO.

Table 2. Consumer Characteristics per Country

					Banking Status of Borrowers		
Country	Internet users (% of adults)	Cellular telef. subcripcions	Sophistication	Innovation	unbanked	underbanked	banked
Austria	84,3	166,1	3,8	5,6	0%	0%	100%
Belgium	86,5	111	4,5	5,5	1%	2%	97%
Czech Republic	76,5	115,5	2,9	4,9	1%	31%	68%
Denmark	97	122,9	3,8	5,3	2%	4%	94%
Estonia	87,2	148,7	3,7	4,9	8%	21%	71%
Finland	87,7	134,5	4,7	5,6	2%	4%	94%
France	85,6	103,5	4	5,5	0%	1%	99%
Germany	89,6	114,5	4,8	5,8	0%	0%	100%
Ireland	82,2	103,6	4,2	5,2	0%	4%	96%
Italy	61,3	140,4	3,8	4,9	8%	26%	67%
Netherlands	90,4	130	4,4	5,7	0%	0%	100%
Norway	97,3	110,1	4,3	5,3	2%	4%	94%
Poland	73,3	146,2	3,4	4,1	8%	21%	71%
Portugal	70,4	109,1	3,7	4,6	1%	15%	83%
Russia	76,4	163,3	3,5	4,2	1%	31%	68%
Spain	80,6	109,7	3,4	4,3	1%	15%	83%
Sweden	91,5	126,7	4,7	5,8	2%	4%	94%
Switzerland	89,4	135,6	5,1	6,2	0%	0%	100%
Ukranie	52,6	132,6	3,1	4,3	1%	31%	68%
United Kingdom	94,8	122,3	4,8	5,5	0%	4%	96%
Argentina	70,2	150,7	3,3	4,1	14%	23%	63%
Brazil	59,7	118,9	3,5	4,1	14%	23%	63%
Canada	89,8	84,1	4,4	5,1	1%	84%	15%
Colombia	58,1	117,1	3,1	3,8	14%	23%	63%
Chile	66	127,1	3,9	4	14%	23%	63%
Mexico	59,2	88,2	3,5	4,1	14%	23%	63%
USA	76,2	127,2	5,3	6	1%	26%	72%
Nigeria	25,7	81,8	3,3	3,9	7%	60%	34%
South Africa	54	142,4	3,9	4,9	74%	0%	26%
Australia	88,2	109,6	4	5,1	14%	59%	58%
Hong Kong	87,3	234	5	4,9	6%	20%	74%
India	29,5	87	4,6	4,5	8%	47%	45%
indonesia	25,4	149,1	3,9	4,8	26%	48%	25%
Japan	92	129,8	4,9	5,1	6%	20%	74%
thailand	47,5	172,6	4,1	4,1	26%	48%	25%
Singapore	81	146,9	4,6	5,1	26%	48%	25%
South Korea	92,7	122,7	5,2	4,7	6%	20%	74%
Turkey	58,3	96,9	3,4	4,1	7%	60%	34%

Source: Own elaboration. Data gathered from the Global Alternative Finance Market Benchmarking Report and The Global Competitiveness Index 2017

2.1.3 Business Efficiency

It would also be sensible to consider some business aspects, specifically the capability of developing new businesses given some market and regulatory conditions. The variables of interest were obtained from the Global Competitiveness Index 2017-2018. Venture capital availability refers to how easy is to start innovative but risky projects through the obtention of equity funding, it ranges from 1 to 7, being 7 “extremely easy”. Regulation of Securities Exchange refers to what extent do regulators ensure the stability of financial markets. It also ranges from 1 to 7, being 7 “to a great extent”. The Legal

Rights Index refers to the degree of legal protection of borrowers' and lenders' rights. It ranges from 0 to 12, being 12 "best protection". The capability of financing refers to what extent can companies raise money by issuing shares and/or bonds on the capital market, being 7 "to a great extent". Finally, the average of several tax rates as a percentage of profits.

Venture Capital Availability seems to be higher for Singapore and the United States. United Kingdom, Hong Kong, Switzerland, and Singapore were some of the leading issuing ICO countries, and those countries also happen to belong to the group of countries with higher values for the variable Capability to raise funds through Equity funds. Singapore, Hong Kong, and Switzerland also have the lowest average Tax rates. The same happens for the remaining 2 variables. Table 3 contains all the information taken from the Global Competitiveness Index 2017-2018.

