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Regulatory Challenges of Virtual Currencies

Master in Law and Business

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March, 2016

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Table of Abbreviations and Acronyms

VC	Virtual Currency
VCs	Virtual Currencies
FC	Fiat Currency
EBA	European Banking Authority
ECB	European Central Bank
ESMA	European Securities and Market Authority
UK	United Kingdom
US	United States of America
EU	European Union
NY	New York
NYDFS	New York Department of Financial Services
AML	Anti-Money Laundering

1. Introduction

In 2013, in a panel with Microsoft founder Bill Gates, vice chairman and the CEO of Berkshire Hathaway, Warren Buffett and Charlie Munger, for *Fox Business*, the host asked the guests what was their opinion on Bitcoin. Charlie Munger quickly said he thought it was "*rat poison*". Bill Gates called it a "*technical tour de force*", although he stated that this is an area where governments will still going to maintain a dominant role. Finally, Warren Buffet said, and I quote, "*I think either Charlie or Bill is right*"[1].

This is a good way to illustrate how polarizing Virtual Currencies (hereinafter "VCs") can be. It is hard to explain what a Virtual Currency (hereinafter "VC") is. It is a hard of a concept to understand. It is as hard as explaining the Internet to the general public back at the time of its inception. Like the Internet in its early days, most people do not know exactly what a VC is and how it will impact society. At this point there are several different types of opinions and predictions: some praise the benefits of this new reality and speak of a revolution; others warn us of the dangers related to VCs and believe it is a trend soon to be dead.

Perhaps in a few years we will talk about VCs as a small incident in the History of Technology, a curious experience of the early millennium. Or maybe we will look back at what is happening now as the beginning of a new technology that changed the way we do business in a deep way. But no matter what the future holds, this new technology is already having impact on the financial world today and creating difficulties and problems in business relationships. These difficulties and problems somehow need to be addressed from a legal perspective.

Moreover the need to address the legal perspective is so urgent in two directions: the Law needs to respond to the innovations and trends arising from VCs; and, on the exact opposite direction, VCs will need to adjust quickly to the existing law and regulation in place.

Needless to say, given the pace and speed of innovations in this area and the fluidity and freedom in which the virtual world operates, we are operating in an absolute ground zero in terms of academic or scientific research in this area. This space is so much virgin that

[1] Source: http://video.foxbusiness.com/v/2359385547001/mungerbuffett-disagree-on-corporate-tax-rates/?playlist_id=1034196606001#sp=show-clips

one may wonder if there is really an academic interest in this topic. We claim this interest lies precisely in its novelty, but mostly in the potential to condition the future use, regulation and legislation of VCs or its derivatives. Any contribution made now has the potential (and the danger) to condition the future use of this novel means of payment.

First and foremost, we need to understand this technology. Understanding it is in itself a daring and ambitious task and for lawyers that means going way out of their comfort zone. Disruptive technologies, like self-driving cars, VCs or artificial intelligence, as they leave the realm of science fiction into the real world are probably going to impose the biggest challenges to law in the coming decades of this century, so the sooner lawyers start to study these new realities, the better.

The purpose of this work is provide an insight of the challenges that VCs impose upon the law, while documenting how some institutions and countries are already answering to them. We find situations in which the problems posed by these disruptive technologies are tackled and solutions are found. This paper does not aim to be a panegyric on the financial promised land of VCs or be an evangelizing defence of the inevitability and virtues of these technologies. Rather this dissertation takes a serious look on how regulation should approach these technologies and their current, future or simply potential widespread usage. To accomplish that we need set our research question: **Where should regulation start in order to create a healthy environment for innovation, while protecting the traditional financial system and fight illegal activities?**

In section 2 we try to understand the concept of VC from a legal point of view. In section 3 we will overview three pieces of work that we consider to be we the most relevant to understand the framework of VCs from a regulatory standpoint, namely, European Banking Authority's Opinion on virtual currencies; United Kingdom Digital currencies: response to the call for information; and New York's Bitlicense. Finally, in section 4 the description of the state of the art on the discussion about such a disruptive issue will represent an original contribution to a knowledge base that is just starting.

2. What is Virtual Currency?

a. Virtual Currency Schemes

Bitcoin, *Litecoin*, *Dogecoin*, *Darkcoin*. These are all examples of different virtual currencies, more specifically cryptocurrencies[2]. *Bitcoin* is by far the most successful digital currency so far, "*with more than 80% market capitalization*"[3]. However, several other digital currencies may be found on the Internet. It is extremely difficult to determine the number of existing digital currencies. The website Crypto-Currency Market Capitalizations[4], a website dedicated to show information on different cryptocurrencies, presently lists a total of seven hundred and eight (708) different cryptocurrencies. Some are more famous than others (like *Bitcoin*), most of them have little to no value.

But what exactly is a VC? The use of the nomenclature "currency" certainly hints at the same definition as fiat currencies (hereinafter FC) like the Dollar or the Euro. However, presently there is still no clear legal definition for VC.

The European Banking Authority defines virtual currencies as "*a digital representation of value that is neither issued by a central bank or a public authority, nor necessarily attached to a Fiat Currency (FC), but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically*."[5]

The European Central Bank (ECB) uses a more expansive definition. It states that "*virtual currency can be defined as a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community*."[6]

This broader approach aims at including different types of "*virtual currency schemes*", as follows:

- Type 1 "*closed virtual currency schemes*": these are the VC used by some virtual communities without interaction with the "real economy" (in video games, for example);

[2] "*Cryptocurrency: virtual currency where all relevant information is carried in encrypted form, e.g. in a blockchain"* definition used by the European Parliament in *Virtual currencies Challenges following their introduction*, March 2016.
[3] European Parliament, *Virtual currencies Challenges following their introduction*; March 2016, cit. page 2.
[4] https://coinmarketcap.com, last consulted March 29, 2016.
[5] European Banking Authority, *EBA Opinion on virtual currencies*, 4 July 2014, cit. page 11.
[6] European Central Bank, *Virtual Currency Schemes*, October 2012, cit. page 5.

