Cryptocurrencies: from characteristics to behaviours

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Cryptocurrencies: from characteristics to behaviours

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Abstract: Over the past few years, cryptocurrencies have been increasingly spoken and have become a global phenomenon known. Their high volatility and lack of regulation makes these investments very risky, and even though these coins are often associated with criminal activities, an increase on the number of investors is visible every day. Most of the published studies explain the technology behind cryptocurrencies, however, there was no published study that aims to understand what kind of profile these investors have and what are their motivations or expectations. Based on a questionnaires and interviews

presented to the investors, this study concluded that there are two separate investor profiles and also understood what are their motivations and expectations for the future. It was also possible to see what vision regulators, private equities and corporate banking have for this new type of currency and if they consider them as a valid mean of payment.

Keywords: cryptocurrencies; investors; financial companies; Bitcoin.

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1   Introduction

The absence of a regulated monetary system means that cryptocurrencies are directly linked to money laundering and criminal activities. In addition, their high volatility makes them a considerably aggressive investment. However, over the past few years, there has been a significant increase in the use of this type of virtual money.

In December 2017, the main cryptocurrency, Bitcoin, reached a historic peak of USD20,000. This has generated a great deal of media interest and attracted the attention of various investors and financial institutions. In the World Bank Report prepared by CapGemini (2018), it is indicated that one third of the world's major investors already receive detailed information related to cryptocurrencies. On the other hand, these virtual coins also generate considerable mistrust. Buffet (2018), during Berkshire Hathaway's shareholder meeting launched the warning – 'Cryptocurrencies will come to a bad ending'. Nevertheless, the number of users has been increasing and Disrupt SF (2018), CEO of Coinbase, during his participation in the TechCrunch Disrupt Conference, predicted that over the next five years, one billion people in the world would be using cryptocurrencies, with 40 million users already estimated in 2018. Therefore, this study seeks to understand what kind of profile these cryptocurrencies investors have taking in consideration various socio-economic and demographical characteristics.

Over the past few years, hundreds of new cryptocurrencies have emerged and several companies have started exploring their technology based on blockchain. The virtual currency is already an investment reality for large players such as Microsoft and IBM, and in recent years, it has attracted the attention of the various financial institutions. Therefore, in order to complement this study, we will try to see how the financial institutions are positioning themselves in relation to this new reality.

In Deutsche Bank's 'Imagine 2030' Report (2019), it is stated that the use of cryptocurrencies can fire up to the next few years – according to strategist Jim Reid, who who collaborates with the study, the arrival of the cryptocurrencies showed the challenges facing by the current banking system. "So far, cryptocurrencies have been additions, rather than substitutes, to the global cash inventory. In the next decade, that can change. Overcoming regulatory obstacles will amplify its appeal and increase the potential to eventually replace money." As far as its possible regulation is concerned, the

US SEC continues to examine cryptocurrencies as its area of compliance adds digital and pre-tech assets to its annual priority list. A future regulation will certainly have a direct impact on the markets and in this study, we will try to understand what investors and financial institutions expect in the near future.

2 Context of investigation

During 2018, ESMA and EIOPA sent a communication to all investors regarding the cryptocurrencies risk and market volatility. On the approach performed by several authors, is consensual that cryptocurrencies could be a valid currency but also a new haven for criminals and money launderers. Even with all these warnings, the number of investors keeps increasing and new crypto coins are being created every day, reason why we should care about this topic. When performing a brief literature review, we find a recent study from University of Cambridge (Hileman and Rauchs, 2017), that focused on cryptocurrencies as an alternative payment system and digital asset. This study aimed to provide a more technical explanation regarding new concepts as wallets, mining and blockchain. It also presents several crypto coins, markets, countries that have more activity and provides relevant information regarding security and the risks associated.

A second study, also dated to the same year (Chiu and Koeppl, 2017) show us how blockchain is important on the transactions, calculate transaction fees and explains the mining process. In addition, there are a number of studies that list the advantages and disadvantages of these digital coins. Regarding the disadvantages, several factors such as lack of knowledge, high volatility and lack of regulation are described. However, even with so many disadvantages, the number of investors continues to increase, and according to various interviews/comments by several people with great knowledge and responsibilities in the financial and technological field, it is also important to see how the main banks and financial institutions are positioning themselves.

The authors will take in consideration the information provided on the already existent studies that include important technical information and analyse the cryptocurrencies investors' characteristics and understand if financial companies are ready for this new reality. This study tends to establish a crypto investors profile and conclude if financial companies are prepared for the cryptocurrencies new trend. Apart from this, it is also important to establish a bridge between financial and crypto investors in order to understand their predisposition to invest in virtual coins. Thus, the main objective of this study is the characterisation of investors' profiles in regards to their appetence to invest in cryptocurrencies.

To complement the study, the authors will also take in consideration some sub-objectives in order to characterise and understand the motivations of the investors regarding cryptocurrencies and understand their motivations and expectations towards a future regulation. It is also relevant to verify how the financial system see this instrument within the financial markets, if they consider it a valid mean of payment and/or a valid investment and if they believe and are ready for a future regulation.

3   Literature review

3.1   *Cryptocurrencies characteristics and blockchain*

In view of the current study, the authors began by reviewing the literature available for cryptocurrencies and their characteristics. Taking the words of Day (2018), the word 'crypto' originates from Greek word 'krypto'. In noun meaning, it denotes a person who secretly supports or adheres to a group, party or belief. In adjective meaning, it denotes hidden, secret, concealed and not publicly admitted.

In the present day, it is a digital currency, digital money, electronic money or electronic currency designed to work as a medium exchange. It is a type of currency available in digital form, e-cash, not in physical form such as banknotes and coins. It uses cryptography to secure its transactions to control the creation of additional units and to verify the transfer of assets.

Cryptocurrencies use a decentralised control and centralised electronic money systems. The decentralised control of each currency works through a blockchain public transaction database, functioning as a distributed ledger. Cryptocurrency is usually controlled by its developers that are accepted as members of a specific virtual community.

Cryptocurrencies characteristics and blockchain technology are also discussed in several papers and Mukhopadhyay (2016), discusses the life cycle of a cryptocurrency. Important aspects like mining, blockchain, hash algorithms and their vulnerabilities are also listed; Watanabe (2015) discusses the use of blockchain for the validation of smart contracts. This technology could also be used for recording contracts. An example of such technology is Ethereum; the paper written by the creator of Bitcoin (Nakamoto, 2008) mentions the decentralised system of cryptocurrencies. It also emphasises on the use of peer-to-peer technology. It explains the need of blockchain and how it would prevent hackers from attacking and manipulating the system.

Although cryptocurrencies decentralisation, anonymity of transaction, and irreversibility of payments offer plenty advantages, Brill and Keene (2014) opine that these features also attract illegal activities (cybercriminals) such as money laundering, drug peddling, smuggling and weapons procurement. This issue has attracted the attention of powerful regulatory and other government agencies such as the FinCEN, the SEC, and even the FBI and DHS. In March 2013, FinCEN issued rules that defined virtual currency exchanges and administrators as money service businesses, bringing them within the ambit of government regulation. In May that year, the DHS froze an account of Mt. Gox – the largest Bitcoin exchange – that was held at Wells Fargo, alleging that it broke anti-money laundering laws. And in August, New York's Department of Financial Services issued subpoenas to 22 emerging payment companies, many of which handled Bitcoin, asking about their measures to prevent money laundering and ensure consumer protection.

3.2   *Advantages and disadvantages*

In order to be able to describe all the advantages and disadvantages surrounding cryptocurrencies, the authors have taken into account two published studies.

In the first one (Rogojanu and Badea, 2015), the defenders assume that Bitcoin is more than a medium of exchange among many others existing, Bitcoin represents money generated in strictly limited quantities, and is therefore from the very beginning a rare currency. The amount of Bitcoin cannot increase more than originally expected, but the value of Bitcoin could, theoretically grow no matter how much.

Since we are talking about a market, the demand and supply of money are the ones that give the value to the cryptocurrencies.

On the other side, rivals relate to the rigidity and conservatism of some theories and are trying to highlight the dangers associated with this currency, based on examples of fraud and theft that have been done using this currency and are also reaching up to the issue of prohibiting the use of Bitcoin.