There are also countries that have relevant scores but only in one or two of the variables. For instance, Colombia is a country that has a very high legal protection for lenders and borrowers but a relatively high tax rate, as well as regular scores for the rest of variables. Other countries belong to an "average range", such that their values do not stand out. Within this "average range" group the Netherlands and Norway could be considered. It could be concluded, just as for the consumer behavior, that the countries in which there is a large number of ICOs, there are at least two variables that have a really high score. The decision of a company to launch a coin offering in a specific country does not only depend on regulation, as commented in previous sections, but also seem to depend on the performance of other business-related variables. The availability of equity funding, as well as the tax rate, appear to be crucial factors in the geographical decision of an ICO initiative.

Table 3. Business Characteristics per country

Country	Venture Capital Availability	Regulation of Securities exachange	Legal rights Index	Capability to finance through Equity	Tax rate (%)
Austria	3,2	5	5	4,6	51,6
Belgium	3,9	5,4	4	5	58,7
Czech Republic	3,4	5,4	7	3,7	50,0
Denmark	3,2	5,6	8	4,2	25,0
Estonia	3,8	5,3	7	4,3	48,7
Finland	4,8	6,3	7	4,9	38,1
France	3,4	5,5	4	4,9	62,8
Germany	4,6	5,4	6	5,4	48,9
Ireland	3,1	4,5	7	3,9	26,0
Italy	2	3,4	2	3,3	62,0
Netherlands	3,9	5,8	3	5,2	40,4
Norway	4,1	6	5	5,4	39,5
Poland	2,8	3,7	7	3,6	40,4
Portugal	3,1	3,4	2	3,1	39,8
Russia	2,6	3,5	6	3,1	47,4
Spain	3,4	4,5	5	3,7	49,0
Sweden	4,5	5,7	6	5,4	49,1
Switzerland	4,2	5,9	6	5,7	28,8
Ukranie	2,3	2,4	8	2,7	51,9
United Kingdom	4,3	5,6	7	5,7	30,9
Argentina	2,2	3,6	2	2,9	106,0
Brazil	2,5	4,9	2	3,5	68,4
Canada	3,7	6,1	9	5,2	21,0
Colombia	2,8	4,6	12	3,4	69,8
Chile	3,3	5,8	4	5	30,5
Mexico	3,1	4,7	10	3,7	52,0
USA	5,2	5,6	11	5,7	44,0
Nigeria	1,8	4,6	7	4	34,3
South Africa	2,9	4,8	5	4,6	28,8
Australia	3,4	6	11	5,2	47,4
Hong Kong	4,4	6,1	8	5,7	22,9
India	4,3	4,5	6	4,3	60,6
indonesia	4	4,7	6	4,5	30,6
Japan	3,6	5,8	4	5,1	48,9
thailand	3,6	4,9	3	5	32,6
Singapore	4,8	6,4	8	5,5	19,1
South Korea	2,9	4,3	5	4,2	33,1
Turkey	2,7	4,1	3	3,8	41,1

Source: Own elaboration. Data gathered from The Global Competitiveness Index 2017

The Cayman Islands were crypto regulation friendly from the early stages of the offerings, and an important coin offering focus in 2017, 2018. Many ICO frauds have occurred since then. The very friendly regulation and tax advantages have resulted in money laundering and ghost corporations that steal the collected money from the coin auction. Setting the ICO itself is not cheap, although the compliance was very welcoming. More than one scandal from Cayman Island has been made public, clarifying that for the

purposes of this study, although they had great regulations, led to the removal of this country from the data set. After considering that the fraud factor might have led to such great number of “coin offerings”, including Cayman Islands would mislead the results, so it will be considered an outlier and left aside.

2.2 Quantitative Analysis

After looking at the tables measuring consumer behavior and business efficiency, as well as the Ether price, there is enough evidence to suggest that there is an underlying relationship of those 3 dimensions to the coin offerings. Therefore, a model will be proposed next with the goal of finding measurable and significant relationships. The model will be calculated in STATA. The aim is to be able to explain the coin offering growth in each country with the information from the tables and the Ether price.

