



# **Cryptocurrencies**

## **Key drivers of adoption by users**

**Jorge Miguel Alegria Pinheiro**

[jorgemiguel.pinheiro@gmail.com](mailto:jorgemiguel.pinheiro@gmail.com)

**Master in Management**

**Supervisor: Prof. Doutora Cláudia Alexandra Gonçalves  
Correia Ribeiro**

**14<sup>th</sup> of September 2018**



## **Biographic Note**

Jorge Miguel Alegria Pinheiro was born in August 3<sup>rd</sup> of 1989, in Porto, Portugal.

In 2012 concluded the Bachelor degree in Economics in the University of Porto and after a few years of work experience from Soc. Comercial C. Santos – Mercedes Benz to Sheraton Porto Hotel and Spa to Yeatman and a post-degree in Hotel and Tourism Management in Porto Business School decided to enrol in the Master in Management in the University of Porto.

## **Acknowledgments**

During the investigation, writing, development of the initial idea to the final stage of this dissertation many people contributed in different forms for the final result. For this reason, I would like to take this section to have the opportunity to highlight their influence and present all my gratitude and appreciation to everyone that was involved somehow in the process.

Firstly, I would like to show my admiration and gratitude to my supervisor, Professora Cláudia Ribeiro for all the valuable comments, incentive, guidance, encouragement and positive attitude which was always a constant and which were crucial for the final outcome.

Secondly, at the personal level, would like to show my appreciation to all my family and friends for their unconditional support and wise words during this all process.

Moreover, such investigation would not be possible to achieve without the cooperation of several intervenient, who helped with their precious time answering the questionnaire and highlighting it to be answered.

## **Abstract**

Technological evolution and innovation brought a variety of tools and products that revolutionized our lives.

The appearance of Bitcoin and other cryptocurrencies based in a technology called blockchain brought several discussions and opinions about the actual state and future of this subject.

This disruptive technology can bring advantages not only locally but globally due to its network features.

We intend with this dissertation to contribute to the on-going academic and institutional research on the key features of this innovation, on the key drivers and purposes that leads users to adopt cryptocurrencies. At the same time the other goal is also to provide information about study this population according to their background, other assets investments and expectations for the cryptocurrencies' future.

Evidence was found that majority of users are male, from engineering and technology area of studies, ranging from 20 to 39 years old and holding a bachelor degree.

The main factors we found were that studies background, different age stages have influence in the decision of users having other assets besides cryptocurrencies. Besides that, motivations also vary according to the purpose of using cryptocurrency either as short term investment or for other reasons.

We hope that our conclusions and findings can serve for a better understanding of this phenomenon and to the practical and theoretical discussions about cryptocurrencies adoption and their future.

**JEL classification:** E42, E52, G11

**Keywords:** Blockchain, Bitcoin, Cryptocurrency, Drivers, Users, Motivations

## Index

1. Introduction .....	1
2. Literature Review .....	5
2.1 Blockchain .....	5
2.2 Bitcoin and Cryptocurrencies .....	8
2.3 Drivers of adoption of Cryptocurrencies .....	9
3. Research Questions .....	13
4. Methodological Considerations .....	17
4.1 Selection/Characterization of the Sample and survey method .....	17
4.2 Questionnaire Design and Pilot test .....	18
4.3 Implementation of the survey .....	18
5. Results .....	20
5.1 Descriptive analysis of the sample .....	20
5.2 Drivers of adoption by users.....	26
5.2.1 Motivations and purposes.....	26
5.2.2 Investment Portfolio .....	29
5.3 Factors preventing the general adoption.....	33
5.4 Hypothesis Testing .....	35
5.4.1 Demographic Factors Influence.....	35
5.4.2 Motivations Influence.....	45
6. Conclusions .....	59
Appendices .....	62
Appendix 1 – Summary Table of Methodologies used in Similar Studies .....	62
Appendix 2 – Respondents’ country distribution .....	74
Appendix 3 – Level of studies vs Background .....	75
Appendix 4 – Normality Tests .....	76
Appendix 5 – Questionnaire Design .....	77
References .....	81

## Table Index

Table 1 – Distribution of percentage of the total amount of cryptocurrencies allocated to usage’ purpose .....	28
Table 2 – Contingency table for the age of the user and the decision of buying crypto for short-term investment purposes .....	36
Table 3 – Chi-Square test for the age of the user and the decision of buying crypto for short-term investment purposes .....	36
Table 4 – Contingency table for the gender of the user and the decision of buying crypto for short-term investment purposes .....	37
Table 5 – Chi-Square test for the gender of the user and the decision of buying crypto for short-term investment purposes .....	37
Table 6 – Contingency table for the age of the user and the decision of also investing in other assets.....	38
Table 7 – Chi-Square test for the age of the user and the decision of also investing in other assets .....	38
Table 8 – Contingency table for the studies background of the user and the decision of also investing in other assets.....	39
Table 9 – Chi-Square test for the studies background of the user and the decision of also investing in other assets .....	39
Table 10 – Coding categorical variables – Demographic Factors.....	41
Table 11 – Omnibus tests of model coefficients .....	41
Table 12 – Model summary or Likelihood and R significance .....	42
Table 13 – Estimated Logit model for the decision of also investing in other assets besides cryptos .....	42
Table 14 – Contingency table for “enhanced anonymity of electronic payment” motivation and the decision of buying crypto for short-term investment purposes .....	46
Table 15 – Chi-Square test for “enhanced anonymity” motivation and the decision of buying crypto for short-term investment purposes .....	46
Table 16 – Contingency table for “secured transfers” motivation and the decision of buying crypto for short-term investment purposes .....	47
Table 17 – Chi-Square test for “secured transfers” motivation and the decision of buying crypto for short-term investment purposes .....	47

Table 18 – Contingency table for “no supervising authority” motivation and the decision of buying crypto for short-term investment purposes .....	48
Table 19 – Chi-Square test for “no supervising authority” motivation and the decision of buying crypto for short-term investment purposes .....	48
Table 20 – Contingency table for “lower or no transaction fees” motivation and the decision of also investing in other assets .....	49
Table 21 – Chi-Square test for “lower or no transaction fees” motivation and the decision of also investing in other assets .....	50
Table 22 – Contingency table for “worldwide usage” motivation and the decision of also investing in other assets .....	50
Table 23 – Chi-Square test for “worldwide usage” motivation and the decision of also investing in other assets .....	51
Table 24 – Contingency table for “flexibility of use” motivation and the decision of also investing in other assets .....	51
Table 25 – Chi-Square test for “flexibility of use” motivation and the decision of also investing in other assets .....	52
Table 26 – Contingency table for “other” motivations and the decision of also investing in other assets .....	52
Table 27 – Chi-Square test for “other” motivation and the decision of also investing in other assets.....	53
Table 28 – Coding categorical variables – motivations .....	55
Table 29 – Omnibus tests of model coefficients .....	56
Table 30 – Model summary for Likelihood and R significance.....	56
Table 31 – Estimated Logit model for the decision of short-term investment regarding the motivations to own cryptocurrencies .....	56
Table 32 – Distribution of users per country .....	74
Table 33 – Distribution of studies background for each education level .....	75
Table 34 – Results from normality test for the demographic variables .....	76
Table 35 – Results from normality test for users motivations .....	76

## Graphics and Figures Index

Graph 1 – Blockchain design .....	6
Graph 2 – Distribution of users by number of cryptocurrencies owned .....	20
Graph 3 – Distribution of respondents by country .....	21
Graph 4 – Distribution of respondents by age interval .....	22
Graph 5 – Distribution of respondents by gender .....	23
Graph 6 – Distribution of respondents according to their education level .....	23
Graph 7 – Distribution of respondents according to their studies background (OECD - FOS) .....	24
Graph 8 – Distribution of answers according to users’ motivations .....	26
Graph 9 – Distribution of answers according to users’ other investments .....	30
Graph 10 – Portfolio investment diversification .....	31
Graph 11 – Cryptocurrencies weight on users’ portfolio .....	32
Graph 12 – Distribution of answers according to users’ opinions on general adoption .....	33

## **1. Introduction**

The present work analyses the background, motivations and characteristics of cryptocurrencies' users from all around the world. It studies the key drivers that lead them to adopt cryptocurrencies, the reasons and demographic factors influencing their behaviour regarding taking positions in cryptocurrencies and in other investments assets. For that, an online questionnaire is used based on previous research and findings.

Cryptocurrencies are an instrument that have been raising growing attention in the last few years in the trading and financial system.

Since 2014 it is noticeable the improvement of market capitalization of all cryptocurrencies, especially during 2017 and getting to the point where currently more than 1300 different cryptocurrencies are traded in several different platforms and listed in [coinmarketcap.com](https://coinmarketcap.com).

One of the first appearances of digital or virtual money, was M-Pesa, a mobile based system used in Kenya which would able people to trade electronic tokens for goods or services. This system implemented in early 2007 would became a very important player in the country daily transactions (Berman, 2011). Apart from this example there is evidence, in particular in the online games, where tokens were also used to buy/sell attributes which could be used in the game. Both systems though, contrary to cryptocurrencies were backed up with current currency, or in other words, based on fiat currency and not designed by a specific protocol with an encrypt security system and without the involvement of a third party which are characteristics from cryptocurrencies (Tapscott and Tapscott, 2017). Moreover, cryptocurrencies and the blockchain are a useful way to incur in savings in the trading process not only in fees but also in the time needed to proceed with the exchange. Furthermore, it could allow people around the world who are not backed by any financial system and who do not have any bank account, currently amounting to 2 billion adults worldwide, to take part of the international trading/financial market (Larios-Hernández, 2017).

These concepts although disruptive are not new, in an interview in 1999 later published on YouTube, Milton Friedman<sup>1</sup> spoke about the attributes of internet and the future appearance of an e-cash currency that would allow consumers to trade between themselves without the normal role of the government or intermediaries in the exchange. To a certain extent the Cryptocurrencies pave the way to the previously predicted due to this no third party involvement.

As one of the most known cryptocurrencies, Bitcoin is responsible for the biggest share of market capitalization according to the data available on coinmarketcap.com. Despite this dominance, there are already different projects, such as Litecoin among others, which could be more complete or efficient than Bitcoin, but the last one gains from the first mover presence in the market. Nevertheless, some of these new cryptocurrencies introduced developments in the speed of the transactions and their approval system, robustness and also privacy (White, 2014).

Although this adoption has a strong potential regarding the different dynamics that could bring, it also poses several questions that may or not jeopardize its future. Taking Bitcoin as an example, some of these issues are related with security but also with the monetary policy or lack of it associated with the price volatility (Yermack, 2013). In the meantime, this peer-to-peer system, Bitcoin, along with other cryptocurrencies, benefit from curiosity of investors, normal people but also a number of different retailers around the world (Rose, 2015).

The rise of popularity and interest can also be illustrated by Google Trends data, which shows that interest for searching the term "Bitcoin" reached an all-time high during December 2017 (Google Trends, 2018).

There is also an increase in the number of ICO's (Initial Coin Offerings) which companies seek to use in order to take advantage of this financial mechanism being the main contributors or investors, either institutional or retailers, from countries such as China, Korea, Japan and USA (Forbes, 2017).

---

<sup>1</sup> Milton Friedman was an American economist and Nobel laureate in Economic Sciences for his contribution in fields such as consumption analysis, monetary history and theory, and the complexity of stabilization policy. Video available in: [https://www.youtube.com/watch?v=j2mdYX1nF\\_Y](https://www.youtube.com/watch?v=j2mdYX1nF_Y)

Along with this, new platforms are being slowly introduced based on the blockchain (BBC, 2017) and in the financial world, Bitcoin futures also started being traded (Finextra, 2018).

This dissertation gives a contribution to the general research on this topic and understanding of this phenomenon, particularly, on the motivations, objectives, purposes, demographic factors and background of users that own or have owned cryptocurrencies, either for investment or as a technological new tool of trading/payment system. In other words, it tries to examine the key drivers that lead users to adopt it. It also intends to get an overlook on if cryptocurrency users also invest in other financial assets and if so, how is their portfolio diversified. Furthermore, the expectations about the future of cryptocurrencies from the users' perspective will also be covered.

This dissertation is useful contribution for whoever user, merchant, legislator or future stakeholder of cryptocurrencies in order to understand the main drivers, influence of demographic factors and motivation, for cryptocurrency adoption and which factors are more prone to influence the most due the fact that includes a larger sample of users that do not only use Bitcoin, but other cryptocurrencies.

Evidence from the questionnaire shows that the majority of users are male, have or had at a certain point up to nine different cryptocurrencies, on the age interval from the 20's to 40's years old, with a bachelor degree and with a background from engineering and technologies and with a larger distribution located in North America and Europe. The evidence also showed that age has relevance on either cryptocurrencies users, invest in other assets or not. It was also found that factors / motivations for cryptocurrencies adoption such as "enhanced anonymity of electronic payment" and "no supervising authority" are factors that influence having or not 25% at least of their cryptocurrencies portfolio for short-term purposes, speculative investment. There are also data supporting that majority of users either use cryptocurrencies for short-term or long-term purposes than for payments or money transfers or donations.

This dissertation is structures as follows: Chapter 2 reviews the literature on the technology that supporting the cryptocurrencies - blockchain, the advent of Bitcoin and other cryptocurrencies and the drivers to adopt them. Chapter 3, presents the different research questions, the hypothesis being tested along with the different dimensions of analysis. Chapter 4, the methodology used for this study is presented and described. It

will be referred as well as the sample used, the survey method and its the implementation. Chapter 5 shows the descriptive analysis and the results discussion regarding the demographic factors, motivations for cryptocurrency use, the purposes of their ownership, other assets investments and the factors which users point out as the more important jeopardizing cryptocurrency general adoption. Still in chapter 5 a deeper analysis of the results is done to study the relationship, significance and in which way the dependent variables, “investing in other assets besides cryptocurrencies” and “having at least 25% of cryptocurrencies for short term purposes” are related with the users motivations to use cryptocurrencies and their demographic factors. Finally, chapter 6 addresses the conclusions, the limitations of the current study, and possible future research.

## **2. Literature Review**

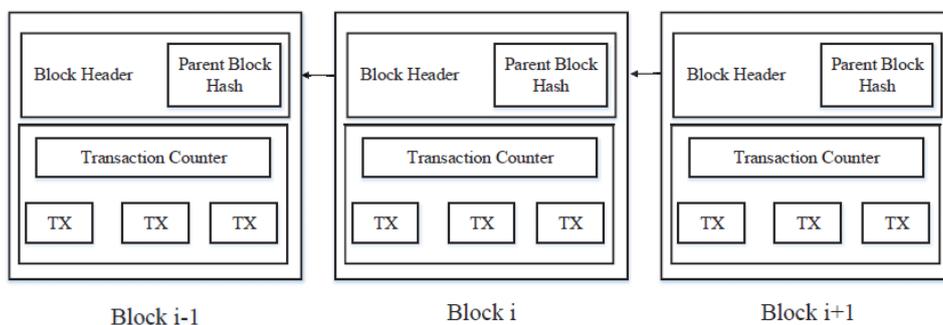
The chapter is divided into the following aspects: definition and characterization of the system that supports every cryptocurrency, the Blockchain, its importance and impact; analysis of the advent of the Bitcoin and other cryptocurrencies, their influence in the financial, banking and trading systems; mentioning the drivers of adoption of cryptocurrencies – previous studies made on the topic. Throughout this work the term “Bitcoin” is used either referring to the technology / system, or to the coin itself.

### **2.1 Blockchain**

Cryptocurrencies, from which Bitcoin is currently the most popular, are based in a system called Blockchain. Blockchain is in fact the “back-bone”, a system that works without any centralized authority or intermediary but by a general consensus of the network, which operates in certain intervals of time and act as a legitimizer of the truth state of this distributed information (EContent, 2016; MIT, 2017).

It works as a ledger which can be used for different goals due the fact that can contain different kinds of data, ranging from currency, digital rights, intellectual property among others (Crosby *et al.*, 2015). Blocks are linearly assembled in chronological order, time-stamped and cryptographically signed and new ones are added containing information about the transaction performed. For this process, there is an important contribution of the so called “miners”.

The representation of the previous stated is shown in the following chart:



Graph 1 – Blockchain design

Source: Zheng *et al.* (2017)

The blocks are linked and recorded with a hash number that identifies the block and the connection to the previous one while containing the information of the performed transactions depending on their size and using the cryptographic mechanism or different protocols to validate it and prevent any kind of attack to the network (Tschorsch and Scheuermann, 2016; Zheng *et al.*, 2017).

For that process to work there are miners which are computer nodes responsible for keeping this ledger updated and validating new blocks into the chain. The miners compete among themselves in order to be the fastest solving algorithmic problems in order to be rewarded with tokens according to the cryptocurrency network for which they are contributing with their computing power (McReynolds *et al.*, 2015). Within this process of competing for each one good they contribute to a common good which is the general consensus of keeping the ledger secure, updated and running. The goal of such system is to create a “trust-free” and transparent mechanism using for this cryptographic language with different proof validity codes (Beck *et al.*, 2016).

Among the several analysis, one of the areas on which blockchain can have an impact is related with the future of central banks and their possible adoption of the blockchain technology and use of their own digital currencies, revolutionizing the business model, monetary policy as long with the interaction of banks with customers as well (Raskin and Yermack, 2016; Seretakakis, 2017; Bordo and Levin, 2017). In fact, the world bank is

currently preparing for the world's first based blockchain bond which will be called bond-i, which stands for Blockchain Offered New Debt Instrument (CNBC, 2018).

Additionally, to all the implications and opportunities that such technology could have in the banking system (either central or commercial banks) and their environment, there are also other authors focusing in the savings it provides to the trading systems. In fact, the banking system could benefit not only from a more environmental sustainable focused way of trading but also from faster transactions' time (Cocco *et al.*, 2017). Having the Bitcoin platform and Ether, the token from the Ethereum ecosystem, as examples, they exam the challenges and opportunities arising with this disruptive technology and describe the computing process behind the technology protocol examining factors such as economic, operational and service efficiency concluding that there is room to improve the current financial system. Moreover, not only in the financial system but blockchain can also impact other industries (Tapscott and Tapscott, 2017) in the timespan of 5 to 10 years (Knezevic, 2018). In fact, other fields such as smart contracts (Kosba *et al.*, 2016), Internet of Things (IoT) (Zhang and Wen, 2016) or security (Noyes, 2016), reputation and public services can use this technology to improve their efficiency and operational structure (Sharpels and Domingue, 2016).