On a second study (Tomar and Agarwal, 2017), the author describes the main cryptocurrencies advantages and disadvantages. The main advantages described are: freedom in payment, possibility to send and get money anywhere in the world at any given time, control of our money as there is no central authority figure in the network, control and security, information is transparent, with the blockchain, all finalised transactions are available for everyone to see, however personal information is hidden, anyone at any time can verify transactions in the blockchain, very low fees, digital currency exchanges help merchant process transactions by converting cryptocurrency into fiat currency and these services generally have lower fees than credit cards and PayPal.

On the other side, we can also find several disadvantages as: lack of awareness and understanding, many people are still unaware of digital currencies, people need to be educated to be able to apply it to their lives, businesses are accepting cryptocurrencies because of the advantages, but the list is relatively small compared to physical currencies, the workers need to be educated on cryptocurrencies so that they can help the customers, risk and volatility, cryptocurrencies have volatility mainly due to the fact that there is a limited amount of coins and the demand for them increases by each passing day. However, it is expected that the volatility will decrease as more time goes on, as more businesses, medias, and trading centres begin to accept cryptocurrencies, its price will eventually settle down. In order to make the digital currency more secure and accessible, new features, tools, and services are currently being developed. As described above, there are still many disadvantages in regards to cryptocurrencies; however, the number of investors and people interested is still increasing.

In Lu (2018), we can find the explanation on why the cryptocurrencies have become so popular, namely Bitcoin. In recent years, the demand for virtual currencies has taken off for multiple reasons. First, an increasing number of start-up companies are choosing to raise money through ICOs. An ICO is, to some extent, similar to an IPO. Issuers sell digital coins to investors who, for fiat or virtual currency, obtain a stake in the start-up, such as a right to use the service or software provided by the start-up. However, unlike global capital markets, the price of the digital coins largely depends on the valuation of their issuers and a small community of investors. Thus, for many new digital currencies, the price hike has been considered as self-dictated, as the limited number of potential buyers means low market liquidity. The price of the cryptocurrencies will probably face a sudden collapse at any time. Second, the Bitcoin bubble is a speculation carnival for investors and traders across the world. It remains controversial whether Bitcoin fits into

the traditional concept of currency, but for global investors, it seems a perfect object on which to take a bet on its ever-growing intrinsic value. This resulted because there is a theoretical maximum number of all Bitcoins circulated, which is around 21 million (20,999,999.9769 BTC). Therefore, as time lapses, it will cost more and more time and money to mine new Bitcoins, leading to their skyrocketing price. As of August 2017, the market capitalisation of all Bitcoins was estimated to be $73.5bn. Finally, the rapid rise of the Bitcoin price is partly due to strict foreign exchange controls in some countries.

3.3   *Volatility studies and factors that influence prices*

The cryptocurrency market has seen an unprecedented level of interest from investors in 2016. Bitcoin, the world's largest digital currency, has risen more than 1,500% since the start of 2017. However, the market is significantly more complex than the public lexicon might suggest. Moreover, while there have been plenty of studies examining the future of Bitcoin and its volatility (Polasik et al., 2015; Letra, 2016; Bouoiyour and Selmi, 2016; Katsiampa, 2017; Chiu and Koeppl, 2017; Chu et al., 2017), there have been a few people that explore the broader cryptocurrency market and how it is evolving.

   The currency is extraordinarily volatile despite its recent ever-peaking performance, rising by thousands of dollars in value on one day only to fall by even more the next. Katsiampa (2017) estimates the volatility of Bitcoin through a comparison of GARCH models and finds that the AR-CGARCH model gives the most optimal fit. He underlines that the market is high speculative. Bouoiyour and Selmi (2016) study daily Bitcoin prices using an optimal-GARCH model and show that the volatility has decreasing trend comparing pre and post-2015 data. Even tough, they still observe significant asymmetries in the Bitcoin market where the prices are driven more by negative than positive shocks. Likewise, Dyhrberg (2016) investigates the asymmetric GARCH methodology to explore the hedging abilities of Bitcoin and he finds that it can be used as a hedging tool against stocks in the Financial Times Stock Exchange Index and against the US dollar in the short-term.

   On the other hand, El Bahrawy et al. (2017) examine behaviour of entire market (1,469 cryptocurrencies) between April 2013 and May 2017. They find that cryptocurrencies appear and disappear continuously and their market capitalisation is increasing (super-)exponentially, several statistical properties of the market have been stable for years. Particularly, market share distribution and the turnover of cryptocurrencies remain quite stable.

   To summarise, Poyser (2017) points three types of crypto price drivers organised into internal and external factors. Supply and demand of cryptocurrency is main internal factors that have direct impact on its market price. On the other hand, attractiveness (popularity), legalisation (adoption), and few macro-finance factors (interest rate, stock markets, gold prices) can be regarded as external drivers.

3.4   *Risk tolerance*

Taking in consideration the high volatility of cryptocurrencies, it is also important to make a brief review of literature linked to factors that determine decisions at financial risk level. Carducci and Wong (1998) study points to an investigation of personality factors as determinants of financial risk taking in everyday money matters. On this study, type A and type B individuals – several researches have shown that type A individuals

are in general associated with higher performance and productivity (Bermudez et al., 1990) – were asked to make a series of everyday financial decisions that varied in degree of risk. Type A individuals took grater financial risks than type B individuals.

Another research (Grable, 2000) takes in consideration other parameters by examining demographic, socio-economic and attitudinal characteristics that may be used either individually or in combination as determinants of financial risk tolerance. It was concluded that males were more risk tolerant than females, older respondents were more risk tolerant than younger respondents, married respondents were more risk tolerant than single respondents, respondents with higher incomes were more risk tolerant than those with lower incomes. Respondents with higher attained education were more risk tolerant than others, respondents with higher levels of financial knowledge were more risk tolerant than respondents with less knowledge and those with greater economic expectations were more risk tolerant than respondents with lower expectations.

4 Theoretical framework

In order to have a theoretical framework on this subject, and with the help of the review of literature, it was possible to identify the most important topics and types of issues to be taken into account in order to have a real characterisation of the investor's profile. It was based on this information that the survey was created.

Table 1 shows the topics defined, the literature used and the type of questions identified to use on the survey.

Table 1 Theoretical framework

Topics definition	*Literature review*	*Type of questions*
Socioeconomic characteristics	Looking into the Literature Review, and taking in consideration the research performed by Grable (2000) where he studied the impact of demography and socioeconomic characteristics in regards to the risk tolerance, it's important also to understand if the same characteristics have an impact on this study.	Age, gender, civil state, country of residence, place of birth, area of studies, occupation, monthly income
Investors characteristics	In order to analyse the investors characteristics I have searched several banks online surveys to understand which questions where more appropriate do add on my study. Regarding the percentage, period and frequency of investment, the questions where identified on the investors profile survey from the Grupo Paulista (https://www.bancopaulista.com.br/Arquivos/Questi onarioAPI.pdf) and the profile classification where identified on the Millennium BCP survey:(https://ind.millenniumbcp.pt/pt/Particulares/ investimentos/Pages/FundsHome page.aspx?trxid=7010118&AllowBack=true)	Percentage of investment in income, investment period, investment frequency, investor profile – conservative [between 1% and 5% of profitability]; moderate [between –5% and 15% of profitability]; aggressive [between –10% and 20% of profitability]

Source: Font by author

Table 1   Theoretical framework (continued)

Topics definition	Literature review	Type of questions
Investors motivations	In order to understand the Crypto investors motivations I took in consideration the Tomar and Agarwal (2017) study where the author describes the main advantages and disadvantages related to the Cryptocurrencies. Having also in mind the Lu (2018) article, where the author explains the increasing number of start-up companies that are raining money through ICO's, it's also important to understand if the crypto investors are looking to invest only in the main coins or also in the Altcoins related to these issuers. On the Nakamoto (2008) publication it is also explain the use of Blockchain technology and the peer-to-peer electronic cash system, so it is also important to understand if the crypto investors are using cryptocurrencies as a mean of payment.	(eason, in how many different currencies invest, how long they have invested, level of happiness, average returns, whether they are considered to increase their investment in the future and use cryptocurrencies as a form of payment
Level knowledge	For the lever of knowledge classification, I used the pyramid model based on the information processing requirement of different levels in a organisation (https://www.conceptdraw.com/How-To-Guide/five-level-pyramid-model)The notions are based on all my Literature review, where Blockchain it's present in all the articles and papers; Peer to Peer is explained in the Nakamoto (2008) paper; ICO, Mining, Altcoin and Tokens are mentioned on the Lu (2018) article; Fork is present in Poyser (2017) study. FUD and Scam are common cryptocurrencies notions and Whale it's normally present in several news related to sudden price changes.	(See the main news and developments in the Cryptocurrencies world, what kind of notions do you know [ICO, Blockchain, Wallet, Mining, Altcoin, Tokens, FUD, Fork, Peer to Peer, Scam, Whale])
Expectations for the future	On the Poyser (2017) it has been mentioned several factors that influence the cryptocurrency prices. I took into consideration the external factors mentioned (cryptomarket, macro-financial and political) to perform some questions in order to understand the crypto investors' expectations for the future.	Realising whether they believe in future regulation and whether it will give them more confidence or disinterest in continuing to invest

Source: Font by author

5   Methodology

In order to answer to our study objectives that pretend to understand the investors' characteristics and motivations of this type of investment, an online survey via secure web-based questionnaire have been developed. The survey was directed, on a first phase to global investors and then segregated to cryptocurrencies investors.