The data was enlarged, such that there is information from The Global Competitiveness index for 2017, 2018 and 2019. After the previous discussion, it would be interesting to look in more detail to check if they might be explanatory factors for the coin offering growth. The sample used contains information for the monthly number of coin offerings in 45 different countries, specifically from July 2017 to November 2020. Although Cayman Islands was thought to be crucial to understand the coin offering popularity, this theory was discarded in the fraud discussion; besides, it was dropped from the sample due to lack of data in the Global Competitiveness Index. The data set contains a total of 1845 observations, the accumulated coin offerings per country were obtained monthly, while the information from the index changes yearly. The data set was initially created in Excel, then enhanced and completed in STATA, to finally save it as a .dta file that will be made available to the readers upon request.

Figure 9 contains a specification of the variables contained in the data set created. The variable to be placed as dependent variable in the model is n_icos. Licos and lether refer to the logarithm of the price of Bitcoin and Ethereum respectively. Transforming these variables to logs, could represent the growth of the underlying variable when put in a regression model.

variable name	variable label
country	country
id	Enumerates all existing observations
n_icos	Monthly accumulated coin offerings per country
Region	String variable, indicates to which continent a country belongs to
ven_cap	Venture Capital availability (how easy is to start innovative but risky projects)
reg_sec	Regulation of Securities Exchange per country. Range: 1-7(best)
_rights	Legal Rights Index; degree of legal protection of borrowers' and lenders' rights
cap_equity	Capablity firms have of raising funds through equity. Range 1-7(best)
tax	Average of several tax rates, as a % of profit
internet_users	internet users as a % of adults, per country
sophistication	Basis of consumers' purchasing desicions.
business_soph	Range 1 (purely price) - 7 (performance)
technlogy_adoption	A compound of companies' regulations and policies. Range 1-7(best)
gGDP	GDP annual growth
Bitcoin	Bitcoin close price at the end of each month
Ethereum	Ethereum close price at the end of each month
licos	log n_icos
lether	log Ethereum
lbtc	log Bitcoin

Figure 9. Description of the variables from the data set. Source: Own elaboration. Produced in STATA.

The regressions rely on panel data theory. First it is worthwhile mentioning that the dimension of the data is *N*T*, where *N* is the number of countries and *T* refers to the time dimension, in this case monthly number of coin offerings. For panel data there can be different measurements for the variations. There is the within variation, that measures the change of the same individual overtime. There is also the between variation, which refers to the variation between individuals, in this case the variation between countries. Finally, the overall variation measures both the variation across time and individuals. How each variation is calculated in the data is stated next:

$$Within\ variation_{it} = Coin\ offerings_{it} - Average\ coin\ offerings_i$$

$$Between\ variation_i = Average\ coin\ offerings_i - Overall\ mean$$

The overall mean is calculated by averaging all observations from all countries. The subindex i refers to the country and t refers to the monthly time observation. The panel data models of most relevance to the study are fixed effect and random effect models. Both models use OLS estimation. Ideally, the results are consistent and efficient, but it is not necessarily the case with these two mentioned models. The consistency and efficiency will depend on the assumptions for estimation. Consistency is established based on the law of large numbers; the larger the sample size, then the more the estimator will approach the real parameter. Whereas efficiency can be reached with OLS or maximum likelihood estimators.

The fixed effects and random effects regression models assume that there is heterogeneity across individuals and therefore there are individual-specific effects. It means that these models will consider that there are effects that depend only on the country, and that are particular to each country. This effect is captured in the models by the term alpha. In the fixed effects model, alpha appears to be an intercept; capturing individuals' specific information that cannot be explained by the rest of regressors. Whereas in the random effects model, $alpha_i$ is the unobserved attribute of an independent variable that is a part of the residuals. The most relevant characteristics of both models will be compared next.

Random effects model:

- The dimension is $N*T$
- Alpha does not change in time, but it does change across individuals. The error term of the regression is the sum of both the residuals and $alpha_i$.
- The random effect parameter measures the relevance of the between and within effects in the model. The random effects model is a weighted average of the between and within estimates, where there is a term that measures how much of the regression is explained by fixed effects (when lambda equals 1) and how much is explained by between effects (when lambda equals 0).
- The between variation is assumed to be random and uncorrelated with the predictor. Individual-specific effects captured in alpha and contained in the error term are random and uncorrelated to the explanatory variables.
- The individual-specific effects should not be correlated to the regressors.

Fixed effects model (or Within effects model):

- The dimension is *N*T*
- Fixed or within effect estimator measures the variation overtime.
- The model is time demeaned. In other words, both dependent and independent variables are transformed before entering the regression. The transformation consists in subtracting the mean to all values of a variable, such that it is *demeaned*. Then the estimation is conducted. Because of the transformation, alpha, which is potentially correlated to the regressors and a constant, cancels out.
- The individual-specific effects might be correlated to the regressors.