- Type 2 "*virtual currency schemes with unidirectional flow*": these VC have conversion rates for purchasing virtual currency but not the other way around, and because of that, you can mostly only buy virtual goods and services; and
- Type 3 "*virtual currency schemes with bidirectional flow*": this category includes virtual currencies that can be converted to fiat currencies and vice versa. This last type is the most relevant, since it is the one that has more interaction with the real economy.

The ECB's definition covers an enormous range of VC schemes: prepaid value; loyalty points; monetization currencies; gaming currencies and value encoded currencies[7]. However, not all of these schemes are relevant for the purposes of this thesis. In fact, not all of the above schemes present the same regulation challenges. For the purposes of this thesis, we are going to focus only on the "*value encoded currencies*". These are schemes that aim to replace cash[8], or at least act as an alternative to FC.

There are some examples of VC schemes that, due to their characteristics, have no relevance in terms of the new regulation challenges that this work will analyzes. Therefore, type 1 and 2 schemes will not be analyzed during this paper. Furthermore, not all type 3 schemes will be analyzed.

Type 1 schemes are closed schemes (i.e., there is no trade outside the virtual community where such VCs were created). The same goes for type 2 schemes, which, despite the fact that VCs can be purchased with dollars or euros, there is no conversion from VC to FC. Therefore, these types of schemes do not aim at being an alternative payment system or act as currency, but rather facilitate the transaction in a certain virtual community or company (like the Nintendo Points or the extinct Facebook Credits).

Likewise, some type 3 schemes may be created only to facilitate transaction within a virtual community or company. This is the case of the Linden Dollars (a virtual currency used in the videogame "Second Life" [9]). Although VCs included in these schemes have bidirectional flow (meaning that there is an exchange rate that allows buying and selling such VCs), it is linked with the "Second Life" world. It only works between the members and inside that virtual world as a way to increase revenue for the company that manages

[7] Selldahl Sara, *Virtual currencies – Real opportunities?* KTH Industrial Engineering and Management, 2013.
[8] European Central Bank, *Virtual Currency …* cit. p. 6.
[9] Second Life is a virtual world where users create customized characters: http://secondlife.com/

it. Any services and goods not related to the Second Life world cannot be bought with Linden Dollars. Again, it does not aim to act as an alternative payment system or as a real currency.

There is a debate about which is the correct term to use when referring to this new phenomenon. For some, Virtual Currencies are, as ECB defines them, a broad concept that fits examples from companies loyalty points to prepaid cards or Bitcoins. Therefore the term "Digital Currencies" would prove to be a more specific term to designate the concept under analysis: the digital representation of value aimed at being used as a medium of exchange and therefore act as an alternative payment system.

Coin Center, a "*non-profit research and advocacy center focused on the public policy issues facing cryptocurrency technologies such as Bitcoin*"[10], claims that "*Virtual currency could refer to any sort of non-tangible currency, e.g., dollars sent through Paypal or airline miles. Digital, by contrast, makes clear that newer electronically tokenized money is what is at issue*."[11]

Despite the fact that the distinction between virtual and digital currencies can help a better understanding of both phenomena, the general public does not fully grasp the distinction (that also includes regulatory agencies). The most notable example is probably the New York State's Department of Financial Services (NYSDFS). This department defines VC as "*any type of digital unit that is used as a medium of exchange or a form of digitally stored value. Virtual Currency shall be broadly construed to include digital units of exchange that (i) have a centralized repository or administrator; (ii) are decentralized and have no centralized repository or administrator; or (iii) may be created or obtained by computing or manufacturing effort. Virtual Currency shall not be constructed to include any of the following:*

1. *Digital units that (i) are used solely within online gaming platforms, (ii) have no market or application outside of those gaming platforms, (iii) cannot be converted into, or redeemed for, Fiat Currency or Virtual Currency, and (iv) may or may not be redeemable for real-world goods, services, discounts, or purchases.*

[10] https://coincenter.org/about/
[11] Van Valkenburg, Peter and Brito, Jerry, *State Digital Currency Principles and Framework*, April 2015 Coin Center Report, version 1.0, cit. page 4.

2. *Digital units that can be redeemed for goods, services, discount, or purchases part of a customer affinity or rewards program with the issuer and/or other designated merchants or can be redeemed for digital units another customer affinity or rewards program, but cannot be converted into, or redeemed for, Fiat Currency or Virtual Currency; or*
3. *Digital units used as part of Prepaid Cards.*"[12]

This regulatory agency uses the term Virtual Currency but defines it the same way the Coin Center and others define Digital Currency.

Considering the above, it feels like arguing in favor of any of the terms analyzed herein might be a lost cause. Instead, we should acknowledge that both expressions exist: "*digital currency*" is a more narrow definition, meaning the newer generation of digital representation of value that aims to act as a payment system (like Bitcoin); and "*virtual currency*" can either be used *lato sensu* to mean every digital representation of value (from prepaid cards to company loyalty points), or *stricto sensu*, having the same meaning as the "digital" term.

b. Virtual Currencies vs Electronic Money (E-money)

The concept of electronic money, or simply e-money, can easily be confused with VC. The European Union defines it as "*electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions as defined in point 5 of Article 4 of the Directive 2007/64/EC, and which is accepted by a natural or legal person other than the electronic money issuer*."[13] The ECB explains that, even if VC may meet some of the criteria established by this definition, there is a fundamental difference: "*In electronic money schemes the link between the electronic money and the traditional money format is preserved and has a legal foundation, as the stored funds are expressed in the same*

[12] New York State Department of Financial Services, Title 23 Chapter I, Regulations of the Superintendent of Financial Services, Part 200 Virtual Currencies, cit. pages 5 and 6.
[13] Article 2 n.º2 of Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009, *on the taking up, pursuit and prudential supervision of the business of electronic money institutions*

unit of account (e.g. US dollars, euros, etc.). In virtual currency schemes, the unit of account is changed into a virtual one (e.g. Linden Dollars, Bitcoins)"[14].