The attributes such as the efficiency mentioned above is based on the savings and the possibilities associated with the use of the blockchain technology, regarding the costs of verification and networking which would be a cheaper way to verify the attributes of a transaction or record and the advantage of functioning without any intermediary party (Catalini and Gans, 2017).

There are also studies focusing on the potential that applications based on blockchain, namely cryptocurrencies but many others, can bring to society as whole and how it could improve the social relationships (Reijers and Coeckelbergh, 2016) and how privacy issues and digital wallets could impact the consumers life and habits (Athey *et al.*, 2018).

This disruptive technology is considered by many to be part of the fourth industrial revolution after the inventions of steam engine, electricity and information technology due its capability of implementation and applications, as mentioned before, in so many different industries and fields (Chung and Kim, 2016; Chen *et al.*, 2018)

## 2.2 Bitcoin and other Cryptocurrencies

Money and currency are subjects that since an early stage of social economics always led to different analysis and perspectives. Jevons (1875) mentions four functions of money: medium of exchange, measure of value, standard of value and lastly a store of value, which are discussed.

Mises (1953) characterizes the function of money as "*...to facilitate the business of the market by acting as a common medium of exchange.*".

More recently, Hayek (1990) in his book "Denationalisation of Money" points out for the possibility of existing currencies, not controlled by a central bank or the government, which would be issued privately and used to trade as a commodity or any other good.

The development of technology, appearance of internet and use as a global network created the conditions for the appearance of cryptocurrencies which are the next stage of money evolution (Vlasov, 2017).

To a certain extent, Cryptocurrencies fulfil some of these functions, especially as a medium of exchange. From that point on this phenomenon is being analysed through different fields of research. Some perspectives focus on the advantages, mentioning as examples the anonymity, transparency, speed of transaction, no inflation among others and disadvantages such as strong volatility, money laundry and no legal formal entity to mention some (Ivashchenko, 2016; Bunjaku *et al.*, 2017; Hileman and Rauchs, 2017).

This area of research in the last few years due to the popularity and recognition that Bitcoin mainly but along with other cryptocurrencies are having in the economic, financial and technological ground.

In fact, the last few years there is being an influx of money regarding the cryptocurrencies market which reached a peak in December 2017 passing the \$400B.

Several cryptography and computer science works among other economic and financial related approaches were made in the recent years to analyse this phenomenon that started with Bitcoin.

The origin of Bitcoin though is related with a paper published by an unknown writer that named himself as Satoshi Nakamoto (2008). The paper introduced a new system of transactions based in a technology called blockchain secured cryptographically, that would allow a decentralized electronic cash system to operate solely in computing power to maintain a public ledger that would keep the historic transactions in which the miners,

the nodes that maintain the system, would be rewarded with Bitcoins, the named currency of that system. The first block appeared in the beginning of 2009 and since that period is being growing to the point which the current supply surpasses 16,714,800 BTC.

Other perspectives take a stance on issues as governance and regulation of such based currency systems, offering some guidelines to take into consideration by regulators in order to keep in mind consumer protection and integrating into a framework according to each country laws without forgetting the problems related with the use of the currency for illegal activities/transactions (Kiviat, 2015; Luther, 2016; Davidson *et al.*, 2016).

Another topic of research is related with prices and exchange rates, which different authors analyse through a more technical vision, using financial and statistical distribution models and looking at different periods of time and analysing which factors, whether fundamental, speculative or technical, are the responsible for the price formulation. (Kristoufek, 2015; Li and Wang, 2017).

This kind of analysis is also used in several works comparing different assets in order to identify the relationship between the exchange rates of Bitcoin and the main currencies such as US Dollar (Osterrieder *et al.*, 2017), Euro and Yuan (Szetela, 2016) or even Gold too (Baur *et al.*, 2017).

### **2.3 Drivers of adoption of cryptocurrencies**

The discussion is also focused in identifying the real reasons of Bitcoin adoption, either as an asset or a currency, finding evidence that especially newcomers would use it as speculative investment (Glaser *et al.*, 2014) and that cryptocurrencies can be used as a financial asset and contribute to the diversification of the investment portfolio. That efficacy is discussed in different works which analyse the correlation between Bitcoin / cryptocurrencies with different sets of assets and in which way it can be used for a better portfolio performance and as an investment opportunity (Elendner *et al.*, 2016; Bouri *et al.*, 2017; Chuen *et al.*, 2017; Trimborn *et al.*, 2018). Due to this characteristic, studies found, regarding Bitcoin, that it is mainly used for speculative investments and that its returns are uncorrelated with all major assets either in normal or extreme times which also confirms the previous analysis on being a good instrument for portfolio diversification (Baur *et al.*, 2017). Other authors contradict this view, pointing out

technological curiosity, blockchain technology and decentralizations as the main reasons for Bitcoin users to embrace it (Krombholz *et al.*, 2016; Presthus and O'Malley, 2017).

There are several studies on the impact in society of the use of cryptocurrencies. Vigna and Casey (2015) study the social impact of Bitcoin in the lives of unbanked people and the broad possibilities of using this currency to take part of the trading world. Some other studies focus on the advantages of a new alternative payment system (Beck *et al.*, 2016; Rysman and Schuh, 2017) and its welfare impacts depending on which design it adopts and the challenges for currently retail payment systems as long with the challenges of double-spending issues (Chiu and Koepl, 2017).

Regarding the users or more broadly speaking, stakeholders and their perspective, some scholars analysed the background of Bitcoin users regarding who they are, their knowledge, their demographic characteristics and their opinions using different streams of data and gathering the information through different channels. Such work was developed in different ways, from using online questionnaires (Lui, 2013) to analyse data from google regarding the terminology used on searches (Yelowitz and Wilson, 2015) and through semi-structured interviews and analysing their data app use from their mobiles regarding bitcoin news/daily surveys (Gao *et al.*, 2015). Different perspectives are also given due to the contribution of several experts and stakeholders which point out factors, drivers and impediments, either economical or technological for Bitcoin / cryptocurrency adoption. (Spenkelink, 2014; Baur *et al.*, 2015; Presthus and O'Malley, 2017; Ermakova *et al.*, 2017). While one perspective states that existing users from Bitcoin were motivated by technological curiosity (Presthus and O'Malley, 2017), other perspective states that it is used as speculation and investment purpose instead of mean of payment (Glaser *et al.*, 2014; Baek and Elbeck, 2015).

Some of the perspectives that influenced the starting point were on drivers and impediments. For that reason, were used the following factors for the drivers: "Enhanced anonymity of electronic payment", "Leaving out intermediaries", "Lower transaction fees", "worldwide usage", "Divisibility into tiny amounts / micropayments", "No prerequisite for participation", "Possibility to gain Bitcoins by mining", "Transaction irreversibility for merchants", "Flexibility of use", "Possibility to ensure full transparency", "No supervision" and the option for mentioning other factors.. On their research, Ermakova *et al.* (2017), lead an online questionnaire with some experts from

different universities on their opinion about which were the factors that were driving Bitcoin adoption. They found evidence mainly descriptive that from those experts' point of view the factors considered more important were "Enhanced anonymity of electronic payment", "leaving out intermediaries", "lower transaction fees" and "worldwide usage". On other prior work, Baur et al. (2015) lead interviews with 13 individuals from 3 different groups, consumers, merchants and Bitcoin exchange employees in an open, inductive and exploratory design to evaluate their views and experiences regarding its perceived ease of use, usefulness, future potential, innovation and technology. The findings also showed low transaction fees as one of the key factors for Bitcoin use.

Regarding the impediments, the factors used were "vulnerability of wallet / exchange", "risk of deflation", "lost coins due to lose access", "bad reputation", "possibility of political regulations", "tax policy not clear", "low adoption by merchants", transaction irreversibility", "lack of trust in the crypto system" and added the option "other". According to the study led by Ermakova *et al.* (2017), among the barriers, the most referred for Bitcoin use were "vulnerability of wallet" and "low adoption by merchants". Abramova and Böhme (2016) also performed an exploratory study on Bitcoin use and its determinants as long with demographic factors to analyse the perceived benefits, risks and ease of use.

On other hand, Yelowitz and Wilson (2015) found evidence that computer programming enthusiasts and illegal activity drive interest in Bitcoin using for that a set of data from Google Trends.

One of the first studies by Lui (2013), using an online survey showed the average user was 32.1 year old, male and drove by curiosity, politics and profit.

Appndix 1 provides a summary table of the methodologies used in all relevant papers on this topic with a detailed description of their results.

Our study stands out from the previous due the fact that the interviewees were all users of cryptocurrencies, to make it possible to have a particular data from the users and compare between the results from experts' views and the users' perspectives on Bitcoin and a more broader range of users and from cryptocurrencies as a whole. The goal of this study is to understand how Cryptocurrencies work for their users, how the community sees them and uses them, the environment, their habits regarding other assets and their

opinion on the future adoption and the actual barriers for a broader use of cryptocurrencies.

Different levels of analysis using different factors were used to understand that impact:

- Cryptocurrencies ownership
- Number of cryptocurrencies owned
- Nationality
- Age
- Gender
- Education Level
- Studies background
- Motivations for using cryptocurrencies
- Percentage of cryptocurrencies used for different purposes
- Investment or not in other assets
- Percentage of portfolio usage with different assets
- Opinion on threats to general adoption

In the following chapter, it will be presented the research questions based on what it was presented in this chapter.

### 3. Research Questions

In order to address this topic which, the research questions of this dissertation are, what drives people to adopt cryptocurrencies? Which are their motivation and objectives? With this questions in mind we will collect data to analyse whether speculation is driving people to invest or if they believe this will be a technology backing up a payments system which is going to be part of the future and for that reason want to be part of it.

After reviewing the literature and analysing the different methodologies and goals of the different approaches, there is still room for more to uncover in such topic as the use of cryptocurrencies and the blockchain network. Considering previous approaches on user adoption and factors influencing it from Bitcoin in specific to a broader cryptocurrency perspective the works from Ermakova et al (2017), Baur (2015), Glaser *et al.* (2014) and Spengelink (2014) give some contributions for this area of research and put some light on the topic to study, the main reasons / expectations that users have when they adopt / invest in cryptocurrencies and which are the drivers that they identify as keys for adoption. Taking their work in consideration, additional research can be done, specially finding a broader sample of users which the topic of this thesis meant to focus, which are the reasons behind their decision to adopt/invest in crypto. Yelowitz and Wilson (2015) also make an approach about the characteristics of Bitcoin users along with Elendner et al. (2016) which focus on the relationship and influence of cryptocurrencies as alternative investment assets and as portfolio diversification mechanism. With that last idea in mind an important aspect arises which is, does users who own cryptocurrencies have a financial market experience background from which it influences them in investing/using Bitcoin/cryptocurrencies?

The study intends to identify the key adoption drivers, purposes and background of cryptocurrency users. The universe is therefore made by those who are using or have used cryptocurrencies in the past. The following dimensions and hypothesis of the study are stated:

Dimension of analysis 1: Descriptive analysis of demographic characteristics and number of coins owned by users.

Dimension of analysis 2: Drivers of adoption – Analysis of the motivations pointed out as the main reasons to use cryptocurrencies. Analysis of cryptocurrencies regarding their main purpose for respondents. If considered as an investment alternative instead of a mean of payment or transfer of money analyse in which way users also invest in other financial markets and their portfolio distribution.

Focusing on Bitcoin, Glaser *et al.* (2014) points out that users, especially the ones uninformed, seek an alternative investment vehicle instead of alternative transaction system. There is also research made that argue that cryptocurrencies could be used as an investment mechanism to diversify a portfolio (Elendner *et al.*, 2016). Bohr and Bashir (2014) found evidence that Bitcoin users that considered themselves as investors, accumulated about 4 times as many Bitcoins as those who did not identify themselves as investors. On other hand Presthus and O'Malley (2017) had results that show that Bitcoin users embraced it due to technological curiosity.

Dimension of analysis 3: Analysis of the main factors jeopardizing the general adoption of cryptocurrencies according to the users' perspective.

According to Ermakova *et al.* (2017) there are several factors that hinder the mass adoption of Bitcoin in particular by the general public. The two mentioned on the hypothesis are identified as being the main reasons for that regarding Bitcoin in particular. Is it also applied to cryptocurrencies in general?

On the other hand, the study aims to find out the factors on which the massive adoption of cryptocurrency would depend, in the current users' perspective. Existing studies (Spengelink (2014) and Böhme *et al.* (2015)) point out to simplified mechanisms, price stability and governance. Do the actual users perceive it the same way? However, there are works (Baur *et al.* (2015)) that considered Bitcoin for instance a niche phenomenon.

Dimension of analysis 4: Study the relation/dependency between the decision of buying cryptocurrencies for investment purposes and i) the users demographic characteristics or ii) the motivations they show for trading cryptos.

Dimension of analysis 5: Study the relation/dependency between the decision of also investing in other assets besides cryptocurrencies and i) the users demographic characteristics or ii) the motivations they show for trading cryptos.

In regard of the dimensions of analysis 4 and 5, the conclusion that there is a specific background and specific motivations for cryptocurrencies users is pointed out in different works, mainly driven on Bitcoin online surveys. Some show the majority of users as males, in their late 20's or 30's (Bohr and Bashir, 2014; Lui, 2013) and with a master degree level (Abramova and Böhme, 2016). It is going to be tested either if any of those demographic factors has some relationship with either of those two situations and which category on those factors play a major relevant role.

Besides those, also the adoption drivers were identified in several exploratory studies based in the opinion of important stakeholders and experts as being the major factors to adopt and invest in cryptocurrencies for users: are low transaction fees, low barriers to entry, speed of transactions and high anonymity, such as in Baur *et al.* (2015), Gao *et al.* (2015), Ermakova *et al.* (2017) and Spenkelink (2014)). For that reason, it is going to be tested which factors mentioned by users have a bigger influence on the two scenarios described above.

Therefore, the main contributions of the current study to the extant literature on this area of research are:

- a) Inclusion of the cryptocurrency users' universe and not focusing only in Bitcoin users;
- b) Generalization of some of the research questions and overview about users' demographic factors, motivations and opinions on general adoption;
- c) Building on previous exploratory studies on the topics, testing their findings in a broader sample;
- d) Overview on purposes of cryptocurrency use along with different assets investment and portfolio distribution. Description of the relation degree and dependency of demographic factors and motivations with investing in other

assets or not and having at least 25% cryptocurrencies for short-term investmet.

## **4. Methodology**

In order to gather the data to test the hypothesis previously stated, a questionnaire was designed including 12 questions grouped by demographic factors, academic background, factors influencing the adoption of cryptocurrencies, the different uses of cryptocurrencies, portfolio diversification and future perspective of cryptocurrencies general adoption. Appendix 3 presents the questionnaire design and its justification according to the relevant literature.

The goal is to identify the main reasons for adoption, the community background and their characteristics as well with their views on the general adoption.

### **4.1 Selection/Characterization of the Sample and survey method**

As mentioned before the current study focuses on cryptocurrency users, despite of which they own or have owned and where they are located. In general, to find a representative sample of a community is hard to achieve (Groves, 1989). Due the complexity of identifying a precise sample of cryptocurrencies users either because there is no central authority, either due its privacy features, the dataset of this study was gathered using a questionnaire online. The final questionnaire hence was published in two different platforms, Facebook and Reddit (a website that works as a collection of different forums of discussion). On both, the focus was to reach as many users as possible and for that reason on Facebook it was chosen to post the questionnaire in groups such as “Criptomodas Portugal” and “Cryptocurrencies”. On Reddit on its turn, the groups chosen were “r/cryptocurrencies”, “r/cryptocurrency”, “r/altcoin” and “r/criptotechnology”. The pertinence of the study traced a goal of at least 5x or 10x more responses than the questions made by (Hair et al., 2009). In this case a sample of  $n = 120$  would be the minimum for analysis. The one criteria to answer the questionnaire is to have or have owned any kind of cryptocurrency. This is the population the study focuses on.

Due the characteristics of this study it was decided to use an online questionnaire for the survey. Besides this method being low-cost and reach people all over the world, there is an advantage that Kempson (2009) points out: people are eager to answer more honestly in an anonymous self-completion survey. This study wanted to building on previous

exploratory studies on the topic that used personal face-to-face and telephone interviews, testing their main findings in a broader sample.

#### **4.2 Questionnaire Design and Pilot test**

Based on previous works and surveys lead by different authors a questionnaire was designed to answer the several hypotheses formulated.

Before implementing the online survey, a pilot test was conducted with a small sample in order to test the clarity of the questions and its pertinence for the interviewees.

The pilot test was run during the first two weeks of May 2018 with 10 individuals with some degree of knowledge about cryptocurrencies, from which 5 have given valid feedback. The selected ones, 4 men and 1 woman, aged between 25 and 35 currently studying or with their degree completed in economics or engineering. Each of them was asked to give their opinion and notes about their opinions and suggestions were taken. After the revision of the questionnaire some adjustments were made, in particular, the number of questions, which were shortened from 14 questions to 12 due the fact they were either repetitive or not fundamental to the formulated hypotheses. There were some English syntax expressions that were corrected as well, and some adjustments made to make the questionnaire more clear and coherent.

#### **4.3 Implementation of the survey**

The final questionnaire was implemented during the last two weeks of May 2018. The questionnaire was published in different moments on Facebook groups related with Cryptocurrencies discussion and also in Reddit which is a general forum, but which has a big community and their own space for discussion about cryptocurrencies and the technology associated. The receptivity of the community was in general very positive with a lot of interest about the results which will, be published or shared in the end of the study. A total of **196** responses were obtained from which **10** were excluded as the respondents assumed they have never bought cryptocurrencies. That means that the sample is equal to 186, due to the fact that the object of analysis are cryptocurrency users and not enthusiasts or curious only. The questionnaire was further divided to enable respondents to answer according to their answer to the question regarding other

investments. In the sample, 99 respondents stated to be invested in other assets and not only in cryptocurrencies.