Overall, the aim is to find a meaningful panel regression for our coin offering data and prove whether there exists a significant within variation regression or random effects regression model. Put into the context of this paper, we will have to check if the number of coin offerings is dependent of the change of the country's consumers and businesses overtime; or if the variations are mostly explained across countries. Will the model have both time and country variations? Or will the time variations dominate the data?

2.2.1 Results

The first step was to decide whether a random or fixed effects model would be more appropriate for the data. A Hausman test was conducted to determine it. The test's purpose is to see if there are any relevant differences between the estimates from the fixed effects model and the estimates from the random effects model. The test statistic is distributed as a Chi-squared distribution with degrees of freedom equal to the number of time-varying regressors. Whenever the coefficients from both models are very close to each other, the test statistic will be close to 0. The null hypothesis considers that the random effects are appropriate for the model, given that the individual-specific effects are not correlated to the regressors. There alternative hypothesis suggests that the fixed effects are more appropriate because it is rejected that the individual-specific effects are uncorrelated to the regressors; which would be a violation of the random effects model assumptions. If the null is true, and there is no correlation, both estimations from the random effects and fixed effects models are consistent, but the estimations from the

random effects model are also efficient. If the null is rejected, then the estimations from the random effects model are no longer consistent or efficient. Then the random effects model should be preferred given that its estimates are solely consistent.

Notice that the statistic is very small, so the null can be rejected, therefore the random effects model is preferred given that it has at least consistent estimates.

Hausman Test
chi2(5) = 20.69 Prob>chi2 = 0.0009
FE coef: consistent under Ho and Ha RE coef: efficient under Ho, inconsistent under Ha Ho: difference in coefficients is not systematic

Figure 10. Hausman test. Source: Own elaboration. Produced in STATA.

The clear choice would be the fixed effects model. The chosen model is shown in Figure 12. In the model, the coin offering growth is pretended to be explained by the ether growth, average tax (from the Global Competitiveness Index), companies' technology adoption, business sophistication, and the percentage of adult internet users. All coefficients are significant at a 99% confidence level. Furthermore, all coefficients are jointly different than 0, according to the Fisher test to the right. The regression contains 745 observations, for a total of 45 countries. On average, each country had almost 17 observations. The corr(u_i, Xb) shows the correlation between the regressors and the residuals, in this case it is negative and at a 0,31; being -1 perfect negative correlation.

Sigma_u is the standard deviation of the alphas, or the variability of the individual effects. Sigma_e is the standard deviation of the model, or deviation of the error term. On the other hand, Rho is the fraction of the variance that comes from individual-specific effects. Rho indicated that 82% of the variance is due to differences across panels, rho is also called the "interclass correlation". A high Rho can be interpreted as follows: there is

an effect, that is specific to the explanatory variables, that generates a high variability of the model. Rho is calculated as:

$$Rho = \frac{sigma\_u^2}{sigma\_u^2 + sigma\_e^2}$$

Notice that the within R^2 is around 58%. Given that the regression is specified as "fe" or a fixed effects regression, the within R-squared will be the one of interest. The main reason why this value is low is due to the type of model. Recall from the previous section that the fixed effects model uses demeaned variables, thus the total sum of squares is smaller and so will the R^2. To avoid the problem of heteroscedasticity, the robust option was specified.

	Fixed effects model
lether	-0.34***
	(0.040)
tax	-0.02***
	(0.004)
technlogy_adoption	-2.20***
	(0.180)
business_soph	2.19***
	(0.204)
internet_users	0.01***
	(0.004)
Constant	5.45***
	(1.085)
Observations	745
Number of country	45
R-squared	0.575
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Figure 11. Fixed effects model. Source: Own elaboration. Produced in STATA.

$$R^2 = \frac{explained\ sum\ of\ squares}{explained\ sum\ of\ squares + residual\ sum\ of\ squares}$$

A similar specification for to regress individual-specific effects is the dummy model. In the dummy model, apart from including the same regressors, a dummy for each country is included. Thus, each dummy takes value 1 for a specific country and value 0 otherwise. The outcome for this model was produced in STATA with a loop. Forty-five dummies were created, one for each country. This regression will have the same estimates as the fixed effects model, with the only difference that the intercepts, $alpha_i$, changes.