Two questions to the main financial institutions have been also performed in order to understand their vision for this type of digital currency.

Step 1: literature review

The literature review has been segregated in four topics: cryptocurrencies characteristics, advantages and disadvantages, volatility and risk tolerance.

This segregation allowed us to identify the most important topics and create a theoretical framework to support the survey creation.

Step 2: online survey via secure web-based questionnaire

The survey was created (through 'Survio' – online survey system) both in English and Portuguese in order to agile the investors answers. Even with the focus in crypto investors, the survey was opened for all investors during 90 days, between the 1st of February 2019 and 30th of April 2019. During this time, we were able to receive 140 survey answers, mainly crypto investors. In order to gather all the answers, it was necessary to work pro-actively on the social network, by joining several cryptocurrencies groups in Facebook and LinkedIn ('CryptoCurrency', 'CryptoCurrency Inc.', 'Cryptocurrency Miners', 'CryptoExchange' and 'CryptoExperts' groups) by contacting investors through WhatsApp and Telegram ('Icenter', 'Promine' and 'CryptoPower' bot's) and by sharing the survey by e-mail to several contacts within the financial area.

Taking into consideration the theoretical framework, the survey was segregated by topics. The first two topics, definition of socio-economic and investor characteristics were opened to all investors so we could identify potential differences between global and crypto investors. The remaining survey was dedicated only to crypto investors where we tried to define their motivations, level of knowledge and expectations towards the future.

Step 3

Taking in consideration the study objectives and the need to verity how the financial system see this instrument within the financial markets, two question have been performed several financial stakeholders – regulators, private equities and corporate and investment banks:

1   Do you believe that cryptocurrencies will be a secure investment and a viable means of payment in the near future?

2   How is your institution positioning itself in relation to virtual money and its possible regulation?

These questions where sent by e-mail to several banks, private equities and regulators during one year, between 1st November 2018 and 1st November 2019. During this time, we were able to receive 12 interviews answers from regulators, private equities and corporate and investment banks.

Step 4

Questionnaire results have been analysed using descriptive statistics, pivot tables, several Excel spreadsheets, tables and pie and column charts. To better analyse the interviews answers, they have been segregated per regulators, private equities and corporate banks.

The main goal of the results discussion was to identify the profile of the crypto investor and understand the vision of the main financial institution.

Step 5: meeting the conclusions identified in the study objectives

After analysing all the results, we were able to identify investors profile, understand their motivations and expectations and have a view from different financial institutions regarding cryptocurrencies.

6   Results discussion

This section presents the results and findings of the survey and interviews. Qualitative and quantitative findings are then provided with respect to the main objectives of this research, showing a reasonably well-balanced sample for this study and key trends of the presented data. A positive response was received from various professional classes and where collected mainly on social networks (Facebook, LinkedIn, Telegram, WhatsApp). Participants showed interest in the current research which proves the need of knowledge adding to this subject.

**Figure 1**   Gender (see online version for colours)
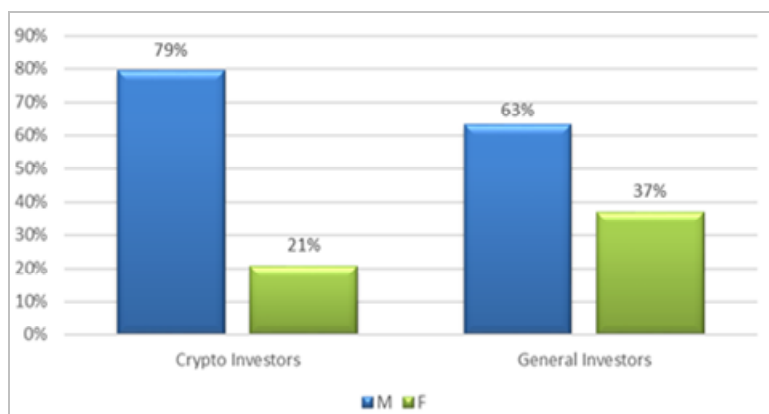
Source: By author

By taking into consideration the socio-economics characteristics, we conclude that there are a higher percentage of males both on global and crypto investors. Marital status does not have influence on the investors, however in terms of ages, crypto investors are youngest than the global investors. In regards to the professional background, the majority of investors are from the financial area but on the crypto investors side, we also see a presence of several professional classes as well the presence of students and unemployed people. We can also notice a presence of a huge diversity of net monthly income values on the crypto investors' side when compared with global investors. Same thing happens on the demography where we see the presence of crypto investors in 17 different countries.
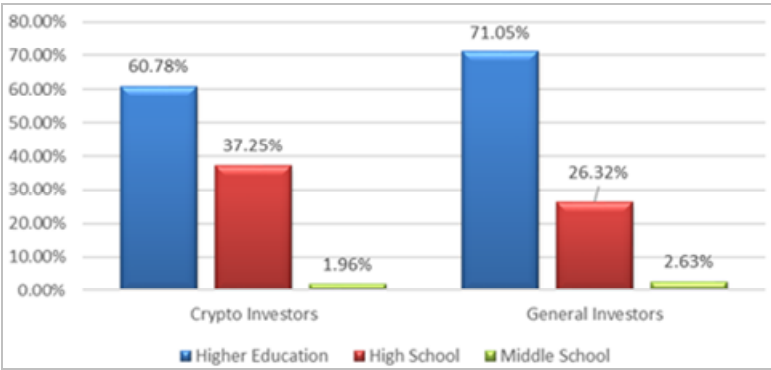
Figure 2 Age (see online version for colours)
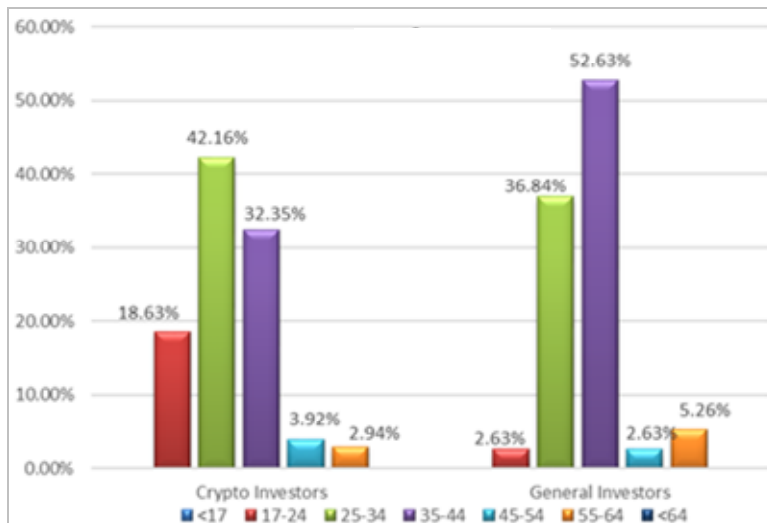
Figure 3 Marital status (see online version for colours)
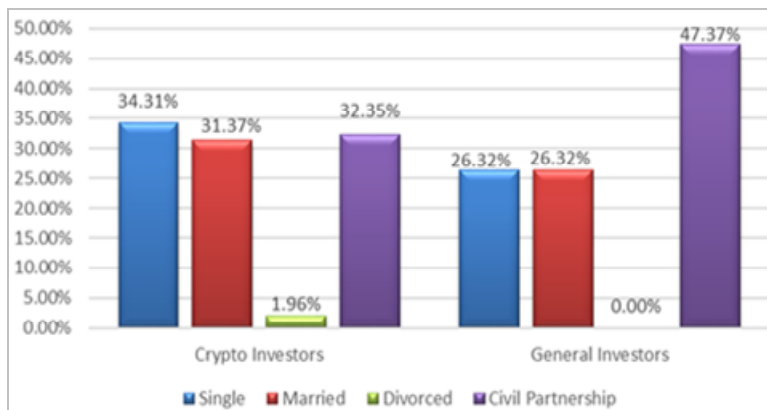
In order to establish a crypto investor's profile, it is also important to analyse the type of coins invested. By looking at these results, we can verify the presence of two distinct profiles.