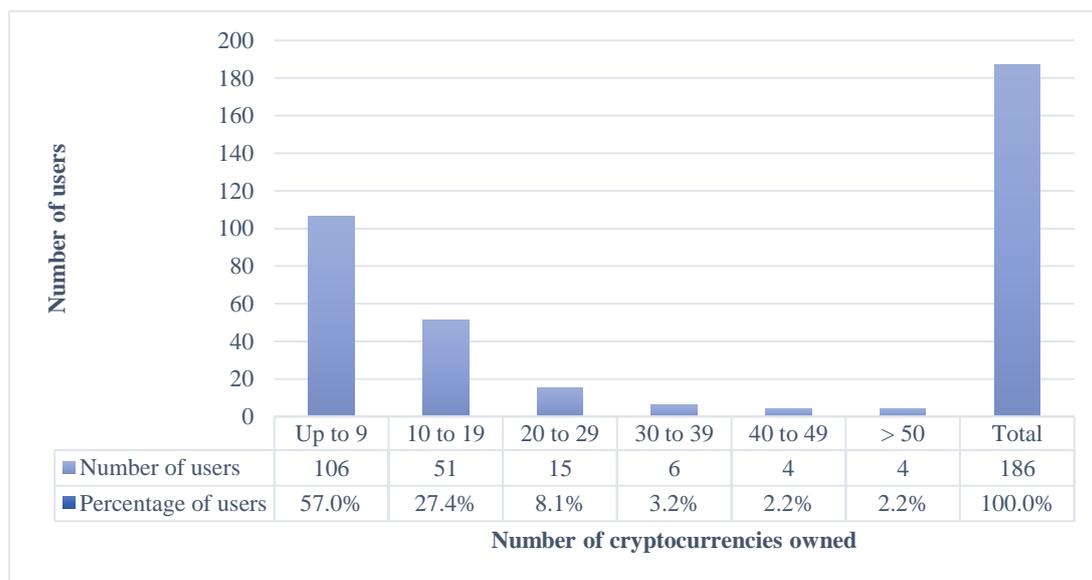
The results obtained from the questionnaire are explored in the next chapter.

## 5. Results

This section, presents the characterization of the sample, the number of cryptocurrencies the respondents own, their demographic characteristics such as age, gender, level of education and studies background. Afterwards it analysis the results obtained for the different motivations/factors for the adoption of cryptocurrencies and also the percentage allocation of cryptocurrencies between the different purposes. The section proceeds with the analysis of the perceived threats the users identify preventing the general adoption of cryptocurrencies and it ends with the analysis of the investment portfolio of the respondents.

### 5.1 Descriptive analysis of the sample

As mentioned, the conducted survey had 186 valid answers. Graph 2 displays the distribution regarding the number of cryptocurrencies owned.

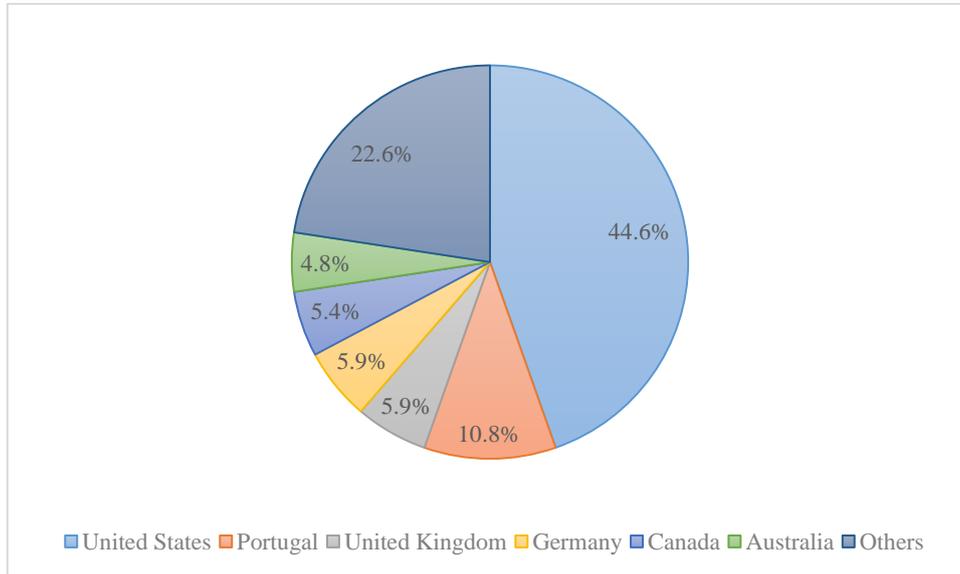


Graph 2 – Distribution of users by number of cryptocurrencies owned

From the 186 valid answers, the results show that, 57% of the respondents have at the most 9 different cryptocurrencies in their portfolio. This rate drops to below 27.4%, for users owning between 10 to 19 different cryptocurrencies and less, lowering to 8.1% for the next level. Only 7.6% of the respondents have 30 or more different cryptocurrencies

in their portfolio. The results allow to conclude that the vast majority of people tend to focus in fewer number of crypto coins.

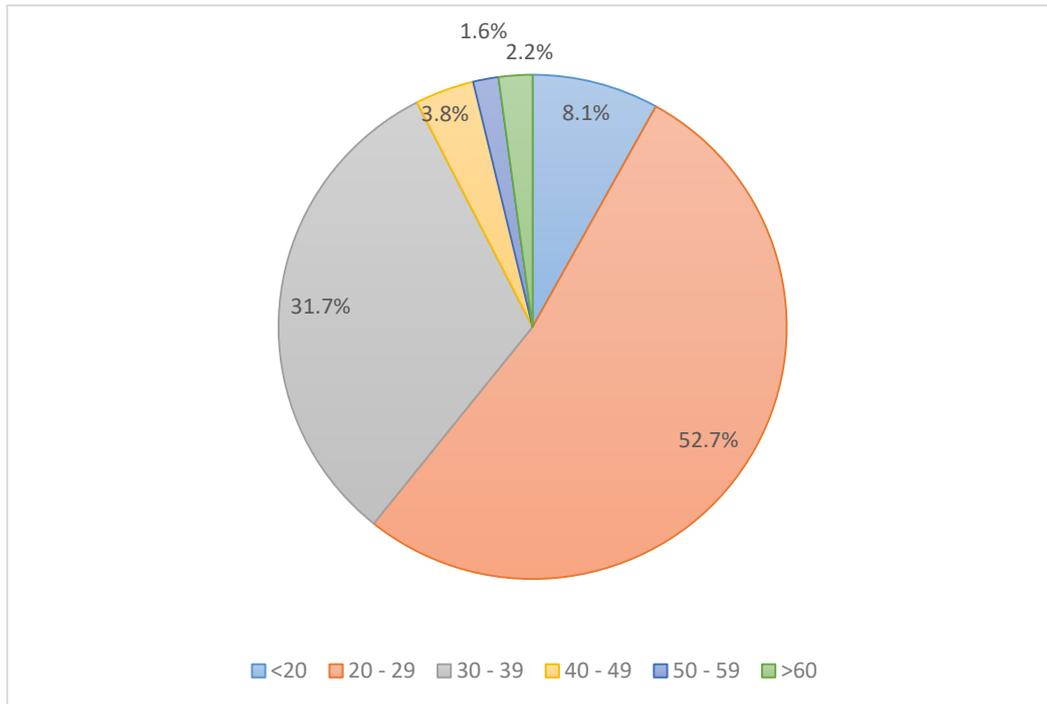
Graph 3 presents country distribution, of the sample.



Graph 3 – Distribution of respondents by country

The country most represented is the United States with 83 nationals representing 44.6% of the sample. Portugal appears as most represented with 20 respondents. It is important to point out that the questionnaire was distributed not only in heterogeneous groups with people from all over the world but shared as well in online platforms mainly used by Portuguese which has impact on the overall result obtained. The countries that obtained more results other than these two, were the United Kingdom and Germany both with 11 respondents, Canada with 10 users and finally Australia with 9 interviewees. The remaining answers came from other 29 countries but all of them obtaining less than 5 respondents, most of them from Europe (see appendix 2 for detail). These results, despite the platforms used, corroborate the findings of Bosh and Bashir (2014) that also found that almost half of the respondents, in their case, Bitcoin users, were from the United States.

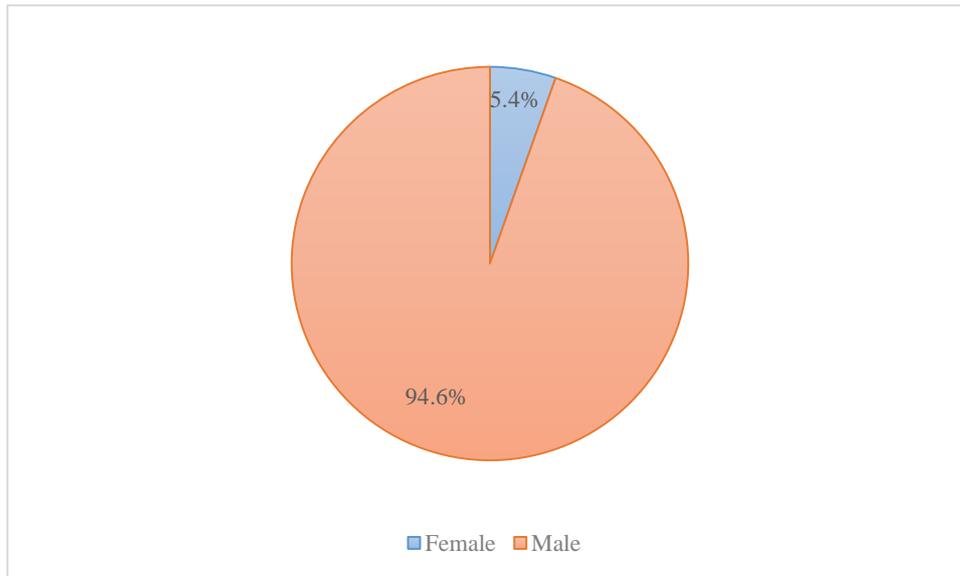
With respect to the age of the respondents, the results are shown in the Graph 4.



Graph 4 – Distribution of respondents by age

The graph shows that 8.1% of the users (15) have 20 years old or less while the vast majority, 52.7% (98) are aged between 20 and 29 years old, followed by 59 users, 31.7%, that are 30 up to 39 years old. Despite being a new technology which appeared in recent years, there are still a fraction of older users from this sample that were appealed by it, registering 7 persons above 50 years old. Therefore, 84.4% of the users have between 20 and 39 years old. These results are in line with the study from Lui (2013) and Bosh and Bashir (2014) which analysed the Bitcoin community and also found that the majority of users ranged from 20 years old to 39 years old.

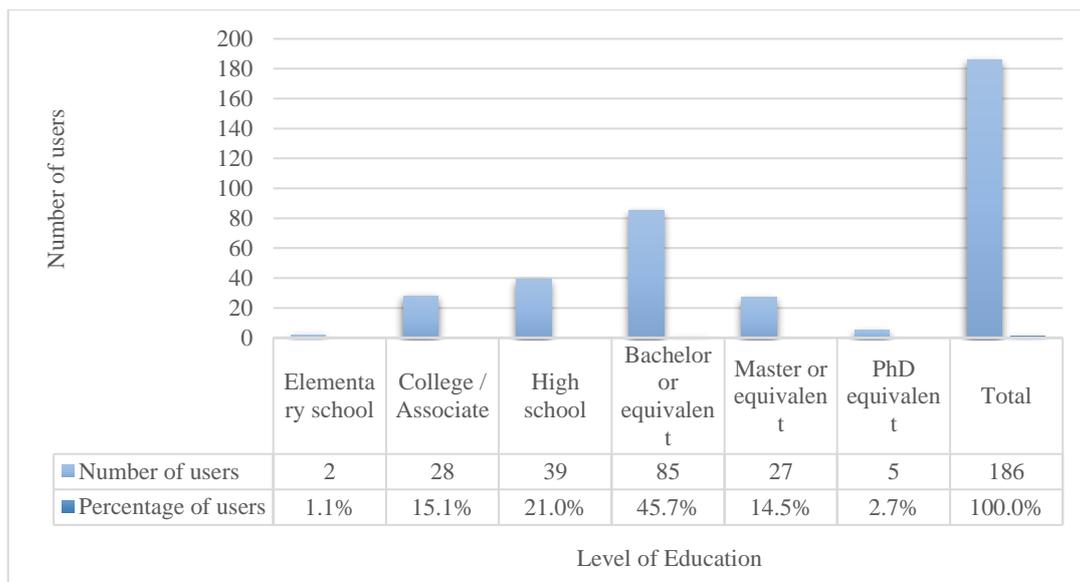
The gender of the sample is shown in Graph 5.



Graph 5 – Distribution of respondents by gender

In the sample 94.6% of the users (176) are male with only 10 female respondents (5.4%). This shows a clear prevalence of male users in the market. These findings are in line with the results of Lui (2013) and Bosh and Bashir (2014) which also found a predominance of Bitcoin users, with about 95% of them being male.

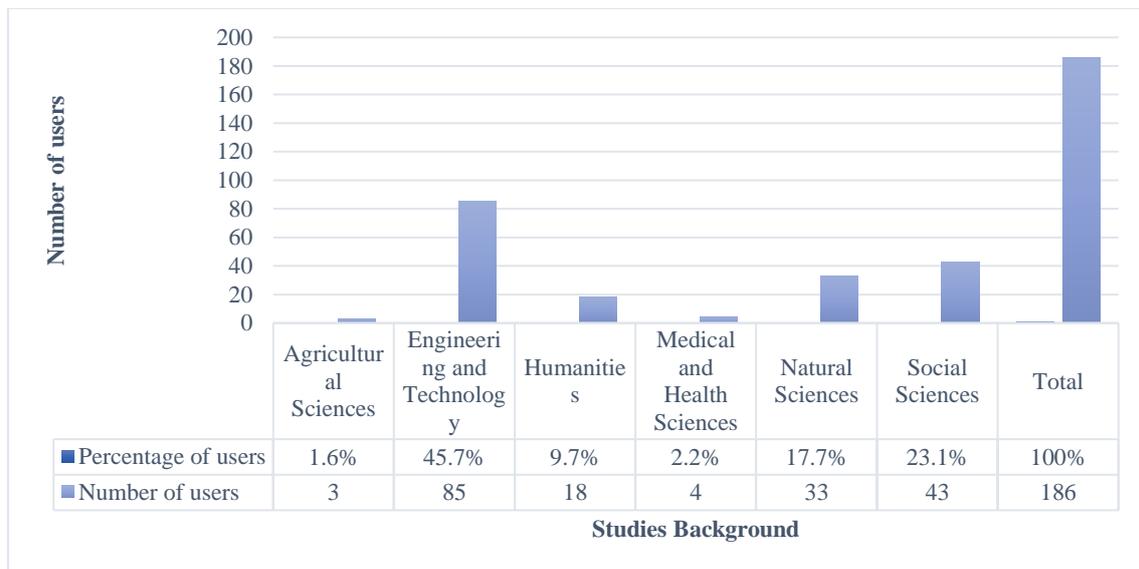
Graph 6 shows the results regarding the level of education.



Graph 6 – Distribution of respondents according to their education level

From the 186 respondents, 85 (45.7%) have a bachelor degree, 39 respondents (21%) have finished high school, 27 (14.5%) have a master degree and only 5 havw a Phd degree. Those results were an interesting difference from the results obtained by Abramova and Böhme (2016) which got a higher relevance for master degree instead. Although a difference on education level was found between the two studies, such can be explained by the samples used being rather small.

As for the field of background studies, ther OECD fields of science and technology (FOS) were used and the results are displayed in Graph 7.



Graph 7 – Distribution of respondents according to their studies background (OECD - FOS)

Engineering and Technology shows greater prevalence with 85 answers (45.7%), followed by Social Sciences with 43 respondents (23.1%) and by Natural Sciences with 33 answers (17.7%). In a transversal analysis of the data, evidence was found that the Engineering and Technology field leads in every different level of education from elementary school to Phd degree (see appendix 3 for detail).

This is a very interesting result and understandable given the fact that, as mentioned before, blockchain is considered to be the fourth industrial revolution. This new technology from which cryptocurrencies benefit due to its structure being base on it, ends up attracting a lot of users from this studies background. This is an interesting finding because in spite of their level of education, users from engineering and technology tend

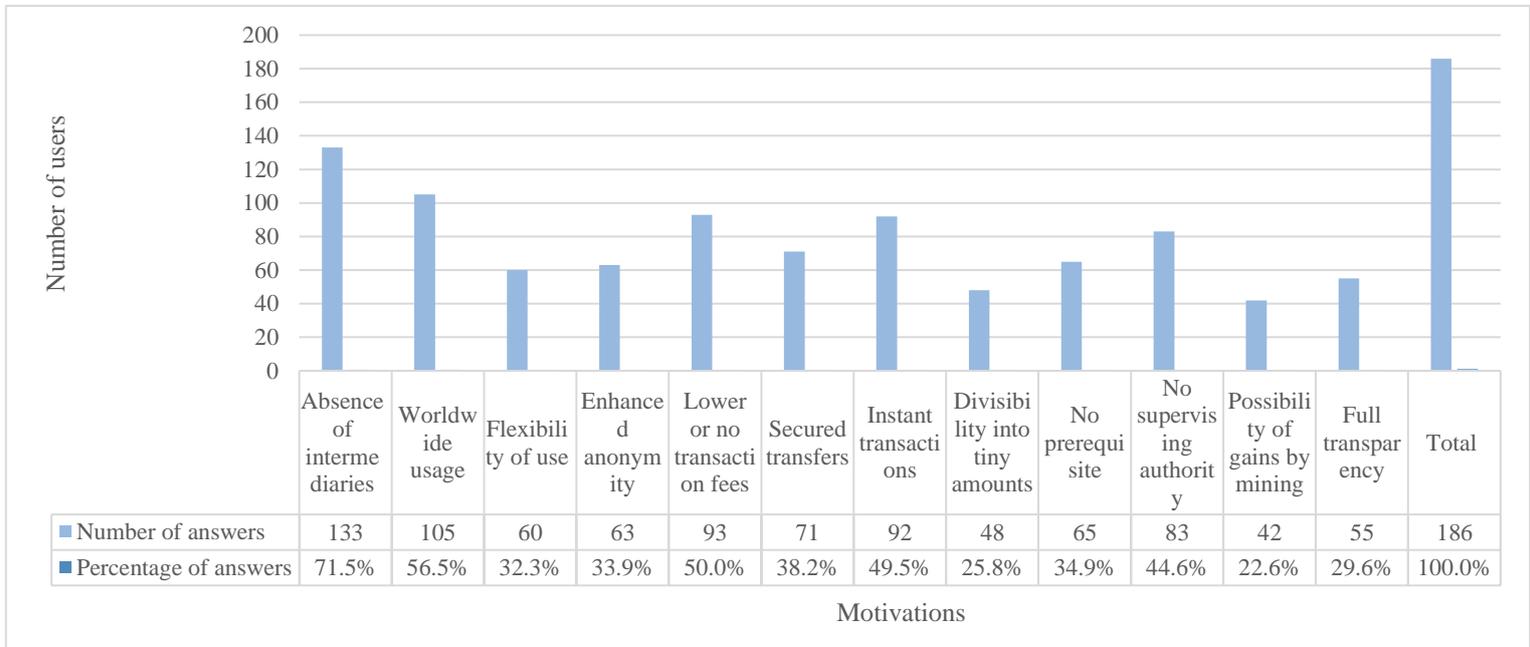
to focus more on it than the general public. This shows that there is not yet a general adoption equally distributed between the users background.