E-money is not a different unit of account, but rather the digital representation of a FC. Contrary to VC, there are no conversion rates since the unit of account is still the FC that represents.

c. Bitcoin

Although some types of virtual currency can be tracked as far as the late 1990's [15], only in very recently years have they got the attention from the general public and from public institutions. This is largely due to the success of Bitcoin.

Therefore, understanding what Bitcoin is becomes imperative to understand VCs in general.

Bitcoin is a VC created by Satoshi Nakamoto, (a pseudonym used by the real creator[16]) in 2008[17]. There are several different definitions of this VC on websites and articles all over the Internet. However, one of the best definitions is the one provided by the United States Government Accountability Office on their report, "*Virtual Currencies Emerging Regulatory, Law Enforcement, and Consumer Protection Challenges*" [18]. As stated on said report, "*The bitcoin computer protocol permits the storage of unique digital representation of value (bitcoins) and facilitates the assignment of bitcoins from one user to another through a peer-to-peer, Internet-based network*"[19]. It further adds that "*users' bitcoin balances are associated with bitcoin address (long strings of numbers and letters) that use principles of cryptography to help safeguard against inappropriate tampering with bitcoin transactions and balances. When users transfer bitcoins, the recipient provides their bitcoin address to the sender, and the sender authorizes the transaction with their private key (essentially a secret code that proves the sender's control over their bitcoin address). Bitcoin transactions are irrevocable and do not require the sender or receiver to disclose their identities to each other or a third party. However, each*

[14] European Central Bank, *Virtual Currency* … cit. page 16
[15] E-Gold in 1996 and Flooz in 1999 were early examples of virtual currencies.
[16] The true identity of the creator or creators of Bitcoin is unknown.
[17] Satoshi Nakamoto published the paper entitled *Bitcoin: A Peer-to-Peer Electronic Cash* System in November of 2008, however only in 2009 the Bitcoin software client was released.
[18] United States Government Accountability Office, *Virtual Currencies Emerging Regulatory Law Enforcement, and Consumer Protection Challenges*, May 2014.
[19] *Idem.*, cit. page 5.

transaction is registered in a public ledger called the "blockchain", which maintains the associated bitcoin addresses and transaction dates, times, and amounts."[20]

Regarding the creation process, the United States Government Accountability Office also states that, "*Bitcoins are created and entered into circulation through a process called mining. Bitcoin miners download free software that they use to solve complex math problems. Solving these problems verifies the validity of bitcoin transactions by grouping several transactions into a block and mathematically proving that the transactions occurred and did not involve double spending of a bitcoin*."[21]

This a complex definition. In order to fully grasp all the elements included therein, it is useful to analyze its main features: (i) unique digital representation of value; (ii) creation of bitcoins and validation of transaction is made through a Peer-to-Peer process called "mining"; (iii) anonymity of the participants vs Publicity of transaction in the "block chain"; (iv) decentralized currency, cryptography replaces trust; (v) it does not have the status of legal tender.

(i) Unique digital representation of value

Bitcoins, like any other VC, are a digital representation of value. However, this representation is not linked to any commodity or economic activity, it has no specific practical use or utility, which means it has no intrinsic value or worth. This characteristic is the main reason for this digital currency's volatility so far. Bitcoin's value/price is solely linked to market fundamentals such as supply and demand, attractiveness for investors, and development of global financial indicators[22]. Two of these factors, supply and demand and attractiveness of investors, are extremely influenced by information. Being a very new financial innovation, it is difficult for users and investors to be well-informed. This volatility behaves like a speculative bubble and "*overoptimistic media coverage of Bitcoin prompts waves of novice investors to pump up Bitcoin prices. The exuberance reaches a tipping point, and the value eventually plummets.*"[23]

[20] *Idem.*, cit. page 6.
[21] *Idem.*, cit. page 7.
[22] Ciaian, Pavel; Rajcaniova, Miroslava; Kancs, d'Artis, *The Economics of Bitcoin price formation*, EERI Research paper series, Nº 8, 2014, cit. page 12.
[23] Brito Jerry and Castillo Andrea, *Bitcoin A Primer for Policymakers*, 2013, Mercatus Center at George Mason University, cit. page 17.

In a sense the fluctuations of Bitcoin values are similar to any other national currency, with the difference that there is no underlying economy or monetary authority behind this particular currency. Hence, the economic fluctuations are in some sense freer than the ones of even the most volatile national currency, whose trends will depend on the trends of the underlying economy and the actions of the monetary authority, usually a national central bank relative to those of the other national currencies.

(ii) Creation of bitcoins and validation of transaction is made through a Peer-to-Peer process called "mining"

The "mining process" is the means through which VCs are created. By downloading and installing specific software, users' computers get access to the Bitcoin network, and lend some of its resources (mainly the processor) to the said network. The mining process is the one that takes place when the "miners" computers solve complex math problems that allow the verification of transactions. The miner is rewarded with fresh created Bitcoins for their contribution to the network. These "miners" substitute the role of the financial clear house, and are the ones that confirm the veracity of all transaction and prevent fraud.

This mining process is built with a Peer-to-Peer (P2P) arquithecture. Without entering into technical details, P2P works in a way of distributing the load of a task by the members/users of that network. That task can consist of different things, file sharing being maybe the most famous example or, in the case of Bitcoin, validation of transaction by solving complex mathematical problems. Every transaction takes ten minutes up to over two hours to be verified, but on average takes an hour[24].

So, the mining process have two outcomes: transaction validation and creation of new bitcoins. It is this process that protects the system's integrity.