One profile related to investors is that they only invest in the main currencies – these investors prefer to invest only between 2 and 4 different coins, are older investors, with a higher net income and show a higher predisposition to continue to invest. The second profile is related to investors that invest in Altcoins – these investors prefer to invest in several low value coins, are youngest investors, with a reduced net income and show a lowest predisposition to continue to invest.

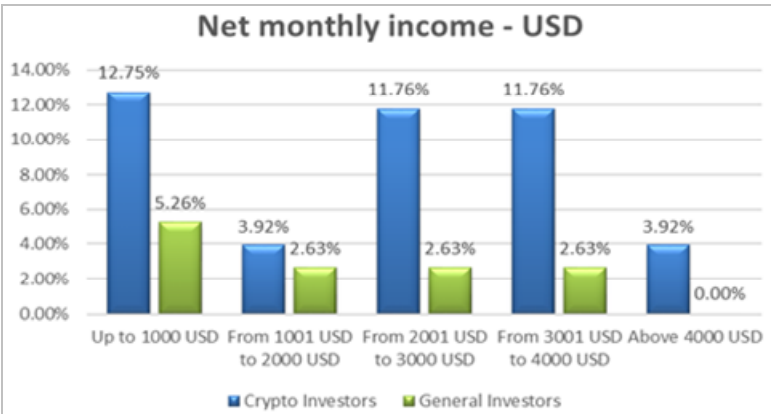**Figure 4**   Education (see online version for colours)

Source: By author

Figure 5   Professional classes (see online version for colours)
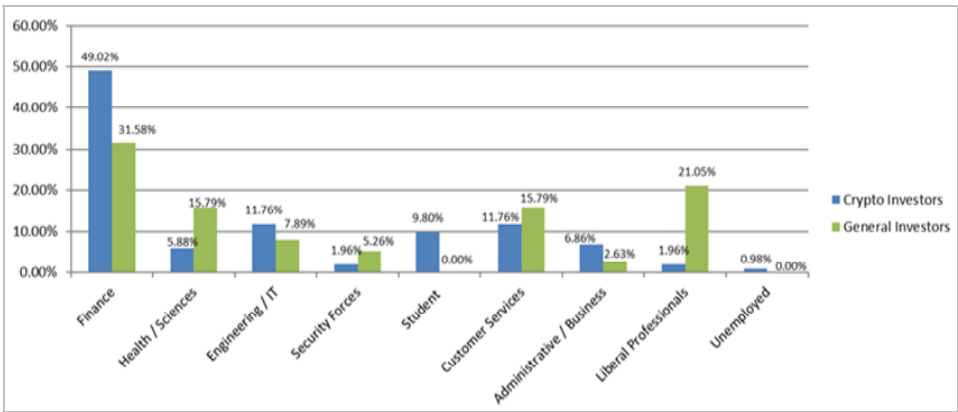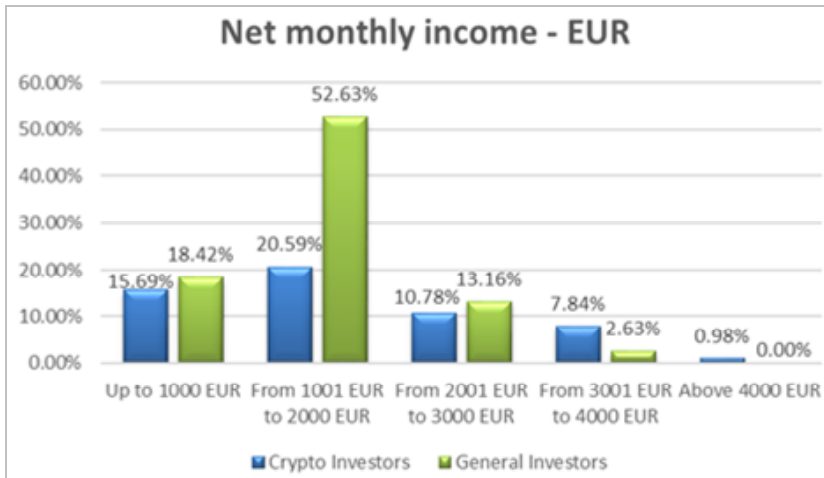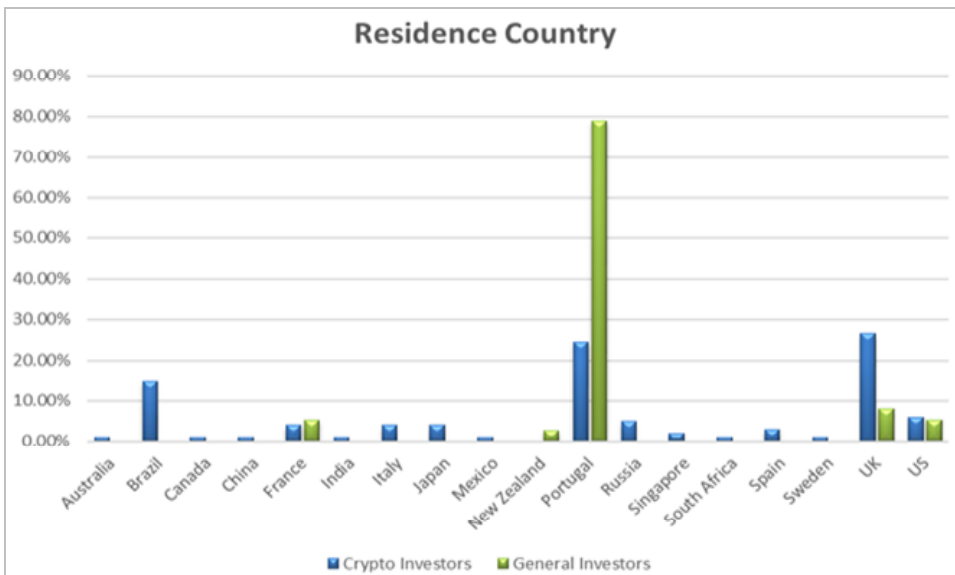

Source: By author

Figure 6   Income USD (see online version for colours)

Source: By author

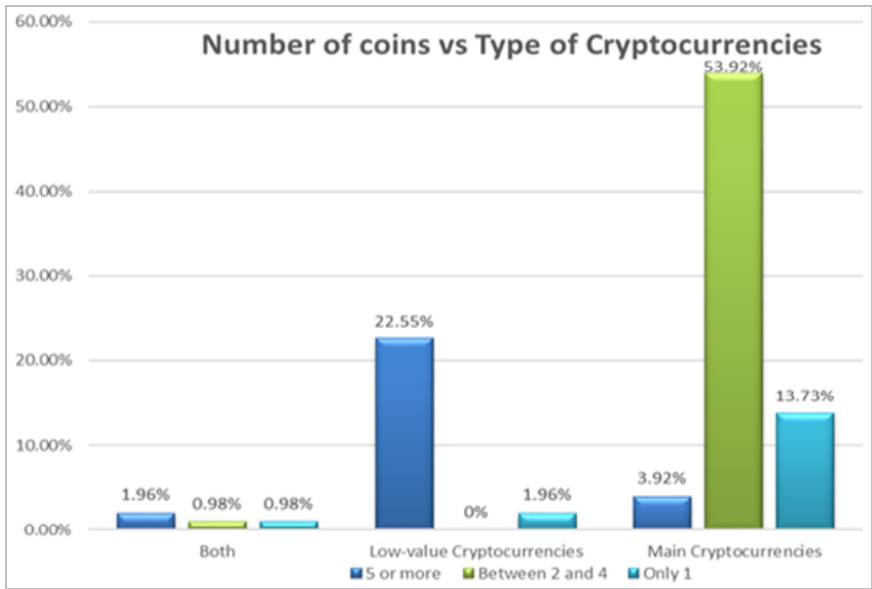**Figure 7** Income EUR (see online version for colours)