STATA considers the dummy from the first country to be a reference category variable to the rest of dummies and as such, disappears from the model. The R^2 of the dummy model is higher, standing at 85%. But one most consider that this model has its downsides as well. By including a dummy for each variable, a customized model for each country is being created, which is adding to the predictive power of the model. But that is not necessarily new, or meaningful information. The specific information or each country does not inform about what is explaining the dependent variable, only accounting for all individual-specific effects.

In the fixed effects regression, the explained sum of squares is also lower because of the demeaned variables, although the residual sum of squares is just as much as in the dummy model. Figure 13 shows both the fixed effect estimations and dummy model estimations. The mutual regressors have the same estimation values. The 45 dummies can be thought of as individual-specific effects. In the fixed effects model, the individual-specific effects cancelled out, thus they were unobservable, whereas in the dummy model, the individual effects are the dummies themselves. Then, each dummy coefficient can be interpreted as the information that can only be explained by a given country. To sum it up, including dummies would give the model more flexibility, although one has to be aware of the consequences of using the dummy model.

Overall, the fixed effects model seems to partially explain what explains coin offering growth overtime, a task that has not been easy due to the lack of information available, but also a task that has been proved to be possible.

	(1) Fixed effects model	(2) Dummy model
lether	-0.34***	-0.34***
	(0.040)	(0.028)
tax	-0.02***	-0.02***
	(0.004)	(0.007)
technlogy_adoption	-2.20***	-2.20***
	(0.180)	(0.120)
business_soph	2.19***	2.19***
	(0.204)	(0.179)
internet_users	0.01***	0.01***
	(0.004)	(0.004)
1.country_dum1		-1.64***
		(0.330)
1.country_dum2		-0.30
		(0.340)
1.country_dum3		1.19***
		(0.229)
1.country_dum4		-1.60***
		(0.303)
1.country_dum5		2.25***
		(0.247)
1.country_dum6		-0.97***
		(0.307)
.		
.		
.		
		(0.255)
1.country_dum43		-1.03***
		(0.255)
1.country_dum44		0.62***
		(0.201)
Constant	5.45***	5.04***
	(1.085)	(0.965)
Observations	745	745
Number of country	45	
R-squared	0.575	0.853
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Figure 12. Fixed effect model estimates and Dummy model estimates. Source: own elaboration. Produced in STATA.

The interpretation of the regressors not only has measure how the independent variable affects the dependent variable, but it must consider that it is affected by a time dimension as well (Bartels and Brandom, 2008). For a given country, as the Ether price growth over one month, the coin offering growth shrinks by .345%. For a given country, as the tax increases over one additional month, the coin offering growth shrinks by 2%. Countries with the companies that had the most disruptive ideas did not bring additional value to the growth in the coin offerings. Then, it makes sense that the countries with a leading disruptive companies, do not have such a significant difference in the coin offering growth. One example is shown is shown in Figure 14. Notice how Sweden, whose average technology adoption is the highest compared to Switzerland and Spain, has the lowest average coin offering growth. Thus, after seeing this comparison, it makes sense to think that countries with the highest technology adoption, did not have an additional impact in coin offering growth. According to the model, in a given country, there is no further growth as technology adoption increases by period. In countries where companies had the most flexibility and friendly policies, the coin offering growth was significantly higher. An increase per period of the business sophistication translated to an increase in the offering growth. Finally, in country in which there was an increase of internet users by period, there was a 12% increase in the coin offering growth.

Comparing ICO growth and technology adoption between Spain, Sweden and Switzerland

	ICO growth	technology_adoption
observations	41	18
Spain	2.897 (0.735)	5.166 (0.243)
Sweden	1.643 (0.814)	6.133 (0.339)
Switzerland	4.765 (0.863)	6.070 (0.243)

Figure 14. Comparing countries, technology adoption and coin offering growth. Source: own elaboration. Produced in STATA.

3. CONCLUSIONS

This study helps understanding the behavior of coin offerings, as well as regulation or specific events that have occurred. Put all together, ICOs have proved to be a valuable alternative for companies that want to raise funds, although many governments did not open enough opportunities for companies interested in coin funding. The mounting expectations from early years, turned into disappointment in the recent years. Fraud scandals, restrictive governments, and confusion around the topic, led to a slow death of the coin offerings.