(iii) Anonymity of the participants vs Publicity of transaction in the "block chain"

After the transactions are authenticated and validated, they are pressed in blocks and submitted to a public record called *Blockchain.* Every transaction ever made with bitcoins is registered in this blockchain, and everyone has access to it. This is how miners can

[24] Bonneau, Joseph, *How long does it take for a Bitcoin transaction to be Confirmed*, Coin Center, November 3, 2015.

authenticate transactions: by having access to the database of all transactions ever made and making sure that the user is not "double spending" their bitcoins.

This transparent publicity of transactions contrasts with the users' anonymity. The *blockchain* only holds information about the transaction, specifically the public key of the sender and receiver, the amount traded and the date. This means that there is no need for users' personal information to be disclosed. Users are identified by an anonymous key (since it is not connected to any personal information) and this is the only piece of information that is published in the *blockchain*. However, this does not mean that anonymity is totally granted. Some authors[25] have called it a pseudo-anonymity. This is so, because, technically, through sophisticated network analytic techniques, it is possible to track down and identify individual users[26].

One may still argue that this pseudo-anonymity still difficult regulatory supervision, however this is not a complete new challenge for States supervisors. In some States, bank secrecy rules impose a real challenge for authorities to investigate customers' information[27]. In the case of VCs, it is not the law that protects the secrecy of the users or customers, rather the network architecture. Therefore is not in the hands of a judge to impose disclosure, but on the technical capacities of the authority.

(iv) Decentralized currency. Cryptography replaces trust

After understanding how Bitcoin works, it is clear that this is a decentralized VC. On its paper, *Bitcoin: A Peer-to-Peer Electronic Cash System*, Satoshi Nakamoto makes it clear from the beginning that the elimination of third parties is the main goal: "*What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party*"[28]. The system is built so that there is no need for a third party acting as an intermediary. The main objective is the replacement of trust on central banks or other financial institutions for a cryptographic system that accomplishes the same functions. For this reason, all decentralized VCs created up to this date are cryptocurrencies.

[25] *Idem.*, cit. page 1 and Doguet, J. Joshua, *The nature of the form: Legal and regulatory issues surrounding the bitcoin digital currency system,* Louisiana Law Review, volume 73, number 4, 2013, cit. page 1130.
[26] Doguet, J. Joshua, *The nature of the form: Legal and regulatory issues surrounding the bitcoin digital currency system,* Louisiana Law Review, volume 73, number 4, 2013, cit. page 1129.
[27] One famous example being the Federal Act on Banks and Savings Banks from Switzerland.
[28] Nakamoto, Satoshi. *Bitcoin: A peer-to-Peer Electronic Cash System*, 2008 cit. page 1.

Opposite to these, are the centralized currencies, which have a central node or administrator controlling it. In this type of VC scheme, the central entity, which can be a company or anyone that creates the VC, does the work of the traditional financial intermediaries or monetary authority; it is the one in charge of creating currency and avoiding the double spending by validating any transaction, acting as financial clear-house.

(v) It is not legal tender

Finally, Bitcoin, like any other VC out there, is not legal tender. As EBA states, this means that VC do not have *"(a) mandatory acceptance, i.e., that the creditor of a payment obligation cannot refuse currency unless the parties have agreed on other means of payment; (b) acceptance at full face value, i.e., the monetary value is equal to the amount indicated; and (c) that the currency has the power to discharge debtors form their payment obligations*."[29] However, as EBA also recognizes[30], this feature can change. Although unlikely to happen in an immediate future, all it takes for this to change is for any country to declare legal tender on a VC.

Different VC can have different characteristics; however, the network effect, or the network externality, impact deeply the value of VC, and this makes Bitcoin extremely influential in comparison to other VC. The concept of network externality tells us that a value of a good or service grows as more people have or use it. In case of VC, this is especially relevant because, not having legal tender, the more people use it the easier it is to spend them. Sooner or later one VC will have such a wide acceptance as a means of payment. At that point regulation of VC will be obvious. The question we raise is whether or not the path of a VC to that wide acceptance should be allowed to happen without any supervision or regulation. To this date Bitcoin is the one VC getting closer to that status. So, it is imperative for every authority that aims at regulating VC to take it into account.

d. Is Virtual Currency really a currency?

Law-makers are very careful with the names they choose. Everything must be precise, and with every name comes numerous conclusions about the thing named. From Digital

[29] European Banking Authority, *Opinion on…* cit. page 13.
[30] *Idem*, cit. page 13.

Currencies to VC or even Crypto Currency, it is clear that it was not a lawyer that chose those names for these new phenomenon, although said designations have been widely accepted by the general public.

Just because it is referred to as VC it does not automatically turns it into a currency. VC still needs to prove itself worthy.

FC has three main functions[31]:

- It serves as a medium of exchange;
- It is a unit of account and measure of relative worth; and
- It acts as a store of value of current earnings for future spending.

Although VC have the potential to accomplish these functions, currently there are some limitations that do not allow them to perform as FC.

Firstly, because VCs are not legal tender, which means that they are not universally accepted, and they only serve as a mean of exchange if the merchant is willing to accept them as payment. FC also has no intrinsic value. However, it is used as money by fiat (decree) of the government. Since VCs are decentralized currencies, no government or authority backs such currencies. In this regard, VCs are closer to commodities.

Secondly, for the case of being a unit of account and measure, the large majority of merchants that trade with bitcoin still tag their price in a FC (like the dollar)[32]. They do not hold bitcoins. To avoid bearing the risk of this VC volatility, they use the services of a third party, an exchange platform[33]. When a customer pays in bitcoins, this third party accepts the bitcoins at the current exchange rate and deposits the corresponding amount in FC in the merchant account[34] (although there are already a few exceptions, websites pricing their goods/services in bitcoins[35]). As such, mostly, Bitcoin and other VC exist in the market correlated to a FC. Ultimately, this means that FC is a common measure of value, whereas VCs are not, especially due to their volatility.