Source: By author

Figure 8 Residence (see online version for colours)
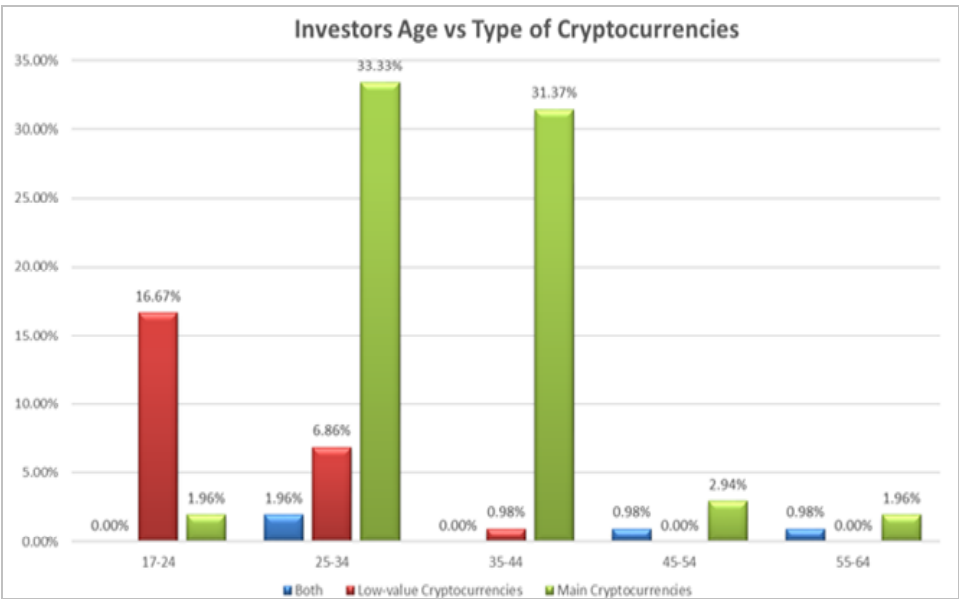

Source: By author

Another verification that is possible to retrieve is related to the level of knowledge. When we use the pyramid model to classify the level of knowledge, we verify that crypto investors are interested in following the news related to their investments. This is also linked to the profitability, as higher profits are related to the investors that follow the news. Only in the lowest profitability's, we see no relevance in following the news.

Figure 9   Number of coins vs. type (see online version for colours)
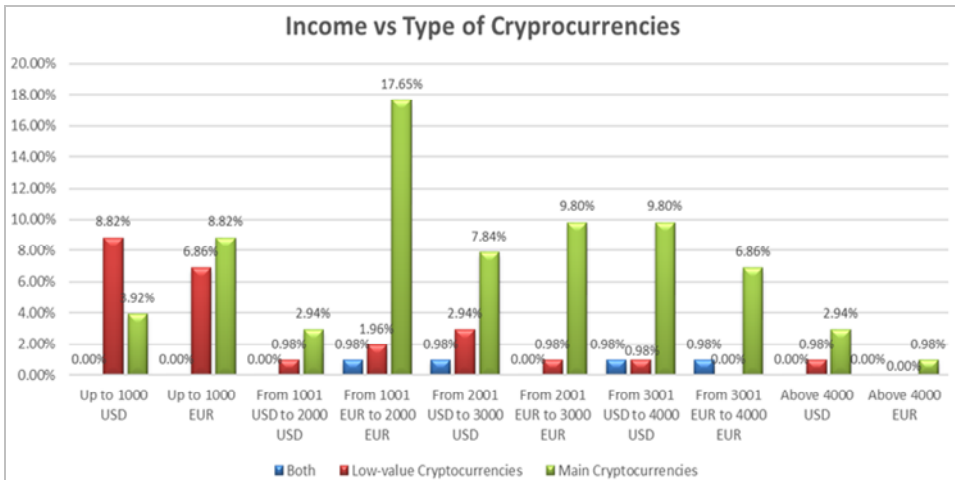
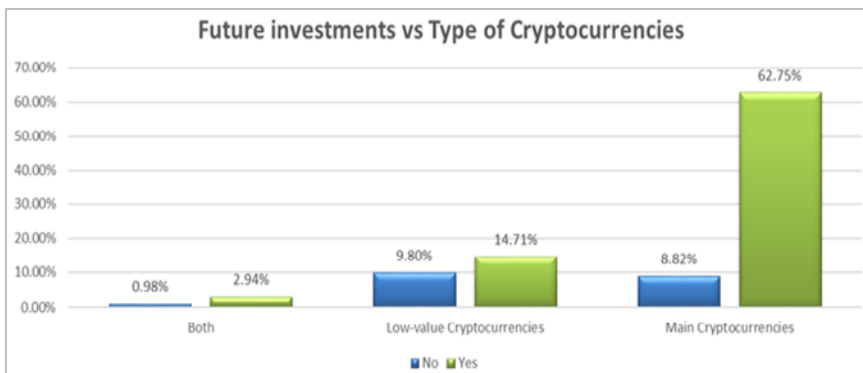**Figure 10**   Age vs. type (see online version for colours)

Figure 11 Income vs. type (see online version for colours)

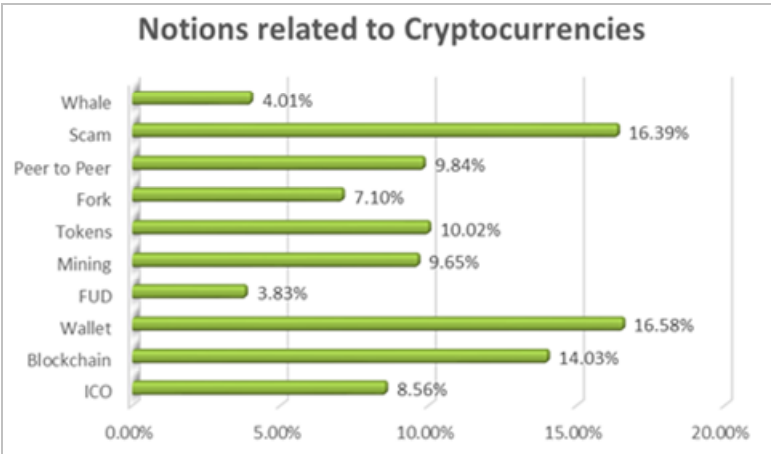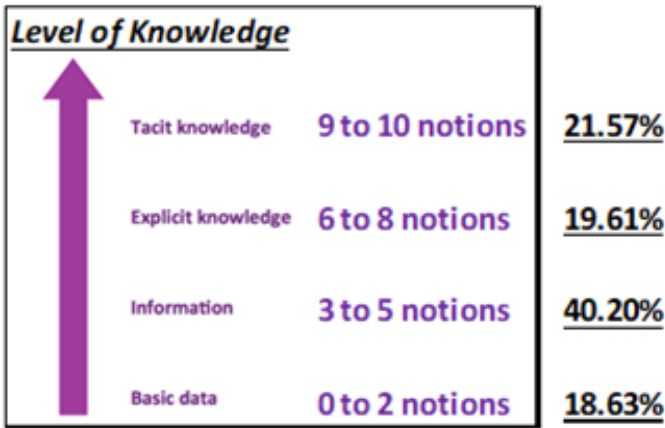**Figure 12** Future investments vs. type (see online version for colours)

To complete the crypto investors' profile, it is also important to retrieve some discussion regarding their average profitability, time of investment and their degree of satisfaction. Taking into consideration these three factors, we verify that the highest degrees of satisfaction reside on the investors with more than one year of investment time. The highest percentage is related to investors with investment time between 1 and 2 years and profitability between 5% and 10%. On the other hand, the surveyed that started to invest less than a year do not have a high degree of satisfaction, except in some cases where we see a huge profitability that we believe are linked to particular Altcoins investments. These Altcoins investments with high profitability are mainly due to the increasing number of start-up companies that are raising money through ICO's – information explained on Lu (2018), article mentioned on our literature review.