## 5.2 – Adoption drivers

This section describes the results obtained in this study and compare them with previous research, although for Bitcoin, instead of cryptocurrencies in general. It studies the adoption drivers that are mentioned as being more relevant for cryptocurrency users. Firstly, the motivations and purposes of cryptocurrency users are mentioned and afterwards the portfolio of other investment assets is analysed.

### 5.2.1 – Motivations and Purposes

Graph 8 shows the distribution of answers regarding the motivations pointed out by the respondents for using cryptocurrencies.



Graph 8 – Distribution of answers according to users' motivations

Evidence shows that for the 186 respondents, the three main reasons / motivations for using cryptocurrencies are:

- “absence of intermediaries (e.g. banks)”,
- “worldwide usage” and
- “lower or no transaction fees”.

Respondents were given 12 different options based on the results of previous exploratory research already mentioned, being able to select as many as relevant. It was created an open option as “other” which could be used to specify other reasons.

In line with the findings in previous studies, the most important reasons were selected by more than 50% of the respondents: “The absence of intermediaries” was chosen by 133 respondents (71.5%), “Worldwide usage” by 105 (56.5%) and “lower or no transaction fees” by 93 (50.0%). It is important to notice that the option “instant transactions” is also mentioned by 92 respondents, which shows the relevance for users along the previous referred motivations.

This data is in line with previous findings (Ermakova *et al.* (2016) that identified these three main reasons as important features driving interest in Bitcoin. Important to identify that although in their study higher importance was given to anonymity and flexibility which in this did not ranked that high in our study with only 63 (33.9%) and 60 (32.3%) answers, respectively.

This is a very important result because it shows that these four factors mentioned before are considered the most important for users and might be the ones with potential to change the world of trading and the financial markets in general. New products to be developed should focus on these characteristics. No costs or lower fees, people like to be able to use a system which is not overload with costs that take a share of their transaction which could allow to more small transactions, small amounts transferred. Instant transactions, in a globalized world fastness is the key. Absence of intermediaries to not overload the circuit, too many steps or bureaucracy to complete a transaction. Worldwide use, as mentioned before, a system should be able to reach the biggest number of users in order to incentive and facilitate trading. A homogeneous system always makes it easier to perform these tasks. Entrepreneurs and companies should focus on these key factors in order to meet consumers / users’ expectations or motivations.

This study also wanted to know for which purposes the cryptocurrencies were used. The respondents were asked to say what percentage of the total amount of crypto they were using for each purpose, among the following:

- As a means of payment for goods and services,
- As a means of cross-border money transfers,

- For donations or gifts,
- As a short term speculative investment,
- As storage of value (long term investment).

The results are shown in Table 1.

	As a means of payment for goods		As a means of cross-border money		For donations or gifts		As a short term speculative		As storage of value (long term)	
<b>Do not use</b>	76	<b>53.90%</b>	111	<b>78.72%</b>	94	<b>66.67%</b>	27	<b>19.15%</b>	5	<b>3.55%</b>
<b>Less than 25%</b>	55	<b>39.01%</b>	25	<b>17.73%</b>	43	<b>30.50%</b>	44	<b>31.21%</b>	6	<b>4.26%</b>
<b>25 - 50%</b>	9	<b>6.38%</b>	3	<b>2.13%</b>	4	<b>2.84%</b>	51	<b>36.17%</b>	48	<b>34.04%</b>
<b>50 - 75%</b>	1	<b>0.71%</b>	2	<b>1.42%</b>	0	<b>0.00%</b>	15	<b>10.64%</b>	35	<b>24.82%</b>
<b>More than 75%</b>	0	<b>0.00%</b>	0	<b>0.00%</b>	0	<b>0.00%</b>	4	<b>2.84%</b>	47	<b>33.33%</b>
	141	100.00%	141	100.00%	141	100.00%	141	100.00%	141	100.00%

Table 1 – Distribution of percentage of the total amount of cryptocurrencies allocated to usage' purpose

There is an important difference regarding the number of valid cases used for this analysis. In fact, only 141 cases were considered valid from the 186 in the sample. When reviewing the answers of each respondent, all the cases where the sum of the allocated percentages was either above or below 100% were excluded. This situation is also mentioned in the subsequent sections.

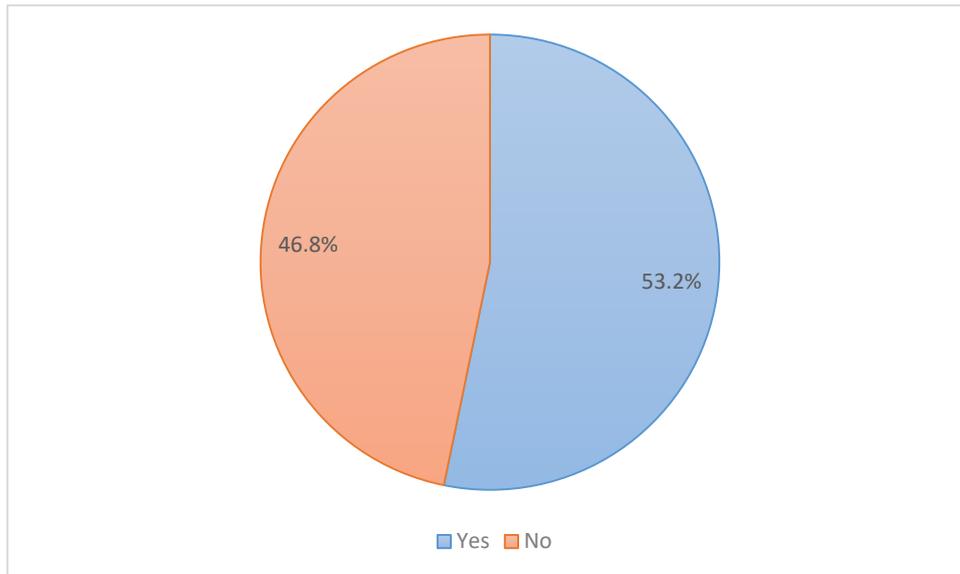
In table 1, each column/purpose shows the number of answers and the respective percentage. Most of the users do not use cryptocurrencies either as a means of payment (53.9%), as a cross boarder way of transferring money (78.7%) or even for donations or gifts (66.7%). This last result differs from the one obtained by Lui (2013) regarding Bitcoin use which registered a percentage of 55% from 533 respondents admitting the use for these purposes. In our study, 46.1% of the respondents admit that allocate at least a few percentage for buying goods or services. That percentage drops to 33.3% for respondents using it as donations or gifts and lowers even more to 21.3% for the ones using it for cross-border transfers. On other hand, the distribution of answers is quite different for short term speculative purposes. In that matter, 80.8% admits using it as a short term speculative investment. Those results are not in line with the ones from Abramova and Böhme (2016) which identified only 52.3% using Bitcoin with that intent.

However, from the 141 respondents, almost everyone, 96.4% admits that use cryptocurrencies as a storage of value (long term investment), only 5 respondents admit not using it at all for that goal. These results regarding the use as store of value differ from the data gathered by Abramova and Böhme (2016) for Bitcoin holders which accounted for 70.9%.

This results point out that being acquired mainly for either short or long term investments. In fact, as mentioned before, it accounts for 80.8% and 96.4% respectively, of respondents using it with those purposes. That is probably explained by the huge price increase of the cryptocurrencies throughout 2017, attracting many investors and curiosity to this market. However the dramatic decline over the year 2018 might lead to a lot of users to leave. These fluctuations of price and the fact that a lot of users are using to have trading gains might affect the primordial use of it as mean of payment or transfer of money due the instable value. Despite that it does not mean that the investors do not look at it as a future way of payment system, but that at the moment there is a dual purpose on possessing cryptocurrencies. On one hand capital gains drive the interest on cryptocurrencies while at the same time on the other hand there is a certain perspective of a payment system based on this technology. Either way, these results might contribute to identify in which way a better payment system could be created or to design more appealing investment assets.

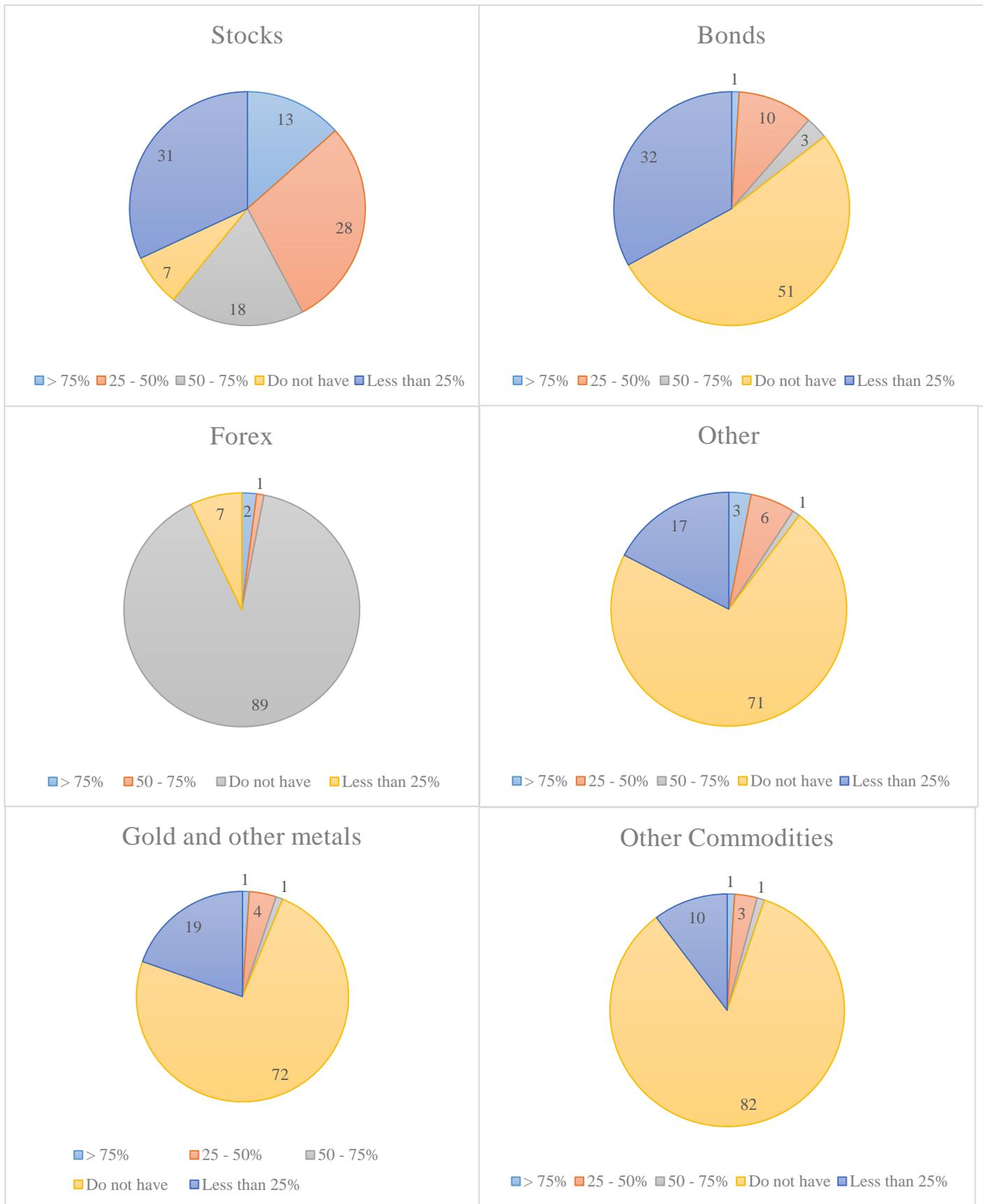
### **5.2.2 – Investment Portfolio**

The Graph 9 shows the distribution of answers according by respondents on having or not positions in other assets besides cryptocurrencies.



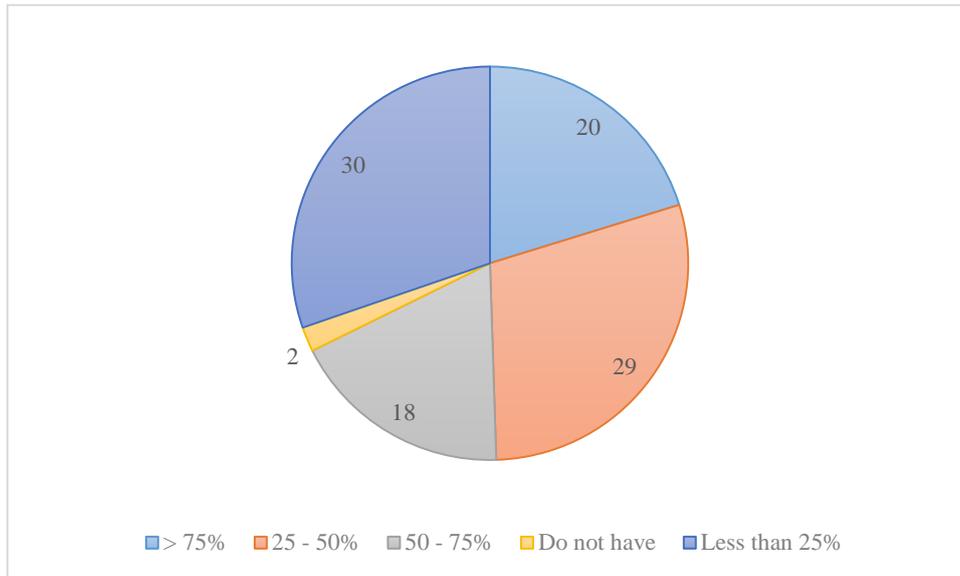
Graph 9 – Distribution of answers according to users' other investments

Evidence shows a quite divided sample, obtaining 53.2% of respondents admitting other investments, while 46.8% of them admitted that they did not have any other investments besides the money allocated to cryptocurrencies. From those respondents that answered positively, we designed a question for them with few possibilities regarding the percentage of their investment portfolio. They were asked in which way their portfolio was divided considering specific assets. The possibilities were: Stocks, Bonds, Forex, Gold and other metals, other commodities, cryptocurrencies itself and the option other. The answers distribution regarding their portfolio are presented in the Graphs, 10 and 11.



Graph 10 – Portfolio investment diversification

In order to put in perspective, there was also the option for cryptocurrencies:



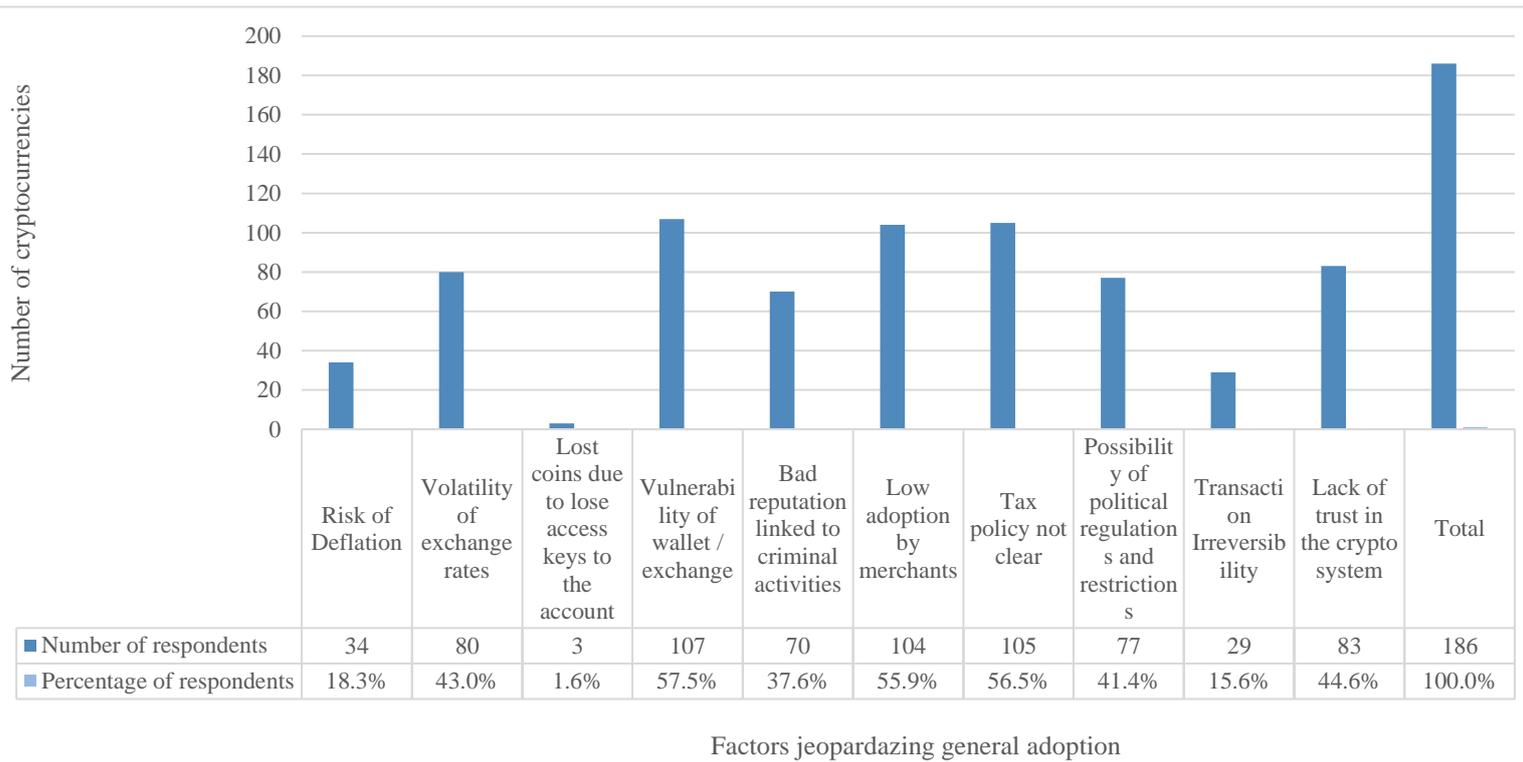
Graph 11 – Cryptocurrencies weight on users' portfolio

From the reduced sample, 67 respondents admitted to include 25% of cryptocurrencies in their general portfolio. It was obtained 2 negative answers that we could interpret as not having cryptocurrencies in the moment on the respective users' portfolio. For that reason we decided to let it stay instead of excluding the result which at first glance could seem dissonant.