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[31] Thomas P. Fitch, *Dictionary of Banking Terms* 391 (1990); Education Policy & Development, American Bankers Association, Banking Terminology 231 (3d ed. 1989).
[32] See for example "Bitcoin for Vinyl": http://www.bitcoinforvinyl.com/
[33] Like Coinbase for example: https://www.coinbase.com/
[34] Brito, Jerry and Shadab, Houman B. and Castillo, Andrea, *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling* (January 15, 2015). Columbia Science and Technology Law Review (2014), cit. page 157.
[35] See for example: https://btctrip.com/ an flight and hotel booking site that price their service in Bitcoin.

Thirdly, VCs current high volatility keeps them from acting as a valid measure of worth and a store of value. To act as a store of value, a currency has to be stable to offer its owners the safety of knowing that they will still have something of value in the future when they decide to spend it. With VC there is the risk of their value collapse. There is no Central Bank or any other Financial Institution to ensure the integrity and continuity of the VC, therefore, their value and, ultimately, their existence relies on their user base. So, anyone that chooses to have VC must bear in mind that in the future they may be worth nothing.

In conclusion, although VCs share a lot with FC, they do not fully accomplish the main functions of said currencies. Therefore VCs should not be considered as a "Currency".

However, we must realize that this reality can change tomorrow.

As stated above, although unlikely in a near future, a country can declare a VC legal tender. On the other hand, the user base can grow so much to a point that having a Bitcoin wallet (or other VC) is as common as having an email address or a Facebook account, making VC a regular medium of exchange and a clear alternative to FC.

The current high volatility may fade away as VC matures and people's understanding of this new phenomenon grows. If the value of a VC (most likely, Bitcoin) stabilizes, that means that they can fully act as a store of value of current earnings for future spending.

In the same way, if the user base grows strong, if merchants that accept VC become more usual and if its value becomes more stable, it is easy to foresee more and more sites pricing their goods and services solo or also in Bitcoin. Especially, the sites that offer exclusive Internet services (like file sharing, music stream or programming services) may see in VC a way of globally pricing their services in the market. This can lead to VC becoming a truly unit of account and measure of relative worth.

Still in this subject matter, ECB states on its report on VC schemes that "*Money is a social institution: a tool created and marked by society's evolution, which has exhibited a great capacity to evolve and adapt to the character of the times. It is not surprising that money has been affected by recent technological developments and especially by the widespread use of the Internet*."[36] This points out the fact that "Money" is an evolving concept that has been changing, adapting itself to technological advances. In the future, VC can evolve

[36] European Central Bank, *Virtual Currency*…, cit. page 10.

into fully accomplish the functions of a currency but also, in their uniqueness, they can make that concept evolve into something slightly different, to accommodate new realities. This, however, is something that we can only speculate about, since we have to wait and see how things will turn out. For now, we have to work with what we have.

Although we subscribe the conclusion that VCs are not real currencies, we, like the EBA[37], find no need to rename this phenomenon. The discussion between names (Virtual currency vs Digital Currency) is one with no real value, misses all the question and problems behind this reality. This paper does not aim at renaming VC into something less misleading, since that term is already the common public denomination. Let's spare us from an unnecessary onomastic crusade.

Though we state that Virtual Currencies are not a currency, it does not mean they do not fall within the scope of action of the central banks, namely the European Central Bank. The potential to accomplish all the main functions of a currency, and the fact that their main goal is to achieve an alternative way of payment are enough to put VC within central bank responsibilities. The same position is stated by ECB on its 2012 report Virtual Currency Schemes: *"… virtual currencies: (…) do indeed fall within central banks' responsibilities as a result of characteristics shared with payment systems, which give rise to the need for at least an examination of developments and the provision of an initial assessment*".[38]

e. VC and Financial Instruments

Bitcoin (and the others VCs created afterwards and inspired by it) was created to be an alternative payment system. There is no doubt about that since the paper from Satoshi Nakamoto is called "Bitcoin: A Peer-to-Peer Electronic Cash System" and its protocol is largely dedicated to transaction, as stated in the paper, "*We have proposed a system for electronic transactions without relying on trust*" [39]. However, its large volatility, that we already mentioned, made it popular for speculators[40]. After its increase in value in 2011,

[37] *Idem.* cit. page 11.
[38] *Idem*. cit. page 6.
[39] Nakamoto, Satoshi. *Bitcoin:* … cit. page 8.
[40] See e.g., James Surowiecki, *Cryptocurrency: The Bitcoin, a virtual medium of exchange could be a real alternative to government-issued money – but only if it survives hoarding by Speculators*, 114 MIT Tech Review, 106, 2006.

there was a rush to buy bitcoins and not to spend them in services or goods but to speculate. Bitcoin is still seen, by many users, as an investment to make profit out of its value fluctuation and not as an alternative payment system[41].

The concept of financial instrument is a difficult one to pinpoint for law due to its recent existence and innovative nature. There is no clear legal definition and this concept is changing constantly due to the growing financial innovation of the past years[42]. VC can well be just a new chapter in the history of financial instruments.

Financial instruments can be divided in three categories: securities; derivatives and money-market instruments. Because of the speculative nature, one may argue that VC fits the concept of derivatives. It is true that one of the main functions of derivatives is indeed speculation (being the other three hedging, asset liability management and arbitrage[43]). Nevertheless, there is a fundamental difference between VC and derivatives. A derivative is a contract referring to an underlying asset. "*A financial derivative is a financial instrument based on another basic instrument, which value depends on it*"[44].

As we stated above, VCs are not linked to any underlying asset or economic activity. Therefore, they fail to achieve all the features needed to fit a more familiar concept. VC are not, *per se*, a financial instrument.

Despite this, there are already financial instrument being indexed to VC (mainly to Bitcoin). These financial instruments raise some questions and legal problems on their one. Most importantly: does the use of VC as an underlying asset of financial instrumental demands extra regulation to deal with specification of this type of investment?