Figure 13   Notions (see online version for colours)

Notions related to Cryptocurrencies

Notion	Value
Whale	4.01%
Scam	16.39%
Peer to Peer	9.84%
Fork	7.10%
Tokens	10.02%
Mining	9.65%
FUD	3.83%
Wallet	16.58%
Blockchain	14.03%
ICO	8.56%

Source: Font by author

Figure 14   Level of knowledge (see online version for colours)

Level of Knowledge

Tacit knowledge	9 to 10 notions	21.57%
Explicit knowledge	6 to 8 notions	19.61%
Information	3 to 5 notions	40.20%
Basic data	0 to 2 notions	18.63%

Source: Font by author

In order to reinforce the above investors profile, and by analysing the results related to the reason why investors decided to invest in cryptocurrencies, we verify that most of the investors are expecting a short-term return. They also see cryptocurrencies as a new type of investment and several use them as a mean of payment. The usage of cryptocurrencies as a mean of payment was mentioned more than ten years ago by Nakamoto's (2008) publication where it is explained the peer-to-peer electronic cash system to transfer money and in the present days this is happening to several investors. On the other side, the long-term investment does not appear to be appellative for the investors, probably due to the high volatility mentioned on the several studies provided on our literature review. It is curious to verify that, even when the expectations on a short-term investment is higher than on a long-term investment, the degree of satisfaction is higher on the investors that invest in cryptocurrencies for more than a year.

Table 2 Profitability vs. time vs. degree of satisfaction (see online version for colours)

| *Average rentability since they started to invest*	*Degree of satisfaction*					
	1	*2*	*3*	*4*	*5*	*Grand total*
Less than 3 months		4.90%	2.94%	0.98%	0.98%	9.00%
Between 1% to 5%		4.90%	2.94%			7.84%
Between 5% to 10%				0.98%		0.98%
Between 10% to 25%					0.98%	0.98%
Between 3 months and 6 months		1.96%	6.86%			8.82%
Between 1% to 596		1.96%	6.86%			8.82%
Between 6 months and 1 year		3.92%	12.75%	8.82%	0.98%	26.47%
Between 1% to 5%		3.92%	11.76%	5.88%		21.57%
Between 5% to 10%			0.98%	2.94%	0.98%	4.90%
Between 1 year and 2 years	0.98%	0.98%	5.88%	33.33%	5.88%	47.06%
Between 1% to 5%	0.98%	0.98%	4.90%		0.98%	7.84%
Between 5% to 10%			0.98%	28.43%	2.94%	32.35%
Between 10% to 25%				1.96%	1.96%	3.92%
More than 25%				2.94%		2.94%
More than 2 years			0.98%	3.92%	2.94%	7.84%
Between 1% to 5%			0.98%			0.98%
Between 5% to 10%				2.94%		2.94%
Between 10% to 25%				0.98%	1.96%	2.94%
More than 25%					0.98%	0.98%
Grand total	0.98%	11.76%	29.41%	47.06%	10.78%	100.00%

Source: Font by author

When we look to the results related to advantages, we verify that investors think that main advantages are the low fees and possibility to send and get money anywhere in the world at any given time, meaning that investors see cryptocurrencies not only as an investment but also a viable mean of payment.

For the disadvantages, clearly the existence of many scam's and the lack of regulation are the aspects that worries clients the most. These preoccupations are in line with Brill and Keene (2014) study that associate cryptocurrencies with several illegal activities (cybercriminals). It also attracted the attention of several regulatory agencies described on the literature review.

It is also interesting to verify that, at this stage, the limited number of cryptocurrencies is not being considered as a disadvantage. On the Nakamoto's (2008) publication, it is mentioned the limited number of Bitcoins, and on a near future, this could have a negative impact on the main cryptocurrency that normally affect all the other currencies.

Figure 15   Decision to invest (see online version for colours)
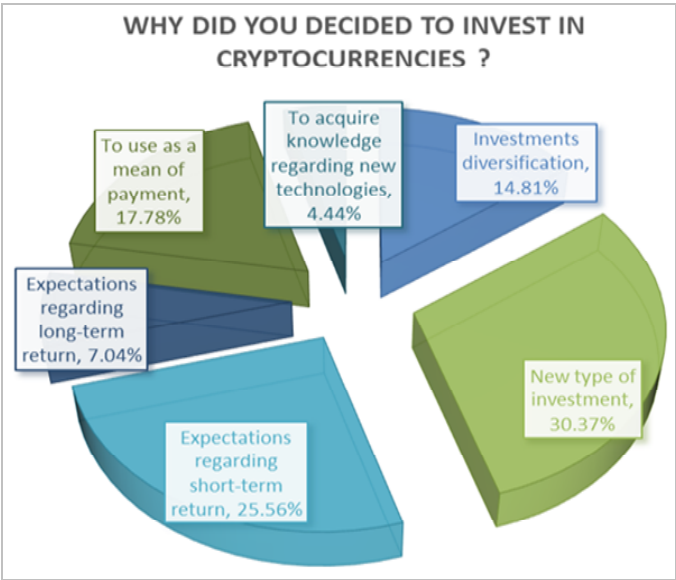
Source: By author

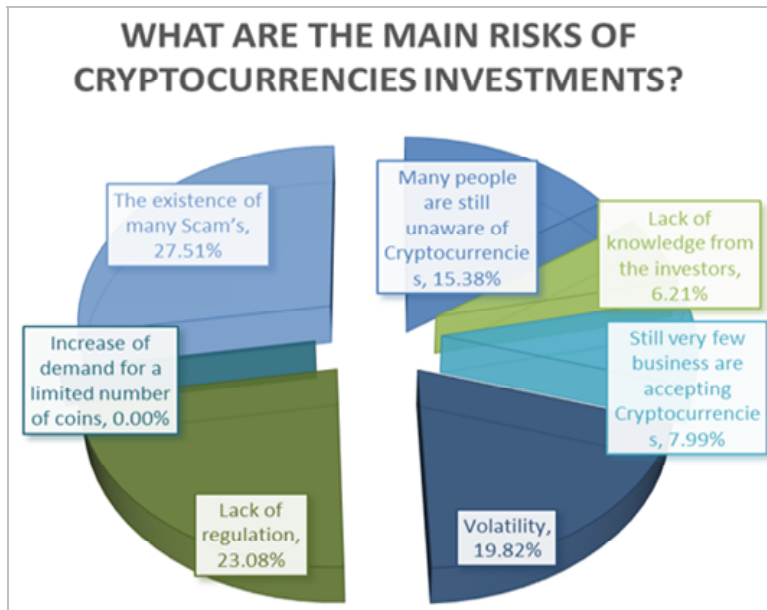**Figure 16**   Advantages (see online version for colours)
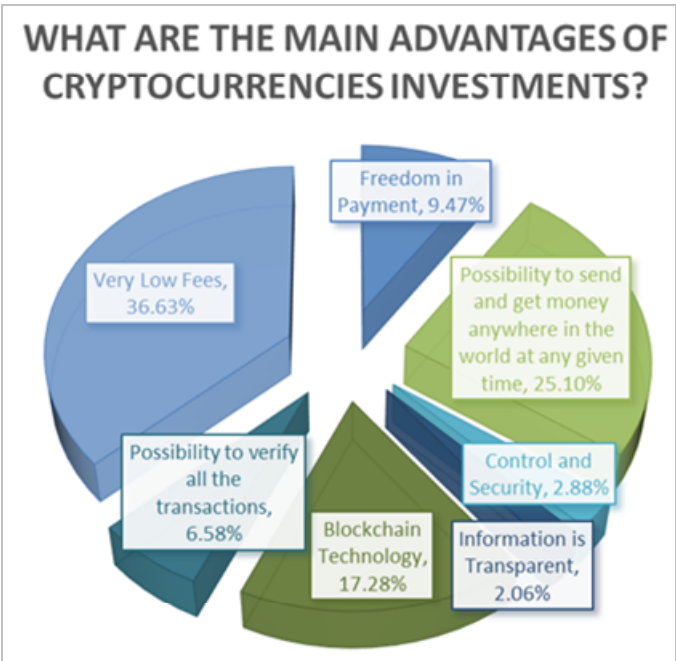
Source: By author

When we globally analyse the investors' expectations in regards to the future, we are able to verify that majority of crypto investors believe that a future regulation will give them

more confidence to increase their investments and to use more of these currencies as a mean of payment. They also believe that a possible regulation will increase the cryptocurrencies value and that bank and financial companies are prepared to this new trend.