Regarding the weight of the other assets in the portfolio diversification, the asset which appears with more relevance is stocks, with 59 respondents having more than 25% allocated to it. Bonds gathered 14 respondents who possess more than 25% of their portfolio for that instrument, while only 3 admitted to allocate more than that percentage for Forex. The other three assets did not gather that many respondents. This evidence shows that cryptocurrencies users that also invest in other assets have preference for stocks. Such evidence could be justified as this combination being beneficent for portfolio diversification as mentioned by Elendner *et al.* (2016).

### 5.3 - Factors preventing the general adoption

According to previous research, the options “Vulnerability of wallets due to hackers’ attacks” and “availability of points of sale accepting cryptocurrencies”, were the main factors jeopardizing their widespread adoption. On our study the distribution of answers are represented in graph 12.



Graph 12 – Distribution of answers according to users’ opinions on general adoption

Evidence from our sample shows that the three main reasons that users consider that can jeopardize the general adoption of cryptocurrencies are “vulnerability of wallet / exchange”, “tax policy not clear” and “low adoption by merchants”. In line with the findings in previous studies, the most important reasons were selected by more than 50% of the respondents: “vulnerability of wallet / exchange” was chosen by 57.5% of respondents, followed by 56.5% who pointed out “tax policy not clear” and 55.9% who referred “low adoption by merchants” as the main reasons impeding this general adoption. On the other end, the least concerning aspects from the users’ perspective that do not jeopardize general adoption are “lost coins due to lose access keys to the account”,

“transaction irreversibility” and “risk of deflation” with 1.6%, 15.6% and 18.3% respectively of answers.

In comparison with Ermakova et al. (2017), it is possible to notice that those aspects do not have the same relevance, especially regarding the “lost coins” feature which was barely an issue selected by 3 users only. The questions although, were posed in different ways, in Ermakova et al. (2017) were in a scale which ranged from not an important issue to a moderately or great extent regarding the barriers of Bitcoin widespread adoption, while in this context, was about a more broader issue, cryptocurrencies and only to identify each component was important or not.

Even so, in both studies the major issue pointed out was the factor “Vulnerability of a wallet (e.g. due to hacking)” which portrays the main concern of the users related with the on-going news regarding the hacking of accounts (Techcrunch, 2018). Another factor which shares the same degree of concern was “Low adoption by merchants” and “tax policy not clear”. Once again it denotes the possible dual way with which users look to cryptocurrencies future. One perspective is as a means of payment, would be necessary to have several points of sale capable of receiving payments this way which otherwise would restrain a broader impact. The other perspective is related with investment or capital gains, where taxes policy play an important role. Therefore, if such policies are not clear might create some doubt from possible users to risk to adopt it. In any case, there is a reason that embraces all views which is “vulnerability of wallet”. That factor is regarded as the top concerning, specially with so many attacks occurring and the impossibility of recovering the lost coins. That portrays a big threat considering that there is no mechanism to take those coins back which could incur in huge losses.

## 5.4 - Hypothesis testing

In this section we further investigate the investment perspective given by the cryptocurrency users. The objective of the analysis is twofold. On the one hand, we want to test whether the decision of buying cryptocurrencies for investment purposes (assessed by whether the user possesses at least 25% of cryptocurrencies for short-term speculative purpose<sup>1</sup>) is related to the users demographic characteristics or to the motivations they show for trading cryptos. On the other hand, we want to test whether the decision of also investing in other investment assets besides cryptocurrencies is related to the users demographic characteristics or to the motivations they show for trading cryptos.

To trace each objective we perform qui-square independence tests and estimate a logit model<sup>2</sup> with all the variables (either demographic or motivation variables).

### 5.4.1 – Demographic factors influence

The demographic factors tested were, age, gender, background field of studies and level of education. Besides these, the number of different coins possessed was also included.

As mentioned before, with respect to percentage of the portfolio allocated to each purpose (including investment purposes) only 141 cases were considered valid from the 186 in the sample. When reviewing the answers of each respondent, all the cases where the sum of the allocated percentages was either above or below 100% were excluded.

With respect to whether the user is invested in other assets or not, all the cases were considered valid and therefore N=186.

### **Analysis of the decision of buying cryptocurrencies for investment purposes**

---

<sup>1</sup> Another proxy was analysed: whether the user possesses at least 25% of cryptocurrencies for long-term investment purposes but the results obtained were not significant.

<sup>2</sup> The dependent variables of the models are binary, capturing:  
- whether the user is buying cryptocurrencies for investment purposes or not (measured by whether the user possesses at least 25% of cryptocurrencies for short-term speculative purposes or not)  
- the user invests in other assets besides cryptocurrencies or not.

The chi-squared independence tests were run against every demographic variables after concluding that the data does not follow a normal distribution (see appendix 2 with the summary results of the normality tests).

Only two demographic variables, age and gender, showed significant dependence with the decision of buying cryptocurrencies for investment purposes. These are the results presented here.

Tables 2 and 3 show the dependence analysis between the age of the user and the decision of buying cryptos for short-term investment purposes.

		Short-Term Investment		Total
		0	1	
Age	< 20	5	6	11
	20 - 29	42	31	73
	30 - 39	15	30	45
	40 - 49	5	1	6
	50 - 59	1	2	3
	60 +	1	2	3
Total		69	72	141

Table 2 – Contingency table for the age of the user and the decision of buying crypto for short-term investment purposes

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.022 <sup>a</sup>	5	.075
Likelihood Ratio	10.379	5	.065
N of Valid Cases	141		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is 1.47.

Table 3 – Chi-Square test for the age of the user and the decision of buying crypto for short-term investment purposes

The results allow us to conclude that, with a significance level of 10%, the variables age of the user and the decision of buying crypto for short-term investment purposes are not independent.

Tables 4 and 5 present similar analysis regarding the gender of the user. The results allow us to conclude that, with a significance level of 10%, the variables gender of the user and the decision of buying crypto for short-term investment purposes are not independent

		Short-Term Investment		Total
		0	1	
Gender	Female	1	6	7
	Male	68	66	134
Total		69	72	141

Table 4 – Contingency table for the gender of the user and the decision of buying crypto for short-term investment purposes

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.539 <sup>a</sup>	1	.060		
Continuity Correction <sup>b</sup>	2.230	1	.135		
Likelihood Ratio	3.928	1	.047		
Fisher's Exact Test				.116	.065
N of Valid Cases	141				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.43.

b. Computed only for a 2x2 table

Table 5 – Chi-Square test for the gender of the user and the decision of buying crypto for short-term investment purposes

This results tell us that there is an important and dependent relation between gender and age and the decision of buying cryptocurrencies for short-term purposes. This relation is important because it allow us understand which factors play the more important role on this decision making and to create products accordingly to gender and to different age range. In fact, it is possible to verify that woman would prefer to take more risks and go for a short term speculative decision than man. Nevertheless is important to point out that a larger sample including more woman would be benefic for this casualty analysis. Regarding the age variable, it is noticeable that in the range from 20 to 29, majority of

users tend to not buy crypto for short-term investment purposes, while from 30 to 39, such behaviour is predominant. These differences allow us to understand in which way different demographic patterns play in the decision of buying crypto for investment intents.

**Analysis of the decision of also investing in other assets besides cryptos**

The qui-squared independence tests were run against every demographic variables. Only two of them, age and studies background, showed significant dependence with the decision of also investing in other assets. These are the results presented here. In this case the 186 answers were considered valid.

Tables 6 and 7 show the dependence analysis between the age of the user and the decision of also investing in other assets.

		Other_Investments		Total
		0	1	
Age	< 20	11	4	15
	20 - 29	49	49	98
	30 - 39	22	37	59
	40 - 49	1	6	7
	50 - 59	1	2	3
	60 +	3	1	4
Total		87	99	186

Table 6 – Contingency table for the age of the user and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.258 <sup>a</sup>	5	.047
Likelihood Ratio	11.827	5	.037
N of Valid Cases	186		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is 1.40.

Table 7 – Chi-Square test for the age of the user and the decision of also investing in other assets

In this case, the chi-square test allows us to conclude that there is a statistically significant relationship between the two variables, age and being invested in other assets, at a significance level of 5%. Important to refer that 50% of the cells obtained less than expected count of 5. Nevertheless all of them represent less than 20% of the observations (underlying assumption for the validity of the test).

With respect to the analysis of the studies background, the results of the Chi-square test are presented in Tables 8 and 9.

		Other_Investments		Total
		0	1	
Background	Agricultural Sciences	1	2	3
	Engineering and Technology	33	52	85
	Humanities	10	8	18
	Medical and Health Sciences	2	2	4
	Natural Sciences	24	9	33
	Social Sciences	17	26	43
Total		87	99	186

Table 8 – Contingency table for the studies background of the user and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.784 <sup>a</sup>	5	.025
Likelihood Ratio	13.043	5	.023
N of Valid Cases	186		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.40.

Table 9 – Chi-Square test for the studies background of the user and the decision of also investing in other assets

Considering a significance level of 5%, we can conclude that both variables have some degree of dependence, studies background and investing in other assets.

This results tell us that there is an important and dependent relation between age and studies background in the decision of investing in other assets besides cryptocurrencies. This relation is important because it allow us understand which factors play the more important role on this decision making accordingly to age and studies background. In fact, it is possible to verify that from 30 years on until 60 years old, users tend to invest more in other assets than the lower ages. From 20 to 29 it is equally distributed and for users aging less than 20 it is more common to not invest in other assets besides cryptocurrencies. This might tell that older users tend to diversify their portfolio. Nevertheless is important to point out that a larger sample including more users from different ages would enrich this analysis. Regarding the studies background variable, it is noticeable that users from Engineering and Technology area and Social Sciences are keener to invest in other assets while users from Natural Sciences show the opposite trend. This might indicate as well the intent with each user from diferente background have regarding cryptocurrencies and regarding other types of investments.

For further analysis of the decision of also investing in other assets besides cryptos (binary variable) we also estimated a Logit model using as regressors all the demographic variables: age, gender, number of different coins, studies background and level of education. Table 10 presents the coding of the explanatory variables used to estimate the model and Table 13 shows the estimated model.

		Frequency	Parameter coding				
			(Dummy1)	(Dummy 2)	(Dummy 3)	(Dummy 4)	(Dummy 5)
Background	Agricult	3	1.000	.000	.000	.000	.000
	Engineer	85	.000	1.000	.000	.000	.000
	Humaniti	18	.000	.000	1.000	.000	.000
	Medical	4	.000	.000	.000	1.000	.000
	Natural	33	.000	.000	.000	.000	1.000
	Social S	43	.000	.000	.000	.000	.000
Age	1	15	1.000	.000	.000	.000	.000
	2	98	.000	1.000	.000	.000	.000
	3	59	.000	.000	1.000	.000	.000
	4	7	.000	.000	.000	1.000	.000
	5	3	.000	.000	.000	.000	1.000
	6	4	.000	.000	.000	.000	.000
Nr_of_Coins	1	106	1.000	.000	.000	.000	.000
	2	51	.000	1.000	.000	.000	.000
	3	15	.000	.000	1.000	.000	.000
	4	6	.000	.000	.000	1.000	.000
	5	4	.000	.000	.000	.000	1.000
	6	4	.000	.000	.000	.000	.000
Education	1	2	1.000	.000	.000	.000	.000
	2	28	.000	1.000	.000	.000	.000
	3	39	.000	.000	1.000	.000	.000
	4	85	.000	.000	.000	1.000	.000
	5	27	.000	.000	.000	.000	1.000
	6	5	.000	.000	.000	.000	.000
Gender	1	176	1.000				
	2	10	.000				

Table 10 – Coding categorical variables – Demographic Factors

		Chi-square	df	Sig.
Step 1	Step	34.481	21	.032
	Block	34.481	21	.032
	Model	34.481	21	.032

Table 11 – Omnibus tests of model coefficients

Step	-2 Log likelihood	Cox and Snell R Square	Nagelkerke R Square
1	222.595 <sup>a</sup>	.169	.226

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 12 – Model summary or Likelihood and R significance

	B	S.E.	Wald	df	Sig.	Exp(B)
Nr_of_Coins			4.406	5	.493	
Nr_of_Coins(1)	1.161	1.298	.800	1	.371	3.193
Nr_of_Coins(2)	1.243	1.302	.911	1	.340	3.466
Nr_of_Coins(3)	.437	1.385	.100	1	.752	1.549
Nr_of_Coins(4)	2.600	1.736	2.244	1	.134	13.470
Nr_of_Coins(5)	1.952	1.763	1.226	1	.268	7.043
Age			8.781	5	.118	
Age(1)	1.604	1.592	1.015	1	.314	4.973
Age(2)	2.197	1.450	2.295	1	.130	8.995
Age(3)	2.678	1.436	3.479	1	.062	14.554
Age(4)	4.162	1.847	5.078	1	.024	64.225
Age(5)	3.008	1.854	2.633	1	.105	20.252
Gender(1)	.016	.901	.000	1	.986	1.016
Education			5.641	5	.343	
Education(1)	-.039	2.064	.000	1	.985	.962
Education(2)	-1.614	1.189	1.841	1	.175	.199
Education(3)	-1.209	1.158	1.089	1	.297	.299
Education(4)	-.530	1.123	.222	1	.637	.589
Education(5)	-.793	1.173	.458	1	.499	.452
Background			12.718	5	.026	
Background(1)	1.470	1.422	1.068	1	.301	4.350
Background(2)	.327	.431	.574	1	.449	1.386
Background(3)	.144	.678	.045	1	.832	1.155
Background(4)	-.793	1.214	.427	1	.513	.452
Background(5)	-1.364	.559	5.955	1	.015	.256
Constant	-2.463	2.111	1.361	1	.243	.085

Table 13 – Estimated Logit model for the decision of also investing in other assets besides cryptos

In Table 11 the chi-square test allows us to conclude that with a significance level of 5% the model is statistically significant fitting better than a model with no predictors. Another way to verify the quality of the model is the Cox and Snell's R Square and Nagelkerke's R Square in Table 12. Both are coefficients of determination, giving information about in which degree, up to a maximum of 1, the variations are explained by the model. In this case, a value of 0.169 and 0.226 were obtained respectively.

Table 13 shows that there are two categories from the variable age used that showed statistically significant with a significance level of 10%. Those categories on the variable age, are the intervals between 30 – 39 and 40 – 49 showing statistical significance and more likelihood than the base category (+60) of possessing other assets besides cryptocurrencies.

On the variable gender, there is no evidence, or statistical significance in either male or female prevalence for having other assets besides cryptocurrencies, fact that can be accessed for the score obtained on the odds ratio column, 0.986 (very close to 1).

Education variable also does not denote a relevant statistical significance although it is the one where all different categories comparing to PhD level are negatively related.

Number of coins does not also plays any significant relevance, which means that possessing more or less coins does not influence the fact that users invest or not in other assets.

The last categorical variable, studies background, also confirms its significance, on which, the area natural sciences is negatively correlated, which means, that a chance of a person of this area it is more likely to fall in not meeting the criteria of having other investments.

Both the chi-square independence tests and the logit model show that demographic factors play an important role on investing or not in other assets.

The results obtained show in which way our model predicts the investment in other assets besides cryptocurrencies considering changes on the categorical variables and the significance of it. It allows us to conclude that the most important factors that impact positively the decision to have positions in other assets is age, namely the age range from 30 to 39 and from 40 to 49. It might be related with more aptence to diversify the portfolio or having more curiosity or information about other kind of assets than the simple

curiosity of opening a position on cryptocurrencies. On the other hand, users that have a background from Natural Sciences tend to have a negative correlation or impact on having other assets as an investment. That shows, that users from this background tend to focus more in cryptocurrencies than in other investments. This is relevant because it shows in which way different demographic factors play in the fact of users having positions in other assets than crypto.

A similar Logit model was estimated regressing the decision of buying crypto for short-term investment purposes over the demographic factors but no significant results were obtained.

#### **5.4.2 – Motivations influence**

The motivations which users mentioned as the more important / drivers to use cryptocurrencies were also factors which were tested. As mentioned in the previous section, regarding the percentage of the portfolio allocated to each purpose (including investment purposes) only 141 cases were considered valid from the 186 in the sample. When reviewing the answers of each respondent, all the cases where the sum of the allocated percentages was either above or below 100% were excluded.

With respect to whether the user is invested in other assets or not, all the cases were considered valid and therefore N=186.

The variables / predictors used were motivations mentioned by users to use cryptocurrencies, which were:

- “Enhanced anonymity of electronic payment”;
- “Leaving out intermediaries”;
- “Lower transaction fees”;
- “Worldwide usage”;
- “Divisibility into tiny amounts / micropayments”;
- “No prerequisite for participation”;
- “Possibility to gain Bitcoins by mining”;
- “Transaction irreversibility for merchants”;
- “Flexibility of use”;
- “Possibility to ensure full transparency”;
- “No supervision”;
- Other factors pointed out by users.