On this topic, the European Securities and Markets Authority (ESMA), on its call for evidence in 2015, stated that while monitoring this type of investment, does not have no plans to take further regulatory measures[45]. In this work, ESMA analyzed the three main types of investment using VC: (i) "*Investment products which have virtual currency as*

[41] Lee, Timothy (2013*), Bitcoin Is A Bad Currency But It Might Be A Good Platform For Financial Innovation*, Forbes, April 1.
[42] Antunes, J. Engrácia, *Os instrumentos Financeiros*, 2009, Almedina cit. page 22.
[43] Hudson, Alastair, *The Law on Financial Derivatives*, 2 edition, Sweet & Maxwell, 1998
[44] Kolb, Robert; Overdahl, James, *Financial Derivatives*, 1, 3 edition, J. Wiley & Sons, 2002
[45] European Securities and Market Authority, *Call for evidence, Investment using virtual currency or distributed ledger technology*, 22 April 2015, cit. page 6.

an underlying"; (ii) *"Investment in virtual currency based assets/securities"* and (iii) "*Other uses of the distributed ledger in relation to investment"*[46].

Also on this topic, Jerry Brito, Houman Shadab, and Andrea[47] make the case that the next wave of regulation will be VC based financial instrument (being New York's Bitlicense, that we further going to analyze, an example of the first wave of regulation). These authors divide those who seek VC, more specifically Bitcoin, based financial instruments, into two categories: those who seek hedge against Bitcoin's volatility, therefore using Bitcoin Derivatives (like Futures, Forwards, Swaps and Options), and those who seek to speculate on its price, using Bitcoin securities (like Bitcoin funds and Bitcoin margin trading). The authors of this paper argue that "*financial regulator should consider exempting or excluding certain financial transactions denominated in Bitcoin from the full scope of the regulations, much like private securities offerings and forward contracts are treated*". This statement alone, as well as the regulation of financial instruments based on VC, are a thesis topic on their own. Therefore, although interesting, we are going to leave this topic for other time.

f. Towards a definition

VCs are very disruptive and highly innovative technology. As a consequence, it is very difficult to fit this new technology into our old concepts and definitions. It is futile to force it. They sit in a grey area, in between familiar concepts, refusing to obey our demand for clarity.

Therefore, we should find a definition that is broad enough to let VC evolve. It is our opinion that EBA provided the best definition:

"*VCs are a digital representation of value that is neither issued by a central bank or a public authority, nor necessarily attached to a Fiat Currency, but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically*."[48]

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[46] *Idem.*, cit. page 7.
[47] Brito, Jerry and Shadab, Houman B. and Castillo, Andrea, *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling* (January 15, 2015). Columbia Science and Technology Law Review (2014), cit. pages 144-220.
[48] European Banking Authority, *Opinion on…* cit. page 7.

It does not define it as being a currency but it does not also exclude it; instead, it focus on the “digital representation of value”. Secondly, it underlines its private nature, as they are not linked to any State. Consequently, people (natural or legal) only accept them if they choose to. Last but not least, it states that VC only exist electronically, not having a physical correspondent.

3. Regulating Virtual Currencies: where to begin?

Being a disruptive technology and a financial innovation, VCs impose difficult challenges to law. Financial regulators all over the world are faced with a fast growing reality that has the ability to change, or at least to have a meaningful impact on e-commerce, which means these institutions need to prepare themselves to deal with it. The fast growth of VC can be linked to a general lack of faith in the traditional financial system, especially after the international financial crisis. An example that illustrates this statement is the positive impact that the Cyprus crisis and bailout had on the price of bitcoin in 2013[49].

How can one regulate something that does not suit our legal concepts? It claims to be a currency, but it is not quite. It behaves somehow as a financial instrument, but it is not quite. The deeply complex technical aspect of VCs (their protocol, the blockchain) also presents a challenge for regulators.

Three main groups of regulatory problems arise from VC:

- Consumer protection;
- Anti-Money laundry (AML);
- Tax policy.

Although it is undoubtedly relevant, tax policy is excluded from the scope of this work. Our research question does not aim at finding how states should tax VC's gains. That is a problem which deserves attention on its own, for its particularities[50]. However, we have to make a remark to highlight the quickness of authorities around the world to frame VCs' gains for taxation purposes.

Terrorism financing using VCs, although a relevant subject, is also left out of the scope of this work. Though we are aware that any regulation with Anti-Money Laundering goals (and we will debate AML measures further on this work) will help fight terrorism financing, we think this is a more complex subject involving specific factors that we do not have the time or the knowledge to tackle on this thesis.

[49] Farrel, Maurreen (2013), *Bitcoin Prices surge post-Cyrprus bailout*, CNN Money, March 28.
[50] For further information on this topic we advise: Bal, Aleksandra Marta, Taxation of Virtual Currency, PhD Thesis, Universiteit Leiden, 2014.

So we are left with our research question: Where should regulation start in order to create a healthy environment for innovation, while protecting the traditional financial system and suppress illegal activities?

To answer this question we must first take an insight on what international institutions and states around the world are already producing concerning VCs In order to do so, three documens were chosen, due to their current relevance on the field: "EBA Opinion on 'virtual currencies'", UK government's "Digital currencies: response to the call for information" and New York state Department of Financial Services' "BitLicense".

a. European Banking Authority

In 2014, EBA made a comprehensive study on the regulatory challenges of VCs. On this report, after analyzing the definition of VC, that has already proven itself useful for this work, EBA goes on to list the market participants that are "more probable addressees for regulation"[51]. This list includes:

1. Users;
2. Merchants;
3. Scheme governance authorities (only existing on centralize VCs);
4. Exchange;
5. Trade platforms;
6. Processing service providers;
7. Wallet providers/custodians;
8. Inventors;
9. Technical Service providers;
10. Information providers;
11. Miners.