The Ether price influenced the behavior on the early years, but there is a turning point in which the Ether price starts picking up again, while the coin offerings stay at the levels they were at. On average, as shown in the model, the Ether growth did not generate additional ICO growth, rather, it remained stagnant. Thus, the initial positive Ether correlation was only conditional to a timeframe and cannot be applicable systematically. This conclusion could only be made now, considering that the correlation from section 2.1.1 had very limited estimation. The other variables used in the model also proved to be helpful; two for business efficiency and one for consumer behavior. All in all, countries with companies that have better policies and in which adult consumers used internet connection, translated into a higher coin offering growth. Whereas, technology adoption, a variable that one would initially think that affected the growth positively, showed that, countries with the most innovative companies did not choose crypto as their means of innovation.

The proposed regression has limitations; for instance, the information from the sample itself is limited, not to mention that the lifespan of the coin offerings was less than four years. Nevertheless, it was also shown that a panel data regression with fixed effects, or a dummy model could accurately describe the data set. Time changing regressors seemed to have more impact in the growth of coin offerings per country, but there is also a significant individual specific aspect to each country that cannot be disregarded.

The big question in the beginning of the investigation was, will coin offerings come back? After all the research the answer is not yet. Coin offerings are not dead, they still happen at a small scale. What really has changed is how companies want financing. Recently there have been great developments and record exchange prices of many cryptocurrencies, but still a lot of speculation and lack of backing from governments. Only when governments decide that these type of operations can be adequately regulated, and when consumers are educated on the topic, will companies find it worthwhile to find financing through coin offerings again.

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5. APPENDIX

ESMA, EBA, Advice Initial Coin Offerings:

January 2019, the European Securities and Markets Authority (ESMA) and the European Banking Authority (EBA) published Advice and a Report, respectively, on the regulatory treatment of crypto-assets, or digital assets. Cryptoassets did not necessarily fit into the electronic money category, so further clarifications were made. Still, no official European regulation exists specifically for coin offerings.

Malta Financial Services Authority (MFSA):

This institution issued a Token Act, such that companies could easily publish legal and regulated coin offerings. The MFSA ensured that both the consumers and the companies are protected by these regulations. In that regulation, they define a Virtual Financial Asset and companies that want to issue coin offerings must first take The Financial Instruments test, to check if their operation fits into in the VFA application. The MFSA introduced a Financial Instrument Test with the objective to determine whether a DLT asset, based on its specific features, is encompassed under (i) the existing EU legislation and the corresponding national legislation, (ii) the Virtual Financial Assets Act or (iii) is otherwise exempt.

The Test is applicable to (i) issuers offering DLT assets to the public or wishing to admit such DLT assets on a DLT exchange in or from within Malta; and (ii) persons providing any service and/or performing any activity, within the context of either the Virtual Financial Assets Act or traditional financial services legislation, in relation to DLT assets whose classification has not been determined.

2gether:

2gether is the first company in Europe that allows you to operate with cryptocurrencies in the same way as with FIAT currencies without any type of commission. Most of its users are people interested in digital assets and in these types of collaborative models. For

this reason, they differ from other *neobanks* and challenger banks that operate in Europe, and also do so with their own token "the 2GT". 2gether gathers more than 20,000 clients. Overall, the business model wishes to decentralize payments. Clients can pay with crypto. 2gether clients are both owners of the platform through the 2GT digital currency. By the time the 2GTs are issued in Malta. The 2GT cryptocurrency was issued regulated in Malta, the first country with specific regulation for Blockchain technologies and businesses. The client buys the 2GT, and has them in his 2gether portfolio, consequently, that client becomes a user with rights to decide on profits and participation in the platform. The 2GT token is a Virtual Financial Asset (VFA) that according to those responsible for 2gether "will be issued in Spain with the OK from the CNMV under the category of Utility Token". The banking operations of the company are regulated by The Bank of Spain. 2GT are considered utility tokens, that is, they have no investment purpose. The token portion of the company's activity is not supervised by the CNMV, but it is covered (follows the standards) of the Malta Act, for the protection of investors and identification of the product.

Hausman test's underlying calculations:

	FE coef	RE coef	Difference FE and RE coef
lether	-0.344820	-0.351249	0.006428
tax	-0.020721	-0.351249	0.003107
technology_adoption	-2.199185	-2.106678	-0.092508
business_sophistication	2.194552	2.154472	0.040080
internet_users	0.012705	0.012539	0.000166

Figure A-1. Outcome used for the Hausman test statistic. Own elaboration. Produced in STATA.