#### **Analysis of the decision of buying cryptocurrencies for investment purposes**

The chi-squared independence test were run against every motivation variable after concluding that for motivations variables do not follow a normal distribution (see appendix 2 with summary results of the normality testes).

Only three motivations variables, “enhanced anonymity of electronic payment”, “secured transfers” and “no supervising authority” showed significant dependence with the decision of acquiring cryptocurrencies for investment purposes. Those results are presented in the following tables.

Tables 14 and 15 show the dependence analysis between the motivation “enhanced anonymity of electronic payment” and the decision of acquiring cryptos for short-term intents.

	Short-Term Investment		Total
	0	1	
Motivations1	38	53	91
Enhanced anonymity of electronic payment	31	19	50
Total	69	72	141

Table 14 – Contingency table for “enhanced anonymity of electronic payment” motivation and the decision of buying crypto for short-term investment purposes

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.291 <sup>a</sup>	1	.021		
Continuity Correction <sup>b</sup>	4.512	1	.034		
Likelihood Ratio	5.328	1	.021		
Fisher's Exact Test				.023	.017
N of Valid Cases	141				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 24.47.

b. Computed only for a 2x2 table

Table 15 – Chi-Square test for “enhanced anonymity” motivation and the decision of buying crypto for short-term investment purposes

The results allows us to conclude that with a significance level of 5%, the variable “anonymity of electronic payment” and the decision of buying crypto for short-term investment purposes are not independent.

The same case also applies to “secured transfers” motivation. On tables 16 and 17, similar results are presented. The results allow us to conclude that, for a significance level of 10%, the variables “secured transfers” and the decision of acquiring crypto for short-tem intents are not independent.

	Short-Term Investment		Total
	0	1	
Motivations4	37	50	87
Secured transfers	32	22	54
Total	69	72	141

Table 16 – Contingency table for “secured transfers” motivation and the decision of buying crypto for short-term investment purposes

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.732 <sup>a</sup>	1	.053		
Continuity Correction <sup>b</sup>	3.093	1	.079		
Likelihood Ratio	3.749	1	.053		
Fisher's Exact Test				.059	.039
N of Valid Cases	141				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.43.

b. Computed only for a 2x2 table

Table 17 – Chi-Square test for “secured transfers” motivation and the decision of buying crypto for short-term investment purposes

The third motivation which is also included in this analysis is “no supervising authority”. The results of the chi-square test are displayed in tables 18 and 19.

	Short-Term Investment		Total
	0	1	
Motivations <sup>12</sup>	29	48	77
No supervising authority	40	24	64
Total	69	72	141

Table 18 – Contingency table for “no supervising authority” motivation and the decision of buying crypto for short-term investment purposes

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.628 <sup>a</sup>	1	.003		
Continuity Correction <sup>b</sup>	7.663	1	.006		
Likelihood Ratio	8.716	1	.003		
Fisher's Exact Test				.004	.003
N of Valid Cases	141				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 31.32.

b. Computed only for a 2x2 table

Table 19 – Chi-Square test for “no supervising authority” motivation and the decision of buying crypto for short-term investment purposes

On this case, the results allow us to conclude that with a significance level of 1%, the variable “no supervising authority” and the decision of having crypto for short-term purposes are not independent.

In this scenario it is possible to conclude, considering the chi-square tests used, that the three motivations which perform a degree of dependency to the variable “possessing at least 25% of cryptocurrencies for short-term purpose” were, enhanced anonymity,

secured transfers and no supervising authority. Those three showed statistical significance for a level of significance of 1%, rejecting this way the null-hypothesis of not having any kind of influence, relation.

The results obtained in the previous chi-square tests are important to show in which way factors that drive users to adopt cryptocurrencies are important to the decision of buying crypto for short-term investment purposes. On this regard, the three motivations previously described are referred as more relevant for users that do not invest in cryptocurrencies with a short-term speculative investment intent than the ones that do it. This means that users that acquire cryptocurrencies for short-term intents do not consider these three motivations as relevant for their decision of using crypto.

**Analysis of the decision of also investing in other assets besides cryptos**

The chi-squared independence tests were run against every motivation variable. On this scenario, four motivations, “lower or no transaction fees”, “worldwide usage”, “flexibility of use” and the option “other”, showed significant dependence with the decision of also investing in other assets. Those results are presented here. For this particular scenario, the 186 answers were considered valid.

Tables 20 and 21 show the dependence analysis between “lower or no transaction fees” and the decision of having positions in other assets.

	Other_Investments		Total
	No	Yes	
Motivations3	37	56	93
Lower or no transaction fees	50	43	93
Total	87	99	186

Table 20 – Contingency table for “lower or no transaction fees” motivation and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.650 <sup>a</sup>	1	.056		
Continuity Correction <sup>b</sup>	3.110	1	.078		
Likelihood Ratio	3.662	1	.056		
Fisher's Exact Test				.078	.039
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.50.

b. Computed only for a 2x2 table

Table 21 – Chi-Square test for “lower or no transaction fees” motivation and the decision of also investing in other assets

The results obtained of the chi-square test allows us to conclude that for a significance level of 10% there is a statistically significant relationship between both variables “Lower or no transaction fees” and the fact that users have or not invested in other assets.

With respect to the analysis of the variable “worldwide usage”, the results of the chi-square test are displayed in the tables 22 and 23.

	Other_Investments		
	No	Yes	Total
Motivations6	30	51	81
Worldwide usage	57	48	105
Total	87	99	186

Table 22 – Contingency table for “worldwide usage” motivation and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.464 <sup>a</sup>	1	.019		
Continuity Correction <sup>b</sup>	4.794	1	.029		
Likelihood Ratio	5.505	1	.019		
Fisher's Exact Test				.026	.014
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 37.89.

b. Computed only for a 2x2 table

Table 23 – Chi-Square test for “worldwide usage” motivation and the decision of also investing in other assets

The results obtained allow us to conclude that for a significance level of 5% there is a statistically significant relationship between the variable “Worldwide usage” and have positions in other assets besides cryptocurrencies

Tables 24 and 25 present similar analysis regarding the motivation “flexibility of use”.

		Other_Investments		
		No	Yes	Total
Motivations <sup>10</sup>		53	74	127
	Flexibility of use (e.g., online, in stores)	34	25	59
Total		87	99	186

Table 24 – Contingency table for “flexibility of use” motivation and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.088 <sup>a</sup>	1	.043		
Continuity Correction <sup>b</sup>	3.475	1	.062		
Likelihood Ratio	4.092	1	.043		
Fisher's Exact Test				.058	.031
N of Valid Cases	186				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.60.

b. Computed only for a 2x2 table

Table 25 – Chi-Square test for “flexibility of use” motivation and the decision of also investing in other assets

The results obtained allow us to conclude that, with a significance level of 10%, there is a statistically significant relationship between the variable “Flexibility of use” and being invested in other assets

Similarly to the results obtained for the previous motivations, it was also possible to find a significant relation for the motivations that users pointed out in the option “others”. After reviewing those answers it was possible to divide it into two categories, investment motivations or technological ones. The results of the tests are presented in tables 26 and 27.

	Other_Investments		Total
	No	Yes	
Motivations <sup>13</sup>	70	70	140
Investment	13	28	41
Technology	4	1	5
Total	87	99	186

Table 26 – Contingency table for “other” motivations and the decision of also investing in other assets

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	6.541 <sup>a</sup>	2	.038
Likelihood Ratio	6.770	2	.034
N of Valid Cases	186		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.34.

Table 27 – Chi-Square test for “other” motivation and the decision of also investing in other assets

Considering a significance level of 5%, we can conclude that both variables have some degree of dependence, other motivations, which include investment and technologic drivers and investing in other assets.

Those scores fit the idea of technology preferences used as a reason to adopt cryptocurrencies are opposite correlated to investing in other assets.

Nevertheless in this last test, is important to refer than 33.3% of the cells obtained less than expected count of 5.

This results tell us that there is an important and dependent relation between these four motivations, , “lower or no transaction fees”, “worldwide usage”, “flexibility of use” and the option “other” in the decision of investing in other assets besides cryptocurrencies. This relation is important because it allow us understand which factors play the more important role on this decision making accordingly to these motivations. In fact, it is possible to verify that similarly to the outcome of the previous section, although for different motivations, the motivations refered, “lower or no transaction fees”, “worldwide usage” and “flexibility of use” are the ones that are not as valued by users that invest in other assets as the users that do not have positions in other assets. The motivation “other” which was divided by investment reasons and technological ones, comproves that users that choose the option technology tend to not invest in other assets while the users that choosed the option investment tend to have other investments positions. This is interesting because it shows in which way the patterns work for investors that are

presented in cryptocurrencies with investment purposes and which motivations they do consider as relevant or not.

For further analysis of the decision of buying crypto for short-term investment purposes (binary variable) we also estimated a Logit model using as regressors all the motivation variables except the motivation “other”. This way the motivation variables used were: “Enhanced anonymity of electronic payment”, “Leaving out intermediaries”, “Lower transaction fees”, “Worldwide usage”, “Divisibility into tiny amounts / micropayments”, “No prerequisite for participation”, “Possibility to gain Bitcoins by mining”, “Transaction irreversibility for merchants”, “Flexibility of use”, “Possibility to ensure full transparency” and “No supervision authority”.

Table 28, presents the coding of the explanatory variables used to estimate the model and table 31 shows the estimated model.

	Frequency	Parameter coding
		Dummy
Motivations12	77	1.000
No super	64	.000
Motivations2	40	1.000
Absence	101	.000
Motivations3	70	1.000
Lower or	71	.000
Motivations4	87	1.000
Secured	54	.000
Motivations5	72	1.000
Instant	69	.000
Motivations6	64	1.000
Worldwid	77	.000
Om Motivations7	109	1.000
Divisibi	32	.000
Motivations11	98	1.000
Possibil	43	.000
Motivations10	97	1.000
Flexibil	44	.000
Motivations9	114	1.000
Possibil	27	.000
Motivations8	92	1.000
No prere	49	.000
Motivations1	91	1.000
Enhanced	50	.000

Table 28 – Coding categorical variables - motivations

		Chi-square	df	Sig.
Step 1	Step	18.755	12	.095
	Block	18.755	12	.095
	Model	18.755	12	.095

Table 29 – Omnibus tests of model coefficients

Step	-2 Log likelihood	Cox and Snell R	
		Square	Nagelkerke R Square
1	176.649 <sup>a</sup>	.125	.166

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 30 – Model summary for Likelihood and R significance

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Motivations12	-1.129	.473	5.699	1	.017	.323
	Motivations1	-.746	.418	3.174	1	.075	.474
	Motivations2	.536	.485	1.221	1	.269	1.710
	Motivations3	.029	.433	.005	1	.946	1.030
	Motivations4	-.451	.478	.889	1	.346	.637
	Motivations5	-.490	.411	1.424	1	.233	.613
	Motivations6	-.128	.451	.081	1	.776	.880
	Motivations7	.358	.530	.457	1	.499	1.431
	Motivations8	.504	.439	1.315	1	.251	1.655
	Motivations9	.447	.490	.830	1	.362	1.563
	Motivations10	.551	.470	1.371	1	.242	1.735
	Motivations11	-.055	.483	.013	1	.909	.946
Constant	.405	.369	1.205	1	.272	1.499	

a. Variable(s) entered on step 1: Motivations12, Motivations1, Motivations2, Motivations3, Motivations4, Motivations5, Motivations6, Motivations7, Motivations8, Motivations9, Motivations10, Motivations11.

Table 31 – Estimated Logit model for the decision of short-term investment regarding the motivations to own cryptocurrencies

In table 29, the chi-square test allows us to conclude that for a significance level of 10% the model is statistically significant, fitting better than a model with no predictors. Another way to verify the quality of the model is using table 30 with the Cox and Snell's R Square and Nagelkerke's R Square. Both are coefficients of determination, giving information about in which degree, up to a maximum of 1, the variations are explained by the model. In this case, a value of 0.125 and 0.166 were obtained respectively.

There are two variables that stand out from the others regarding their influence, due to the fact that they showed statistical significance with a significance level of 10%. Those motivations were in table xx Motivation nr 1 and 12, which stand for enhanced anonymity of electronic payment and no supervising authority.

Those two categorical variables are the ones that score a higher Wald value, on the third column, with 3.174 and 5.699 respectively and have significance for a confidence level of 90%. In the table labelled "Variables in the Equation" it is possible to see the coefficients, the standard errors, Wald test statistic with the degrees of freedom associated and p-values, as long with the exponentiated coefficient (also known as an odds ratio). The last ratio mentioned, is in fact an indicator of the influence of the predictor category has on the odds of the dependent variable. So, in this case, the odds of investing in cryptocurrencies with short-term perspective, would increase if that ratio is over 1, would not change if it is equal to 1 and would decrease if it is less than 1.

As it is possible to verify in table 31 both variables, enhanced anonymity of electronic payment and no supervising authority scored less than 1, in fact, 0.474 and 0.323 respectively. These results from the categorical variables aligned with the negative sign on the first column on the left (B) means that, the odds of a user investing in other assets decreases by a factor, odds ratio, which is represented on the right-side column of over 50%, for every unit increase of the enhanced anonymity predictor and for every unit of the no supervising authority predictor added. This means that cryptocurrency users that selected these two components are keener to do not invest in cryptocurrencies for short-term speculative purposes, while the other users that did not mention these two options as a motivation for using cryptocurrencies are more prone to do it with that intent. On the opposite side, motivations nr. 2 and 10, which correspond to absence of a third party and flexibility of use, respectively, have a positive impact. Both scored above 1, the categorical variable absence of a third party scored 1.710 while the other predictor

flexibility of use scored 1.735. This value shows that increasing a unit of this predictor would induce an increase on the odds of investing in cryptocurrencies for short-term purposes, although in both cases not being statistical significant for the confidence level used previously.

This results are important to show in which way different motivations are considered relevant for users that adopt cryptocurrencies with the intent of short-term gains and the ones that are on the system for other reasons. These drivers for users that have this goal which are less appealing on using crypto are for enhanced anonymity of electronic payment and no supervising authority. Those are two factors which are not considered relevant for the main purpose of being invested for short-term gains. On the other hand, absence of a third party and flexibility of use are the motivations pointed out as bigger influence for those users to adopt cryptocurrencies for short-term intents. This scenario allows us to perceive that users have different motivations according to the main purpose which they have to obtain crypocurrencies.

A similar Logit model was estimated regressing the decision decision of also investing in other assets besides cryptos (binary variable) over the motivations factors but no significant results were obtained.

## 6. Conclusion

This extensive survey led to several interesting findings, regarding the initial objectives of analysing the influence of factors such as motivations on cryptocurrency use and user profile namely demographic reasons. It also reflected the sample views on problems reflecting the general adoption of the cryptocurrencies and on the purposes of cryptocurrency use. This study contributes for the general understanding and current research made on the drivers that lead cryptocurrency users to adopt it, as whole and not focusing only on the main known cryptocurrency Bitcoin. It also analyses which factors play the most important role on the users' intentions and attitudes regarding this technology and how do they use it. Regarding the sample the majority of users, 57.0% admit that have or had up to 9 different cryptocurrencies. A closer look on the demographic factors also allows to conclude that 94.6% were male, with a bachelor's degree, with a higher presence of users from engineering and technology studies. Most of users are aged between 20 to 39 years old which accounts 85% of the total respondents. This matches also other findings performed before this study. Besides that, the majority of respondents also identified themselves having a studies background from engineering and technology. Users mainly use cryptocurrencies as a store of value for long term purposes or as a short-term speculative investment despite of the main goal of this technology as a mean of payment or transfer of funds. In fact, 80.8% admits using it as a short term speculative investment while 96.4% admits that use cryptocurrencies as a storage of value (long term investment).

It was also noticeable that besides cryptocurrencies users do have other investments although there was not a big difference between those who do and those who do not invest, 99 against 87 users respectively. Regarding those who invest in other assets, stocks were the kind of asset that got more preference. Nevertheless for most portfolios, cryptocurrency were the leading asset.

In a deeper analysis, concerning the demographic factors, evidence was found regarding the users that invest in other assets, that age and studies background had a degree of dependency on that decision. On other hand evidence was found that supports a dependent relationship between age and gender on regard the decision of acquiring crypto for short term purposes. That evidence was further supported in which way it impacts.

Motivations such as “enhanced anonymity in electronic payment” and “no supervising authority” are referred by users that acquired cryptocurrencies for short-term, speculative investment purposes, not having a relevance on their crypto adoption. Despite those results it was also possible to identify a dependence relation regarding the dependent variable “other investments” with the motivations such as “lower transactions fees”, “worldwide usage”, “flexibility of use” and the category other in which users either choose technology or investments reasons. Except the last, the other three were mentioned more by users that are not in the system for short-term investment purposes than the ones that do.

On the perspective of general adoption, users referred, three factors as the more important for cryptocurrencies to reach a broader public. In order to reach such stage of acceptance, problems with “vulnerability of wallet / exchange”, “low adoption by merchants” and “tax policy not clear” would need to be solved.

This work shown in a very effective way, the key determinants and barriers of cryptocurrency adoption in the users’ perspective. We help expand the body of knowledge about users’ views, background, motivations and purposes of using cryptocurrencies. We were able to reach a broader sample of cryptocurrencies users and at the same time identify the ones that have positions in other assets besides cryptocurrencies and the relation between motivations that drive their participation accordingly to their purposes. The data gathered is useful for either investors, developers or currently users to perceive the actual panorama and aims of different categories of individuals considering their demographic factors as well.

However, there is room for more research and improvement in the questionnaire design in order to assemble different structured data to statistically test. It would be interesting to gather more answers and reach this way a larger sample of users in order to gather their answers.

Would be important as well to test how users are using cryptocurrencies as indeed a mean of payment / transfer, like it was initially conceived or as diversification asset for their portfolio while investing in other assets or just as an experience to boost their gains. Would be also interesting to analyse how effective ICO’s are being made which are being used to attract investors through this mechanism, and at the same time the returns, in case users have short or long-term positions, that investors obtained trading cryptocurrencies.

Nevertheless which intent is made or in which way is used, the technology it is already being applied in several areas and going to continue to expand, blockchain is a tool that will continue to bring gains and efficiency no matter if it is applied for a currency or another platform for trading.