From this list we highlight the miners because of their essential role on decentralized VCs as we found out in the second chapter. Additionally, the role of exchanges, trade platforms, processing service providers and wallet providers/ custodians most be highlighted because, in spite of not being essential to the system, meaning they do not have a core function for the scheme to work, they have an important role making it more

[51] European Banking Authority, *EBA Opinion on* … cit. pages 13 to 14

efficient. Without them we would still have Bitcoin and other VCs; however they create an appropriate environment for them to growth.

Exchanges and Trade platforms bring liquidity to VCs helping them being exchanged for FCs or other VCs and being able to trade them for goods. Processing services providers help merchants who price their goods/services in an FC by receiving the equivalent amount in VC and immediately exchange it for FC, holding, therefore, the exchange rate risk. Lastly, wallet providers/custodians store VCs of its users on an online account, offering extra security.

Hereupon, EBA goes on to analyze the benefits and risks associated with VC.

Benefits:

EBA divides potential benefits" into "economic benefits" and "individual benefits".

The first group includes: transaction costs; transaction processing time; certainty of payments received; contribution to economic growth and financial inclusion outside the EU.

Lower transactions costs are widely regarded, inside the community and for authorities that study VC, as one of the biggest benefits. A few notes should be made on this matter. As EBA states, the absence of intermediaries makes the transaction costs much lower than those of the traditional financial system. Looking at Bitcoin as an example, transaction costs can be less than 0.0005 BTC, or around 1% of the amount transacted[52]. Another benefit is that these costs do not diverse depending on the geographical position of the parts. These lower numbers make micropayments viable, a not very-well explored financial land. However, when third parties are involved (like trading platform, payment service providers or even e-wallets) they can claim fees for themselves. With the possibility of these parties being regulated, compliance costs will arise, making it also possible the raise of the VC overall transaction cost.

There is also the question of the miners demanding higher fees so that the mining process keeps profitable. EBA explores the possibility stating "*it is therefore reasonable to assume that transaction fees will increase in the future*"[53]. Although it is a possibility, it

[52] The fees go to the miners as an incentive. The rules of when or how much the fees cost are built into the network protocol and are related with the size of the transaction in bytes and the age of the coin spend. For more technical information go to: http://bitcoinfees.com/

[53] European Banking Authority, *EBA Opinion on* … cit. page 17

can be trickier than EBA makes it seem, because a change to miners fees needs to be made into the VC protocol itself (it would not occur naturally) and the threshold where the current fees stop being profitable for miners can take more than a decade to reach, and if the transaction grows fast enough, that threshold will probably never be reached[54].

Transaction processing time refers to the fact that, no matter where the parts are located and at what time the transaction is made, it take somewhere from ten to over two hours, but on average it will take about an hour[55], meaning it takes that time for a new block to be added into the blockchain. The network works 24/7, since the servers are around the world are constantly processing new transactions.

Certainty of payments received points to the fact that transactions of decentralized VC are irrevocable. This can be seen as beneficial for merchants who can then avoid charge backs and credit card fraud schemes. On the other hand, consumers may be overexposed to error or frauds of merchants. As Brito and Castillo point out "*those who want the protection and perks of using a credit card can continue to do so, even if they pay a little more. Those who are more price – or privacy – conscious can use bitcoins instead*."[56]

Contributing to economic growth relates to stimulation for financial innovation, and growth of business like the trading and exchange platform, but also in the hardware sector that specializes in mining. In this economic growth we should also include the potential within the blockchain. This technology is already being studied for others application than just a ledger[57].

Financial inclusion outside the EU, or as Brito and Castilho call it "potential to combat poverty and oppression", refers to the positive impact that VC can have in the parts of the globe where people do not have access to basic financial services.

Under the "individual benefits" EBA includes security of personal data and limited interference by public authorities.

[54] Wagner, A. (2014), *Don't Raise Bitcoin Transaction Fees*, BitcoinMagazine, July, 16.
[55] Bonneau, Joseph. "How long does it take for a Bitcoin transaction to be confirmed?" Coin Center 2015.
[56] Brito, Jerry e Andrea Castillo. *Bitcoim, A Prime for Policymakers*. Mercatus Center, George Mason University, 2013, page 13.
[57] This includes smart contracts, where the conditions and outcomes are encoded in the contract; smart property, a way to replace the public record of home ownership, for a record based on blockchain technology. Too see more on this subject: http://www.wired.com/2015/01/block-chain-2-0/

The increased security of personal data is a consequence of the anonymity factor already analyzed in the last chapter[58].

The Limited interference by public authorities is especially relevant for people who believe that governments and central banks are unworthy of the power over currency. One may argue, as a consequence, that a currency which is independent of any state power, and is attached only to market force is a stronger currency.

Risks

EBA also listed the potential risks of virtual currencies, which are summarised in table one.

With this EBA list of risks, we close the chapter on benefits and move on to a thorough risk analyze of VC under the name "Risks, and their casual drivers". In the present work, there is not enough room to go over all the seventy risks identified, so we going to focus more on the risks drives. The following table[59] is presented by EBA to summarize the subject:

#	Driver of risks
a	**VC schemes can be created (and their functioning subsequently changed) by anyone, anonymously:** Anyone can anonymously create a VC and can subsequently make changes to the VC protocol or other core components if the required majority of (anonymous) miners agree.
b	**Payer and payee are anonymous:** Transmitters and recipients of VCs interact on a person-to-person basis but remain anonymous.
c	**Global reach:** the internet-based nature of VC schemes does not respect national and, therefore, jurisdictional boundaries
d	**Lack of probity:** exchange is neither audited nor subject to governance and probity standards, and is subject to misappropriation, fraud and seizure
e	**Not a legal person:** market participants are not incorporated as entities that could be subjected to standards
f	**Opaque price formation:** price formation on exchanges is not transparent and is not subject to reliable standards, and exchange rates differ significantly between exchanges, which facilitates manipulation of exchanges
g	**No refunds or payment guarantee:** VC transactions are not reversible, so no refunds are issued for erroneous transactions