Figure 17 Main risks (see online version for colours)

Source: By author

Figure 18 Regulation vs. crypto value (see online version for colours)
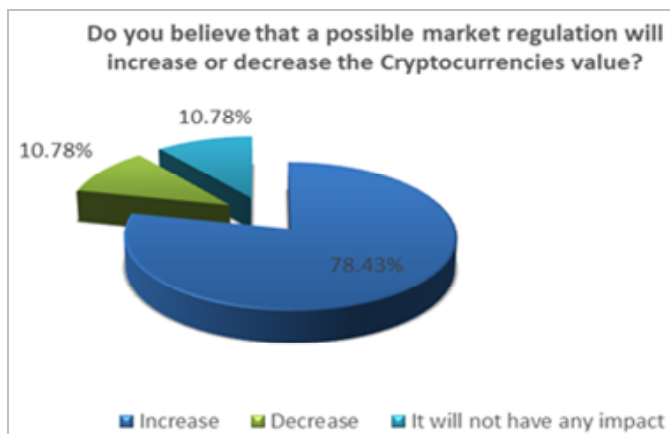
Source: Font by author

During the results discussion, we have cross-checked these figures with some social and demography aspects in order to identify some relevant features that allow us to complete the investors' profile. When we look to professional classes and liberal professionals

(most of them lawyers), they both have a different opinion from the great majority as they do not believe that a possible regulation will increase the payments or cryptocurrencies value.

Another relevant aspect is related to young investors (directly linked to students) where a possible regulation will not have any impact on the payments or on their investments. They also believe that banks and financial companies are not opened to the use of cryptocurrencies.

**Figure 19**   Regulation vs. payments (see online version for colours)

Source: Font by author

Figure 20   Banks and financial companies' vs. openness (see online version for colours)
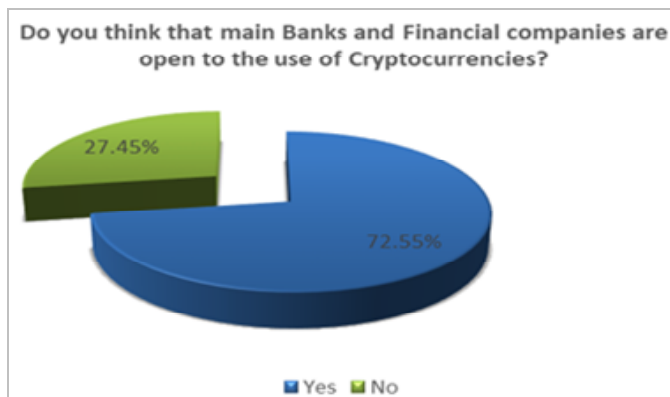
Source: Font by author

In terms of demography, we can determinate that in Italy and Singapore, a possible regulation will have no impact on their investments while in Brazil and South Africa, the investors do not believe that banks and financial companies are prepared for this trend.

Figure 21 Regulation vs. investments (see online version for colours)
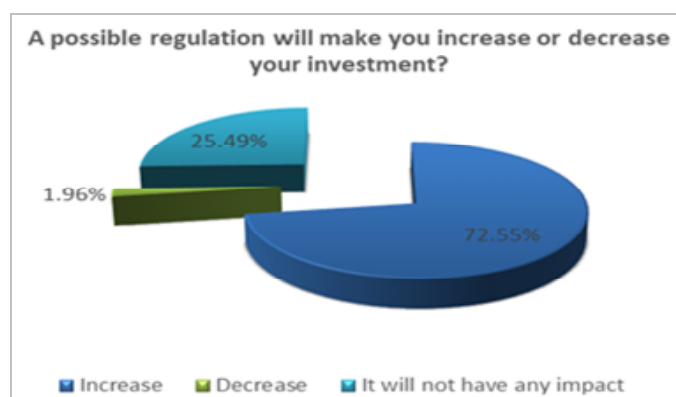
Source: Font by author

As mentioned in Section 5, questions where sent by e-mail to several banks, private equities and regulators. By analysing the answers from regulators regarding the first question, we found different positions. Some believe that cryptocurrencies could evolve into legitimate private means of payment, but they do not see them evolving in ways that would challenge the powers of official currencies. Ultimately, as a potential competitor to official currencies, cryptocurrencies could even have a positive effect by acting as a disciplinary device pushing central banks (especially in countries with histories of lax monetary policy) to take their price stability mandates seriously.

Other regulators have a different opinion as at this moment, there are so many suspicions. Lack of regulation creates a risky and fraud-prone environment. In addition, there are system scalability issues and the opposition of the banking system. The issuing and trading activity of virtual currencies is not regulated nor supervised by any authority of the national or European financial system, in particular by the European Central Bank. Therefore, entities issuing and trading virtual currencies are not subject to any authorisation or registration obligation, and therefore their activity is not subject to any prudential or behavioural supervision. On private equities and corporate investment banks side, is considered that they will be/are a viable means of payment, but not yet a secure investment (due to deregulation and a lack of transparency/counterparty risk assessment).

For the second question, on regulators view, at the moment, cryptocurrencies operate alongside official currencies. The current volumes are small and do not challenge the position of official money as the main currency. Nevertheless, as algorithms improve to limit the volatility of cryptocurrencies, their popularity and use could increase. This would lead to a coexistence with other official currencies. However, the evidence so far suggests that cryptocurrencies are not as widely used as any official currency and are not real contenders for currency substitution. The design of their protocols, at least so far, is very primitive and arbitrary relative to what the management of modern financial systems requires. We therefore do not see an immediate risk of cryptocurrencies challenging central bank-controlled currencies, and certainly not international currencies like the US dollar and the euro. Years of good practices and price stability, combined with their legal status and strong networks of users, have given official currencies a natural monopoly. However, as the underling algorithms of cryptocurrencies develop to reflect

better demand for money and more general economic conditions, one could envisage an increase in their popularity and use.

On the other hand, currently, there is no regulation of virtual currencies. On financial markets, there is no room for uncertainty, insecurity and lack of credibility. The financial/banking system needs to consensually regulate and integrate virtual money, legally and securely. On the private equities side, in light of the severe compliance issues and current procedures to which their companies are bound (in receipt, allocation and movement of capital), they are not and cannot position themselves at this time. Concerning their industry, they are naturally in favour of a greater regulation, as this will only be viable for use/investment in this industry.

Corporate and investment bank do not have a positive perception in regards to virtual currencies. They are still associated with criminal activity and institutional clients are very conservative and at this point not interested in having their name associated to this kind of investments. Even with some regulatory movements in some countries, corporate and investment banks will only move forward with a global regulation that will allow them to trade and invest in different countries under the same regulatory supervision. However, during the past year, they are having a little more focus on these currencies, not in terms of investments but in terms of their technology and private networking.

All the answers provided by the distinct financial system participants have common factors. The main negative factor is related to the lack of regulation and presence of any prudential or behavioural supervision, as this does not bring confidence and protection for the investors and for the financial system. Nevertheless, they are all in favour of a future regulation that will allow them to look into this trend more seriously, bring price's stabilities and a central bank authority. Even so, none of them believes that cryptocurrencies could ever challenge the official currencies. Other negative factor mentioned was the association to criminal activity, money laundry and terrorist financing that could potentially bring some loss of reputation within the main banks. The presence of several risks as: no legal protection, total devaluation of virtual currencies without any fund to cover losses and possibility to lose money on a trading platform were also mentioned by the Portuguese regulator that does not believe that virtual currencies will become a viable mean of payment. On the positive side, some of the financial companies show interest and trade cryptocurrencies with a good regulation and some technology used could be applied on the development of private networking.

7 Final considerations

In this section, the conclusions of the current thesis are presented, by providing a summary of the research findings. The research included quantitative and qualitative elements, an analytical survey and interviews analysis. An extensive review of the literature was undertaken, where the significance of the research was highlighted. With the collected data analysis against the research objectives, conclusions have been presented. The key purpose of this study is to provide detailed analysis regarding crypto investor's profile.

To accomplish a characterisation of investors profiles in regards to their appetence to invest in cryptocurrencies, a set of survey questions have been developed expecting to gather data to allow the characterisation of a determinate profile. After analysing the survey results, we are able to find the following conclusions that allow us to determinate

an investor's profile. Taking in consideration the data presented on the results discussion, we are now in a position to establish two crypto investors' profiles:

- 1st profile: Male, based in several different countries/moderate investors profile/main currencies/high incomes/several professional classes (mainly on the financial area)/ages between 25 and 44 years old/follows the news related to cryptocurrencies/pre-disposition to continue to invest/main profit between 5% to 10%/started to invest between 1 and 2 years ago/high degree of satisfaction.