**Appendices**

**Appendix 1 - Summary Table of Methodologies used in Similar Studies**

Authors	Name	Year	Journal	Main Goals / Research Question	Methodology			Results
					Data	Data Collection / Questionnaire Design	Statistic Methods	
Baur et al.	Cryptocurrencies as a Disruption? Empirical findings on user adoption and future potential of Bitcoin and Co	2015	14th Conference on e-Business, e-Services and e-Society, Delft, Netherlands.	<p>1. What are the perceived advantages and disadvantages of Bitcoin as compared to other forms of (electronic) payment?</p> <p>2. What are the drivers and barriers Bitcoin users, merchants, and experts see in the adoption of Bitcoin?</p>	13 interviews with individuals from three distinct groups: end-consumers, e-commerce merchants, and employees of Bitcoin exchanges.	Open, inductive, exploratory research design.	<p>Axial coding used to refine the categories.</p> <p>TAM – Technology Acceptance Model for perceived ease of use and perceived usefulness.</p> <p>Subjective norm of TAM2.</p>	<p>Perceived ease of use among stakeholders is considered low.</p> <p>Perceived usefulness confirmed.</p> <p>Subjective norm is split.</p> <p>Bitcoin considered as a niche phenomenon.</p>

				3. How do users, merchants, and experts evaluate the future potential of Bitcoin as a serious means of currency, unit of account, asset, and disruption for society?				
Elendner et al.	The Cross-Section of Cryptocurrencies as Financial Assets: An Overview	2016	Edoc-Server – Discussion Paper SFB 649	Investigate cryptocurrencies as alternative investment assets and as portfolio diversification mechanism.	Data set of 327 cryptocurrencies – Analyse co-movements of altcoins and Bitcoin and compare their relation to stock index, real estate, gold, US Treasury Bills.	Prices in USD, evolution in different periods of time.	Value at risk and expected shortfall. Market index CRIX, equally-weighted portfolio and a value-weighted by market cap. Power Law.	Returns on cryptocurrencies are weakly correlated both in their cross-section as well as with established assets. Size effect like

								stocks. Consider to be a valuable contribution to portfolio allocation.
Ermakova et al.	Bitcoin: Drivers and Impediments	2017	SSRN – Electronic Journal	Factors influencing Bitcoin cryptocurrency adoption.	Online survey – 98 experts opinions used.	Set of questions about: Demography and general background. Four open-ended questions: (What do you see as the biggest advantages that may drive the adoption of Bitcoin?); (What do you see as the	Percentage share regarding set of question and possible answers. Inductively content-analysis on the four-open ended questions.	Majority of respondents with a medium, advanced or expert level in fields such as IT and finance. One third had invested in Bitcoin. Knowledge about Bitcoin ranged from

						<p>biggest challenges to the adoption of Bitcoin?); (What would be the biggest incentives for you personally to adopt Bitcoin?); (What would be the most important reasons for you personally NOT to adopt Bitcoin?).</p>		<p>novice to advanced. 41% of respondents believe that Bitcoin will never be used</p>
Yelowitz and Wilson	Characteristics of Bitcoin users: an analysis of	2015	Applied Economics Letters	Who might be Bitcoin users?	Google Trends (Terms related with Bitcoin and clientele) – US	Google ‘search term’ versus ‘topic (Currency)’	1 <sup>st</sup> relative state-level popularity of each search term for the full period	Robust evidence that computer programming

	Google search data				States and Washington DC.	Index for Bitcoin topic search Index for Bitcoin topic search cross-sectional popularity.	and scale each state-series relative to the most popular state and 2 <sup>nd</sup> rescaling each state-specific time series by its geographic popularity.	enthusiasts and illegal activity drive interest in Bitcoin and limited or no support for political and investment motives.
Spengelink	The adoption process of cryptocurrencies – Identifying factors that influence the adoption of cryptocurrencies from a multiple stakeholder perspective	2014	Master Thesis – University of Twente	What are factors influencing the adoption of cryptocurrencies in different usage scenarios for different stakeholders?	Interviews (semi-structured) with 15 participants from different industries.	Qualitative interpretive approach.	System Dynamics model.	Payment behaviour changes very slowly. Security risks seen as a minor problem. Anonymity not seen as a specific

								<p>advantage or disadvantage.</p> <p>Agreement on regulation having impact on adoption.</p> <p>Main pillars for future mass adoption identified as ease of use, price stability and governance.</p>
Glaser et al.	<p>Bitcoin – Asset or Currency?</p> <p>Revealing users’ hidden intentions.</p>	2014	<p>Twenty Second European Conference on</p>	<p>What are users' intentions when changing their domestic into a digital currency?</p>	<p>Trading data of a Bitcoin exchange (Mt Gox), transaction data from the Bitcoin</p>	<p>Step one comprised investigating whether Bitcoin intra-network transaction and</p>	<p>Autoregressive Conditional Heteroskedasticity (ARCH) estimation of the volumes</p>	<p>Indications that new Bitcoin users rather use it as an asset than as a currency and</p>

			Information Systems.		Blockchain, visitor statistics for the Bitcoin Wikipedia article and dates of important Bitcoin events.	on-exchange trading volumes were linked. Second step, elaborated if new users had impact on both types of volume and drew conclusions about the users' intentions.		as a speculative investment with low intention to use for goods or services payments.
Lui	The demographics of Bitcoin	2013	Simulacrum – Blog	Community characteristics	Online survey with a sample of 1000 valid responses	Several questions about demographics and personal.	Normal Distribution, percentage.	The “average Bitcoin user” is male (95.2%), 32.1 years old, libertarian / anarcho-capitalist

								(44.3%), non-religious (61.8%), with a full time job (44.7%), and is in a relationship (55.6%).
Gao et al.	Of Two Minds, Multiple Addresses, and One History: Characterizing Opinions, Knowledge, and Perceptions of Bitcoin Across Groups	2015		Perceptions on Bitcoin (what do they think of it, how do they feel, and how knowledgeable they are.)	Interview study with 22 participants from US to discuss Bitcoin and other related financial topics	Semi-structured interviews	Key themes extracted and associated original quotes to each theme.	Not understanding how Bitcoin works is not a barrier for entry. User participants are in a state of cognitive dissonance concerning the role of

								governments in the system
Presthus and O'Malley	Motivations and Barriers for End- User Adoption of Bitcoin as Digital Currency	2017	ScienceDirect	What are the end- users' motivations and barriers for using Bitcoin as digital currency?	Survey with 135 answers	1. Do you own, or have you previously owned, a Bitcoin? 2. When did you become a Bitcoin owner? (month and year) 3. Why did you become a Bitcoin owner? 4. How many Bitcoins do you own, approximately? 5. What would it require for you	Technique of identifying themes and performing cross- analysis	Bitcoin users embrace Bitcoin due to technological curiosity.

						<p>to start using Bitcoin? 6. What you think it would require for your family and/or our circle of friends to start using Bitcoin? 7. Your age 8. Gender 9. For the students: which faculty do you attend? (predefined categories) 10. If you are working: what is your title?</p>		
Bohr and Bashir	Who uses Bitcoin?	2014	2014 Twelfth Annual	1- What predicts the accumulation	1,193 responses downloaded	Questions to analyse	Log-linear regression to	Age, time of initial use,

			Conference on Privacy, Security and Trust (PST)	<p>of wealth among Bitcoin users?</p> <p>2- What predicts optimism about the near- and long-term value of Bitcoin?</p> <p>3- What attracts people to Bitcoin?</p>	<p>from Lui Smyth's website. The link to the survey was posted on Bitcointalk.org, Reddit, Twitter, and Google+</p>	<p>demographics, behaviour, and political orientation.</p>	<p>analyse predictors of log-transformed values and logistic regression</p>	<p>geographic location, mining status, engaging online discourse, and political orientation are all relevant factors that help explain various aspects of Bitcoin wealth, optimism, and attraction.</p>
Abramova and Böhme	Perceived Benefit and Risk as Multidimensional Determinants of	2016	Thirty Seventh International Conference	H1 - Perceived benefit influences users' engagement in Bitcoin	Online large-scale survey interviewing	Set of questions regarding: Descriptive Statistics on	TAM	All decentralized currencies face the problem of

	Bitcoin Use: A Quantitative Exploratory Study		on Information Systems,	transactions positively; H2 - Perceived risk influences users' engagement in Bitcoin transactions negatively; H3 - Perceived ease of use influences users' engagement in Bitcoin transactions positively; H4 - Perceived ease of use influences perceived benefit of Bitcoin positively.	6395 respondents.	Bitcoin Behavior;  PLS Model	User	network effects in their adoption, as their benefits and value are positively correlated with the number of users.
--	--	--	-------------------------------	--	----------------------	---------------------------------------	------	--

## Appendix 2 – Respondents’ country distribution

Country	Percentage	Number of respondents
Algeria	0.54%	1
Antarctica	0.54%	1
Antigua and Barbuda	0.54%	1
Australia	4.84%	9
Austria	0.54%	1
Belgium	1.08%	2
Brazil	1.61%	3
Bulgaria	0.54%	1
Canada	5.38%	10
Denmark	1.61%	3
Estonia	0.54%	1
Finland	1.08%	2
France	1.08%	2
Germany	5.91%	11
Gibraltar	0.54%	1
Iceland	0.54%	1
India	0.54%	1
Ireland	0.54%	1
Italy	1.08%	2
Latvia	0.54%	1
Netherlands	2.15%	4
New Zealand	0.54%	1
Norway	0.54%	1
Philippines	0.54%	1
Poland	0.54%	1
Portugal	10.75%	20
Romania	0.54%	1
South Africa	0.54%	1
Spain	1.08%	2
Sweden	1.08%	2
Switzerland	0.54%	1
Turkey	0.54%	1
United Kingdom	5.91%	11
United States	44.62%	83
Zimbabwe	0.54%	1
Grand Total	100.00%	186

Table 32 – Distribution of users per country

### Appendix 3 – Level of studies vs Background

<b>Level of studies vs Background</b>	<b>Number of users</b>
<b>Bachelor or equivalent</b>	<b>85</b>
Engineering and Technology	34
Humanities	7
Medical and Health Sciences	1
Natural Sciences	14
Social Sciences	29
<b>College / Associate</b>	<b>28</b>
Agricultural Sciences	1
Engineering and Technology	16
Humanities	4
Natural Sciences	6
Social Sciences	1
<b>Elementary school</b>	<b>2</b>
Engineering and Technology	1
Humanities	1
<b>High school</b>	<b>39</b>
Agricultural Sciences	2
Engineering and Technology	19
Humanities	4
Medical and Health Sciences	2
Natural Sciences	8
Social Sciences	4
<b>Master or equivalent</b>	<b>27</b>
Engineering and Technology	13
Humanities	2
Natural Sciences	4
Social Sciences	8
<b>PhD equivalent</b>	<b>5</b>
Engineering and Technology	2
Medical and Health Sciences	1
Natural Sciences	1
Social Sciences	1
<b>Grand Total</b>	<b>186</b>

Table 33 – Distribution of studies background for each education level

## Appendix 4 – Normality Tests

The results presented in the following tables allow us to reject the null hypothesis and conclude that the data does not follow a normal distribution.

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Nr_of_Coins	.312	186	.000	.677	186	.000
Age	.294	186	.000	.782	186	.000
Gender	.540	186	.000	.235	186	.000
Education	.261	186	.000	.899	186	.000
Background	.266	186	.000	.870	186	.000

a. Lilliefors Significance Correction

Table 34 – Results from normality test for the demographic variables

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Motivations1	.424	186	.000	.597	186	.000
Motivations2	.458	186	.000	.554	186	.000
Motivations3	.341	186	.000	.636	186	.000
Motivations4	.402	186	.000	.616	186	.000
Motivations5	.343	186	.000	.636	186	.000
Motivations6	.374	186	.000	.630	186	.000
Motivations7	.464	186	.000	.545	186	.000
Motivations8	.418	186	.000	.603	186	.000
Motivations9	.479	186	.000	.516	186	.000
Motivations10	.434	186	.000	.586	186	.000
Motivations11	.445	186	.000	.573	186	.000
Motivations12	.371	186	.000	.631	186	.000

a. Lilliefors Significance Correction

Table 35 – Results from normality test for users motivations

**Appendix 5 – Questionnaire Design – Justification according to the relevant literature:**

Literature	Conclusions	Questions
N.a.	First question for the target public to answer the questionnaire.	<p>1. Do you own or have you owned in the past any cryptocurrency? (Expl: Bitcoin, Ethereum, other...)</p> <p>a) Yes b) No</p> <p>If not, do not proceed.</p> <p>If yes:</p> <p>2. How many different cryptocurrencies do (did) you own? (either in wallets, of any form, in exchanges or mining programs):</p> <p>1 a 9 10 a 19 20 a 29 30 a 39 40 a 49 &gt;50</p>
Ermakova et al. (2017)	Participants potentially representative of the Bitcoin user community (Germany and US share almost 40% each). Does the same apply for other cryptocurrencies users?	<p>3. Where are you from?</p> <p>Country: _____ (select from list)</p>
Lui (2013)	Prevalence for 30's of Bitcoin users.	<p>4. How old are you?</p> <p>&lt; 20 20 – 29</p>

		<p>30 – 39</p> <p>40 – 49</p> <p>50 – 59</p> <p>&gt; 60</p>
Lui (2013); Abramova and Böhme (2016)	Prevalence for man to use Bitcoin / Cryptocurrencies	<p>5. Gender?</p> <p>a) Male</p> <p>b) Female</p>
Abramova and Böhme (2016)	Higher % of users with Master degree.	<p>6. Level of education?</p> <p>a) Elementary school</p> <p>b) College/associate</p> <p>c) High school</p> <p>d) Bachelor or equivalent</p> <p>e) Master or equivalent</p> <p>f) PhD or equivalent</p>
N.A.	Used the OECD Fields of Science and Technology (FOS)	<p>7. What is your studies background?</p> <p>a) Natural Sciences</p> <p>b) Engineering and Technology</p> <p>c) Social Sciences</p> <p>d) Medical and Health Sciences</p> <p>e) Agricultural Sciences</p> <p>f) Humanities</p>
Ermakova et al. (2017); Spengelink (2014); Baur et al. (2015)	<p>Experts' opinions regarding the advantages of cryptocurrencies and analysis the different categories in which they think have more importance.</p> <p>Interviews with consumers, merchants and experts quote a few different reasons for Bitcoin use. What about</p>	<p>8. Which are your main reasons / motivations for using cryptocurrencies? (choose as many as relevant)</p> <p>a) Enhanced anonymity of electronic payment</p> <p>b) Absence of intermediaries (e.g., banks)</p> <p>c) Lower or no transaction fees</p> <p>d) Secured transfers</p> <p>e) Instant transactions</p> <p>f) Worldwide usage</p> <p>g) Divisibility into tiny amounts / micropayments</p>

	cryptocurrencies as general for users?	<ul style="list-style-type: none"> <li>h) No prerequisite for participation</li> <li>i) Possibility of gaining cryptocurrencies by mining</li> <li>j) Flexibility of use (e.g., online, in stores)</li> <li>k) Possibility to ensure full transparency</li> <li>l) No supervising authority</li> <li>m) Transaction irreversibility for merchants</li> <li>n) Other:</li> </ul>
<p>Abramova and Böhme (2016);</p> <p>Yelowitz and Wilson (2015);</p> <p>Lui (2013)</p>	<p>Different percentages of Bitcoin use for the different purposes.</p> <p>Evidence of Bitcoin use.</p>	<p>9. On average, what percentage of your total amount of cryptocurrencies do (did) you use for the following purposes?</p> <ul style="list-style-type: none"> <li>a) As a means of payment for goods and services</li> <li>b) As a means of cross-border money transfers</li> <li>c) For donations or gifts</li> <li>d) As a short term speculative investment</li> <li>e) As storage of value (long term investment)</li> </ul> <p>Answer options: Do not use, less than 25%, 25-50%, 50-75%, &gt;75%</p>
Elendner	The study concludes that cryptocurrencies, considered as a new alternative asset, allow for diversification to portfolio allocation. Do users of cryptocurrencies invest in other financial assets? And if so, which?	<p>10. (if only selected percentages in a), b) or c) please proceed to the question nr. 12) If you selected any percentage of d) and/or e): do (did) you invest in other assets? (expl: stocks, bonds, etc)</p> <ul style="list-style-type: none"> <li>a) yes</li> <li>b) no</li> </ul>

<p>2.º Inquérito sobre o Perfil do Investidor Português On-Line</p> <p>Elendner et al. (2016)</p>	<p>Preference for stocks</p> <p>Cryptocurrencies behave similarly to stocks and contribute for portfolio diversification</p>	<p>11. What is the percentage of the following assets that have impact in your portfolio?</p> <p>Stocks, Bonds, Forex, Gold, other commodities, Cryptocurrencies</p> <p>Other:_____</p> <p>(Answer options: Do not have, less than 25%, 25-50%, 50-75%, &gt;75%) the sum up of answers shouldn't pass more than 100%</p>
<p>Ermakova et al. (2017)</p>	<p>Experts' opinions regarding the reasons that are hindering the adoption of Bitcoin. Do other cryptocurrencies share the same problem?</p>	<p>12. In your opinion which of the following jeopardizes the general adoption of crypto?</p> <ul style="list-style-type: none"> <li>a) Vulnerability of wallet / exchange</li> <li>b) Risk of deflation</li> <li>c) Lost coins due to lose access keys to the account</li> <li>d) Bad reputation linked to criminal activities</li> <li>e) Volatility of exchange rates</li> <li>f) Possibility of political regulations and restrictions</li> <li>g) Tax policy not clear</li> <li>h) Low adoption by merchants</li> <li>i) Transaction Irreversibility</li> <li>j) Lack of trust in the crypto system</li> <li>k) Other:</li> </ul>

## References:

Abramova, S. and Böhme, R. (2016). Perceived Benefit and Risk as Multidimensional Determinants of Bitcoin Use: A Quantitative Exploratory Study. *Proceeding of the International Conference on Information Systems. Research Paper*. Retrieved from <https://pdfs.semanticscholar.org/b9f6/db898cad75fab22162909711b6f5622959b0.pdf>

Agresti, A. (2007). An Introduction to Categorical Data Analysis. *Wiley Series in probability and statistics*, 147. Retrieved from <https://mregression.files.wordpress.com/2012/08/agresti-introduction-to-categorical-data.pdf>