- 2nd profile: Male, based in several different countries/moderate investors profile/low-value currencies/low incomes/several professional classes (existence of unemployed and students)/ages between 17 and 24 years old/do not follow the news related to cryptocurrencies/do not have pre-disposition to continue to invest/main profit between 1% to 5%/started to invest between three months and one year ago/low degree of satisfaction.

On both profiles, investors expect a short-term return and started to invest mainly because cryptocurrencies are a new type of investment and a viable mean of payment. On the other side, expectations in a long-term return are low, mainly due to the high volatility linked to this type of investments. The main advantages pointed by the investors are the low fees and the possibility to send and receive payments from everyone based everywhere at any time, whereas the main disadvantages are the existence of many frauds and the lack of regulation.

Apart from these two main profiles, we can also conclude other information related to some characteristics that at the moment have no impact on the investors' profile: we still see a low percentage of females that invest in cryptocurrencies, the marital status does not have any impact and the majority of investors are from the financial area and have higher education. At this stage, we can also see that conservative profiles are not investing in cryptocurrencies, something that could change in the future with a possible regulation and prices stability. A future regulation will increase investors' confidence that in turn will increase their investments and the usage of cryptocurrencies as a mean of payment, except for the young investors that believe that a possible regulation will not have any impact on their investments.

To conclude, financial companies, banks and regulators are in line with the investors in some aspects but have a different vision in others. Similar to the investors, they believe that a possible regulation will increase the usage of cryptocurrencies as a mean of payment but on the other side, if the majority of investors believe on an increase of cryptocurrencies value with the regulation, the financial companies believe on a prices stability. In addition, most of the investors believe that banks and financial institutions are open to use cryptocurrencies and this is not clear on the answers provided by them.

In summary, the research provides qualitative and quantitative analysis in regards to the characteristics and behaviours from the crypto investors. The analysed surveyed answers allowed us to verify that crypto investors have different characteristics from the global investors as they are younger, more risk tolerant, with diverse net incomes and are present on several Professional areas including unemployed and students. Within the crypto investors, it was possible to establish two different profiles according to the type of investments. One profile linked to the main currencies, where the investors have a higher investments maturity, income, profit and degree of satisfaction. On the other side, a profile related to low value coins is linked to investors with low income, profit,

investments maturity and degree of satisfaction. In a global scale, we can conclude that crypto investors have a positive opinion in regards to cryptocurrencies (6.8 values in a scale from 1 to 10). The financial companies and banks that answered to our questions have a different opinion. Even with a reduce number of answers we were able to gather information from companies with different roles in the financial area. All of them are still not comfortable with the use of cryptocurrencies as a mean of payments or investments, as they still see them linked to criminal activities and terrorism financing. However, some of them admit that a possible regulation will bring more control and stability that potentially might increase their interest in return.

References

Bermudez, J., Perez-Garcia, A.M. and Sanchez-Elvira, M.A. (1990) 'Type A behaviour pattern and attentional performance', *Personality and Individual Differences*, Vol. 11, No. 1, pp.13–18.

Bouoiyour, J. and Selmi, R. (2016) 'Bitcoin: a beginning of a new phase?', *Economics Bulletin*, Vol. 36, No. 3, pp.1430–1440.

Brill, A. and Keene, L. (2014) 'Cryptocurrencies: The next generation of terrorist financing?', *Defence Against Terrorism Review*, Vol. 6, No. 1, pp.7–30.

Buffet, W. (2018) *Berkshirehathaway 2018 Letter* [online] https://www.berkshirehathaway.com/letters/2018ltr.pdf (accessed December 2018).

CapGemini (2018) *World Bank Report* [online] https://www.capgemini.com/news/world-retail-banking-report-2018-banks-must-respond-to-soaring-customer-expectations-as-non-traditional-competition-looms/ (accessed December 2019).

Carducci, B.J. and Wong, A.S. (1998) 'Type A and risk taking in everyday money matters', *Journal of Business and Psychology*, Vol. 12, No. 3, pp.355–359, https://doi.org/10.1023/A:1025031614989.

Chiu, J. and Koeppl, T. (2017) *The Economics of Cryptocurrencies –Bitcoin and Beyond*, Bank of Canada.

Chu, J., Chan, S., Nadarajah, S. and Osterrieder, J. (2017) 'GARCH modelling of cryptocurrencies', *Journal of Risk and Financial Management*, Vol. 10, No. 17, pp.1–15.

Day, P.K. (2018) *Cryptocurrency – Few Words on Digital Money* [online] https://www.europarl.europa.eu/cmsdata/150761/TAX3%20Study%20on%20cryptocurrencies%20and%20blockchain.pdf (accessed December 2019).

Disrupt SF (2018) *Coinbase CEO Brian Armstrong to Talk the Future of Cryptocurrency at Disrupt SF* [online] https://techcrunch.com/2018/05/16/coinbase-ceo-brian-armstrong-to-talk-the-future-of-cryptocurrency-at-disrupt-sf/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmB0Lw&guce_referrer_sig=AQAAADQHUznnwc7BQSLuGvQvhkrpyoYxzlBQAszFeFrYmBV72jf5zr3lZZXYguXiZaO1zeNTiEeTEJGmHtyBJa0RSAQafF_FNv5tRFRCE71TSGHSVHS1t9uvi9FbaibwKbkglfyJ8kLdAcpMjaPrRjdSsv086-zUw91pzHXNbVZGs5EF (accessed December 2018).

Dyhrberg, A. (2016) 'Hedging capabilities of Bitcoin. Is it the virtual gold?', *Finance Research Letters*, Vol. 16, No. 2, pp.139–144.

ElBahrawy, A., Alessandretti, L., Kandler, A., Pastor-Satorras, R. and Baronchelli, A. (2017) 'Evolutionary dynamics of the cryptocurrency market', *Royal Society Open Science*, Vol. 4, No. 11, p.170623.

Grable, J.E. (2000) 'Financial risk tolerance and additional factors that affect risk taking in everyday money matters', *Journal of Business and Psychology*, Vol. 14, No. 4, pp.625–630.

Hileman, G. and Rauchs, M. (2017) *Global Cryptocurrency Benchmarking Study*, Cambridge University.

Katsiampa, P. (2017) 'Volatility estimation for Bitcoin: a comparison of GARCH models', *Economics Letters*, Vol. 158, pp.3–6.

Letra, I.J.S. (2016) *What Drives Cryptocurrency Value? A Volatility and Predictability Analysis*, Doctoral dissertation, Instituto Superior de Economia e Gestão.

Lu, L. (2018) 'Bitcoin: speculative bubble, financial risk and regulatory response', *Butterworths Journal of International Banking and Financial Law*, Vol. 33, No. 3, pp.178–182, ISO 690.

Mukhopadhyay, U. (2016) 'A brief survey of cryptocurrency system', *14th Annual Conference on Privacy, Security and Trust (PST)*.

Nakamoto, S. (2008) 'Bitcoin: a peer-to-peer electronic cash system', *Decentralized Business Review*.

Polasik, M., Piotrowska, A., Wisniewski, T.P., Kotkowski, R. and Lightfoot, G. (2015) 'Price fluctuations and the use of Bitcoin: an empirical inquiry', *International Journal of Electronic Commerce*, Vol. 20, No. 1, pp.9–49.

Poyser, O. (2017) *Exploring the Determinants of Bitcoin's Price: An Application of Bayesian Structural Time Series*, arXiv preprint arXiv:1706.01437.

Rogojanu, A. and Badea, L. (2015) *The Issue of "True" Money in Front of the BitCoin's Offensive*, Bucharest University of Economic Studies, Romania.

Tomar, A. and Agarwal, P. (2017) *A Comprehensive Study of Cryptocurrency Systems* [online] https://www.academia.edu/37069857/A_Comprehensive_Study_of_Cryptocurrency_Systems (accessed December 2019).

Watanabe, H. (2015) 'Blockchain contract: a complete consensus using blockchain', *2015 IEEE 4th Global Conference on Consumer Electronics (GCCE)*.