Athey, S.; Catalini, C. and Tucker, C. E. (2018). The Digital Privacy Paradox: Small Money, Small Costs, Small Talk. *MIT Sloan Research Paper No. 5196-17*. doi: <https://dx.doi.org/10.2139/ssrn.2916489>

Baek, C. and Elbeck, M. (2015). Bitcoins as an investment or speculative vehicle? A first look, *Applied Economics Letters*, 22:1, 30-34. doi: 10.1080/13504851.2014.916379

Baur, A.W.; Bühler, J.; Bick, M. and Bonorden, C.S. (2015). Cryptocurrencies as a Disruption? Empirical Findings on User Adoption and Future Potential of Bitcoin and Co. *Open and Big Data Management and Innovation. Lecture Notes in Computer Science, vol 9373*. 63-80. doi: [https://doi.org/10.1007/978-3-319-25013-7\\_6](https://doi.org/10.1007/978-3-319-25013-7_6)

Baur, D. G.; Dimpfl, T. and Kuck, K. (2017). Bitcoin, Gold and the Dollar – A Replication and Extension. *SSRN Journal*. doi: <https://dx.doi.org/10.2139/ssrn.3024377>

Baur, D.; Lee, A. D. and Hong, K. (2015). Bitcoin: Currency or Investment? *SSRN Electronic Journal*. doi: 10.2139/ssrn.2561183

BBC (2017) *Australian stock exchange to move to blockchain*. Retrieved January 6, 2018, from <http://www.bbc.com/news/business-42261456>

Beck, R.; Czepluch, J. S.; Lollike, N. and Malone, S. (2016). BLOCKCHAIN – THE GATEWAY TO TRUST-FREE CRYPTOGRAPHIC TRANSACTIONS. *Research Papers, AIS Electronic Library*. Retrieved from [https://aisel.aisnet.org/ecis2016\\_rp/153](https://aisel.aisnet.org/ecis2016_rp/153)

Berman, M. S. (2011). The Development, Use and Cultural Context of M-PESA in Coastal Kenya. *Independent Study Project (ISP) Collection. SIT Digital Collections*. 6-14. Retrieved from [https://digitalcollections.sit.edu/isp\\_collection/1197](https://digitalcollections.sit.edu/isp_collection/1197)

Böhme, R.; Christin, N.; Edelman, B. and Moore, T. (2015). Bitcoin: Economics, Technology, and Governance. *Journal of economic perspectives, vol 29, no 2*, 213-238. doi: 10.1257/jep.29.2.213

Bohr, J. and Bashir, M. (2014). Who Uses Bitcoin? An exploration of the Bitcoin community. *Conference Paper Twelfth Annual Conference on Privacy, Security and Trust (PST)*. doi: [DOI: 10.1109/PST.2014.6890928](https://doi.org/10.1109/PST.2014.6890928)

Bordo, M. D. and Levin, A. T. (2017). Central Bank Digital Currency and the Future of Monetary Policy. *Hoover Institution, Economics Working Paper 17104*. Retrieved from: [https://www.hoover.org/sites/default/files/research/docs/17104-bordo-levin\\_updated.pdf](https://www.hoover.org/sites/default/files/research/docs/17104-bordo-levin_updated.pdf)

Bouri, E.; Mornár, P.; Azzi, G. and Hagfors, L. I. (2017). On the hedge and safe haven properties of Bitcoin: Is it really more than a diversifier? *Finance Research Letters, 20*. doi: 10.1016/j.frl.2016.09.025

Bunjaku, F.; Gorgieva-Trajkovska, O. and Miteva-Kacarski, E. (2017). Cryptocurrencies – advantages and disadvantages. *Journal of Economics, 2 (1)*. Retrieved from <http://eprints.ugd.edu.mk/18707/>

Casey, M. and Vigna, P. (2015). *The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order*. St. Martin's Press.

Catalini, C. and Gans, J. S. (2017). Some Simple Economics of the Blockchain. *Rotman School of Management Working Paper No. 2874598; MIT Sloan Research Paper No. 5191-16*. doi: <http://dx.doi.org/10.2139/ssrn.2874598>

Chen, G.; Xu, B.; Lu, M. and Chen, N. (2018). Exploring blockchain technology and its potential applications for education. *Smart Learning Environments*. doi: <https://doi.org/10.1186/s40561-017-0050-x>

Chiu, J. and Koepl, T. V. (2017). The Economics of Cryptocurrencies – Bitcoin and Beyond. *SSRN Journal*. doi: <http://dx.doi.org/10.2139/ssrn.3048124>

Chuen, D. L. K.; Guo, L and Wang, Y. (2017). Cryptocurrency: A New Investment Opportunity? doi: <http://dx.doi.org/10.2139/ssrn.2994097>

Chung, M. and Kim, J. (2016). The internet information and technology research directions based on the fourth industrial revolution. *KSII Trans. Internet Inf. Syst.* 10, No 3, 1311–1320. Retrieved from [http://scholar.googleusercontent.com/scholar?q=cache:SiZkDSykTS8J:scholar.google.com/&hl=en&as\\_sdt=0,5](http://scholar.googleusercontent.com/scholar?q=cache:SiZkDSykTS8J:scholar.google.com/&hl=en&as_sdt=0,5)

CNBC (2018) *The World Bank is preparing for the world's first blockchain bond*. Retrieved August 20, 2018, from <https://www.cnbc.com/2018/08/10/world-bank-picks-commonwealth-bank-for-worlds-first-blockchain-bond.html>

Cocco, L.; Pinna, A. and Marchesi, M. (2017). Banking on Blockchain: Costs Savings Thanks to the Blockchain Technology. *Future Internet* 9, no. 3: 25. doi: <https://doi.org/10.3390/fi9030025>

Crosby, M.; Nachiappan; Pattanayak, P.; Verma, S. and Kalyanaraman, V. (2015). Blockchain Technology. *Sutardja Center for Entrepreneurship and Technology*

*Technical Report*. Retrieved from <http://scet.berkeley.edu/wp-content/uploads/BlockchainPaper.pdf>

Davidson, S.; De Filippi, P. and Potts, J. (2016). Economics of Blockchain. *SSRN Journal*. doi: <http://dx.doi.org/10.2139/ssrn.2744751>

Econtent (2016) *Blockchain: A New Architecture for Digital Content*. Retrieved August 10, 2018, from: <http://www.econtentmag.com/Articles/Editorial/Commentary/Blockchain-A-New-Architecture-for-Digital-Content-114161.html>

Elendner, H.; Trimborn, S.; Ong, B. and Lee, T. M. (2016). The Cross-Section of Cryptocurrencies as Financial Assets: An Overview. *SFB 649 Discussion Paper 038*. Retrieved from <http://crix.hu-berlin.de/data/SFB649DP2016-038.pdf>

Ermakova, T.; Fabian, B.; Baumann, A.; Izmailov, M. and Krasnova, H. (2017). Bitcoin: Drivers and Impediments. *SSRN Journal*. doi: <http://dx.doi.org/10.2139/ssrn.3017190>

Finextra (2018) *Redline Offers Bitcoin futures trading on Cboe and CME*. Retrieved January 12, 2018 from <https://www.finextra.com/pressarticle/72136/redline-offers-bitcoin-futures-trading-on-cboe-and-cme/wholesale>

Forbes (2017). *Why The Crypto Market Has Appreciated More Than 1,200% This Year*. Retrieved January 20, 2018, from <https://www.forbes.com/sites/cbovaird/2017/11/17/why-the-crypto-market-has-appreciated-more-than-1200-this-year/#bd6db916eed3>

Friedman, M. (1999) *Land value tax and internet currencies*. Retrieved October 14, 2017, from [https://www.youtube.com/watch?v=j2mdYX1nF\\_Y](https://www.youtube.com/watch?v=j2mdYX1nF_Y)

Gao, X.; Clark, G. D. and Lindqvist, J. (2015). Of Two Minds, Multiple Addresses, and One History: Characterizing Opinions, Knowledge, and Perceptions of Bitcoin Across Groups. Retrieved from <https://arxiv.org/pdf/1503.02377.pdf>

Glaser, F.; Zimmermann, K.; Haferkorn, M.; Weber, M. C. and Siering, M. (2014). Bitcoin Asset or Currency? Revealing Users' Hidden Intentions. *ECIS, SSRN Journal*. Retrieved from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2425247](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2425247)

Google Trends (2018) *term searched: Bitcoin*. Retrieved March 3, 2018, from <https://trends.google.pt/trends/explore?q=%2Fm%2F05p0rrx>

Groves, R. M. 1989. *Survey Errors and Survey Costs*, Hoboken, NJ: John Wiley and Sons, Inc.

Hair, J., Black, W., Babin, B. J. and Anderson, R. (2009). *Multivariate data analysis. Prentice Hall*

Hayek, F. (1990). Denationalisation of Money. The argument refined. An Analysis of the Theory and Practice of Concurrent Currencies. *Von Mises Institute*. Retrieved from <https://mises.org/library/denationalisation-money-argument-refined>

Hileman, G. and Rauchs, M. (2017) *Global Cryptocurrency Benchmarking Study*. doi: <http://dx.doi.org/10.2139/ssrn.2965436>

Ivaschenko, A.I. (2016). Using Cryptocurrency in the Activities of Ukrainian Small and Medium Enterprises in order to Improve their Investment Attractiveness. *Problems of economy*, (3), 267-273.

Jevons, W. S. (1875). *Money and the Mechanism of Exchange. Library of Economics and Liberty*. Retrieved from: <http://www.econlib.org/library/YPDBooks/Jevons/jvnMME.html>

Kempson, E. (2009). Framework for the Development of Financial Literacy Baseline Surveys: a First International Comparative Analysis. *OECD Publishing*

Kiviat, T. I. (2015). Beyond Bitcoin: Issues in Regulating Blockchain Transactions, *65 Duke Law Journal* 569-608. Retrieved from: <https://scholarship.law.duke.edu/dlj/vol65/iss3/4/>

Knezevic, D. (2018). Impact of Blockchain Technology Platform in Changing the Financial Sector and Other Industries. *Montenegrin Journal of Economics*, Vol. 14, No. 1, 109-120. doi: 10.14254/1800-5845/2018.14-1.8

Kosba, A. E.; Miller, A.; Shi, E. and Papamanthou, C. (2016). Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts. *Conference Paper, IEEE Symposium on Security and Privacy (SP)*. doi: [10.1109/SP.2016.55](https://doi.org/10.1109/SP.2016.55)

Kristoufek, L. (2015). What Are the Main Drivers of the Bitcoin Price? Evidence from Wavelet Coherence Analysis. *PLoS ONE* 10(4). doi: <https://doi.org/10.1371/journal.pone.0123923>

Krombholz, K.; Judmayer, A.; Gusenbauer, M. and Weippl, E. (2016). The Other Side of the Coin: User Experiences with Bitcoin Security and Privacy. *Financial Cryptography* doi: [10.1007/978-3-662-54970-4\\_33](https://doi.org/10.1007/978-3-662-54970-4_33)

Larios-Hernández, G. J. (2017). Blockchain entrepreneurship opportunity in the practices of the unbanked. *Business Horizons*, Vol. 60, Issue 6, 865-774. doi: <https://doi.org/10.1016/j.bushor.2017.07.012>

Li, X., and Wang, C. A. (2017). The technology and economic determinants of cryptocurrency exchange rates: The case of Bitcoin. *Decision Support Systems*, 95, 49-60. doi: 10.1016/j.dss.2016.12.001

Lui (2013) *The Demographics of Bitcoin (Part 1, Updated)*. Retrieved December 1, 2017 from <https://spacedruiddotcom.wordpress.com/2013/03/04/the-demographics-of-bitcoin-part-1-updated/>

Luther, W. J. (2016). Regulating Bitcoin: On What Grounds? *In Reframing Financial Regulation: Enhancing Stability and Protecting Consumers*, Hester Peirce and Benjamin Klutsey (eds.). Arlington, VA: Mercatus Center at George Mason University. doi: <http://dx.doi.org/10.2139/ssrn.2631307>

McReynolds, E.; Lerner, A.; Scott, W.; Roesner, F. and Kohno, T. (2015) Cryptographic Currencies from a Tech-Policy Perspective: Policy Issues and Technical Directions. *Financial Cryptography and Data Security. FC 2015 International Workshops*, 94-111. doi: [10.1007/978-3-662-48051-9\\_8](https://doi.org/10.1007/978-3-662-48051-9_8)

Mises, L.(1953). *The Theory of Money and Credit*. *Von Mises Institute*. Retrieved from <https://mises.org/library/theory-money-and-credit/html>

MIT (2017). *Blockchain, Explained*. Retrieved December 15, 2017, from <http://mitsloan.mit.edu/newsroom/articles/blockchain-explained/>

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Retrieved from: <http://nakamotoinstitute.org/>

Noyes, C. (2016). BitAV: Anti-Malware by Distributed Blockchain Consensus and Feedforward Scanning. Retrieved from <https://arxiv.org/pdf/1601.01405.pdf>

Osterrieder, J.; Chan, S.; Chu, J. and Nadarajah, S. (2017). A Statistical Analysis of Cryptocurrencies. *Journal of Risk and Financial Management*, 10, 12. doi: 10.3390/jrfm10020012

Presthus, W. and O'Malley, N. O. (2017). Motivations and Barriers for End-User Adoption of Bitcoin as Digital Currency. *Procedia Computer Science, Vol 121*, 89-97. doi: <https://doi.org/10.1016/j.procs.2017.11.013>

Raskin, M. and Yermack, D. (2016). Digital Currencies, Decentralized Ledgers, and the Future of Central Banking. *NBER Working Paper No. 22238*. Retrieved from <http://www.nber.org/papers/w22238>

Reijers, W. and Coeckelbergh, M. (2016). The Blockchain as a Narrative Technology: Investigating the Social Ontology and Normative Configurations of Cryptocurrencies. *Philosophy & Technology, Vol. 31, Issue 1*, 103-130. doi: <https://doi.org/10.1007/s13347-016-0239-x>

Rodríguez, G. (2007). Logit Models for Binary Data. *Lecture Notes on Generalized Linear Models,3*. Retrieved from <http://data.princeton.edu/wws509/notes/c3.pdf>

Rose, C. (2015). The Evolution of Digital Currencies: Bitcoin, A Cryptocurrency Causing A Monetary Revolution. *Clute Institute International Business and Economics Research Vol. 14*, Number 4. doi: <https://doi.org/10.19030/iber.v14i4.9353>

Rysman, M. and Schuh, S. (2017). New Innovations in Payments. *Innovation Policy and the Economy, vol 17, issue 1*, 27 - 48. doi: <http://dx.doi.org/10.1086/688843>

Seretakis, A. L. (2017). Blockchain, Securities Markets and Central Banking. doi: <http://dx.doi.org/10.2139/ssrn.3007402>

Sharples, M. and Domingue, J. (2016). The Blockchain and Kudos: A Distributed System for Educational Record, Reputation and Reward. *European Conference on Technology Enhanced Learning, Adaptive and Adaptable Learning*, 490-496. doi: [10.1007/978-3-319-45153-4\\_48](https://doi.org/10.1007/978-3-319-45153-4_48)

Spengelink, H. (2014). The adoption process of cryptocurrencies – Identifying factors of influence the adoption of cryptocurrencies from a multiple stakeholder perspective. Retrieved from <https://pdfs.semanticscholar.org/5c0d/bbf5c9aa38766d61eac90a0258b4d7d97f6f.pdf>

Szetela, B.; Mentel, G. and Gedek, S. (2016). Dependency Analysis between Bitcoin and Selected Global Currencies. *Dynamic Econometric Models Vol. 16*, 133-144. doi: 10.12775/DEM.2016.009

Tapscott, D. and Tapscott, A. (2017). Realizing the Potencial of Blockchain – A Multistakeholder Approach to the Stewardship of Blockchain and Cryptocurrencies. *White Paper, World Economic Forum*. Retrieved from [http://www3.weforum.org/docs/WEF\\_Realizing\\_Potential\\_Blockchain.pdf](http://www3.weforum.org/docs/WEF_Realizing_Potential_Blockchain.pdf)

Techcrunch (2018). 'Unhackable' BitFi crypto wallet has been hacked. Retrieved August 19, 2018, from <https://techcrunch.com/2018/08/14/unhackable-bitfi-crypto-wallet-has-been-hacked/?guccounter=1>

Trimborn, S.; Li, M. and Härdle, W. K. (2018). Investing with Cryptocurrencies – A liquidity Constrained Investment Approach. *SSRN Journal*. Retrieved from <http://dx.doi.org/10.2139/ssrn.2999782>

Tschorsch, F. and Scheuermann, B. (2016). Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies. *IEEE Communication Survey Tutorial*, 18, 2084-2123. <https://doi.org/10.1109/COMST.2016.2535718>

Vlasov, A. V. (2017). The Evolution of E-Money. *European Research Studies, Vol. XX, I*, 215-224. Retrieved from [ftp://ftp.repec.org/opt/ReDIF/RePEc/ers/papers/17\\_1\\_p21.pdf](ftp://ftp.repec.org/opt/ReDIF/RePEc/ers/papers/17_1_p21.pdf)

White, L. H. (2014). The Market for Cryptocurrencies. *GMU Working Paper in Economics No. 14-45*. doi: <http://dx.doi.org/10.2139/ssrn.2538290>

Yelowitz, A. and Wilson, M. (2015). Characteristics of Bitcoin users: an analysis of Google search data. *Applied Economics Letters*, 22:13. 1030-1036. doi: 10.1080/13504851.2014.995359

Yermack, D. (2013). Is Bitcoin a Real Currency? An Economic Appraisal. *NBER Working Paper*. doi: 10.3386/w19747

Zhang, Y. and Wen, J. (2016). The IoT electric business model: Using blockchain technology for the internet of things. *Article in Peer-to-Peer Networking and Applications 10(4)*. doi: [10.1007/s12083-016-0456-1](https://doi.org/10.1007/s12083-016-0456-1)

Zheng, Z.; Xie, S.; Dai, H.; Chen, X. and Wang, H. (2017). An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends. *Conference Paper, IEEE 6<sup>th</sup> International Congress on Big Data*. doi: 10.1109/BigDataCongress.2017.8