[58] Chapter 2 c. Bitcoin

[59] One of the columns was omitted because it refers to letters and numbers for each risk, and so have no relevancy for us. To check the full table see page 38 *EBA Opinion on virtual currencies.*

h	**Unclear regulation:** the regulatory treatment is unclear and creates uncertainty for market participants
I	**Lack of definitions and standards**: the features of a product can be misrepresented because of a lack of definitions and standards
j	**Inadequate IT safety:** the IT systems, infrastructure, transaction ledger, VC protocol and encryption are either insecure, subject to fraud and manipulation, and, in the case of the protocol, can be changed through a majority of minders
k	**Information is neither objective nor equally distributed:** limited availability of comprehensible, independent and objective information on VC activities. As a result, some market participants benefit from information inequality, e.g. on events that influence price formation
l	**Insufficient funds or VC units:** market participants have insufficient funds to meet financial obligations or to compensate creditors in the case of bankruptcy
m	**No separation of accounts**: VC units temporarily held at an exchange are often not segregated from the exchange, i.e. held in client accounts
n	**No complaint process**: no effective channel for users to complain
o	**Lack of access to redress**: no access to redress, compensation or protection schemes
p	**Lack of corporate capacity and governance**: lack of skills, expertise, systems , controls, organizational structure and governance exercised by market participants
q	**No reporting:** lack of reporting requirements to any authority, e.g. of suspicious transactions
r	**Interconnectedness to FC:** VC units and FC funds can be exchanged easily, therefore creating spill-over effects or risks from VC to FC systems
s	**Not legal tender**: merchants are not legally required to accept a particular (or any) VC and can switch between different VC schemes
t	**No stabilizing authority**: no authority that could provide exchange rate stability and/or act as the redeemer of last resort

A few notes on some of these drivers of risk. Any regulatory attempt of VCs need to address these issues, so any regulator needs to understand this table in order to be successful.

Understanding the risks of VCs is essential to create adequate and effective regulation. Due to time and space constraints, this thesis cannot analyse all the above mentioned risks in detail but we will focus on some of the drivers of risk as a basis to ascertain some essential elements of the regulation of VCs.

Driver (a) is especially relevant for centralizing VC, where the creator or the entity that oversees the currency (if different) will have the power to change the protocol. With

decentralized VC it's harder to change the protocol because even if the updates are made by the same individual or group of individuals, as the Coin Center explains, "*this network, composed as it will be of independent, technologically-sophisticated users, will audit the new code and likely reject any code that attempts to inject risk or fraud into the system*."[60] Since the protocol of decentralized VC is open source, everyone can "audit" any changes. The network of users acts, once again, as the guardian of the integrity of the VC.

Regarding driver (b), we have already analysed the anonymous feature. We have discussed that it is not an absolute anonymity but rather a pseudo-anonymity[61]. Users need to take additional measures if they want to stay anonymous.

VC is a new transnational/cross border concept that imposes challenges for national jurisdictions. This is showed on driver (c) due to the fact that VCs work exclusively on the Internet, independently of the geographic location of the users. The global reach demands cooperation and coordination from different States so that regulatory goals can be achieved effectively. This has already been pointed out by the US Government Accountability Office that stated that that "law enforcement may have to rely on cooperation from international partners to conduct investigations, make arrests, and seize criminal assets."[62]

Drivers (d), (e), (f) and (l) all mention the lack of standards, especially the lack of oversight of business that gravitate around VC, like exchange or trading platforms, which can have a negative impact on the market and consumers.

We have already discussed driver (g) when we analysed the "certainty of payment", concluding that there are benefits and risks associated to the irreversibility of transactions.

It is evident that Driver (j) is of the utmost importance for the confidence of users in VCs although, we believe that it is so for different reasons than the ones present by EBA. There is no report of any of the major VC protocols to have been compromised to this date. However, there is a big number of VCs getting stolen from users' accounts. The most notable example was Mt. Gox. This company was the biggest bitcoin exchange platform in 2013, handling 70% of all transaction of bitcoins. In April 2014 it filled bankruptcy protection after announcing that 850 000 bitcoins, evaluated around 450 million dollars,

[60] Vankenburgh, Peter and Jerry Brito. *State Digital Currency …* cit. page 9.
[61] In chapter 2. c: *Anonymity of the participants vs Publicity of transaction in the "block chain"*.
[62] New York State Department of Financial Services, Title 23 Chapter I, Regulations of the Superintendent of Financial Services, Part 200 Virtual Currencies, cit. page 22.

were stolen by hackers (even though it was never clear if all the amount was really stolen or if the users were subjected to fraud)[63]. This shows the negative impact that the lack of a strong IT safety has on the network.

Driver (k) refers to information problems on VC markets, partially due to the technical complexity of this technology. This can act as deterrence for people to trust VCs.

Since there is no regulation, companies that operate with VC do not have capital requirements. This means they are unprepared to deal with users' compensation and other creditors in case of bankruptcy. This is linked to drivers (l) and (o). Once again, Mt Gox can be used as an example since, after filing for bankruptcy, the users of this exchanger were left without any compensation. They only had access to the accounts to check their balance[64].

The lack of separation between accounts, driver (m), can be problematic in case of bankruptcy.

Driver (n) is also a direct result of the lack regulation in the sector. Consumers do not have an accessible and effective way to complain if they feel their rights were violated.

Companies working with VC are not obliged to adopt any governance mechanism or accountability schemes. Driver (p) is special relevant if we take into account that most companies using VCs are actually start-ups, with little experience hence this industry is so recent.

Driver (q) and driver (t) are linked as they both refer to the lack of an authority with powers to act upon suspicious transactions.

Driver (r) refers to the impact that VC, being a bidirectional flow scheme, can have on FC schemes and on the traditional economy. Nowadays, this problem may have little since the total capital market of bitcoin $ 5,671,050,562[65], which may seem small knowing that this is a worldwide phenomenon. However, this problem can become real in a couple of years if VC continues to grow.

[63]Vigna, P. (2014), 5 things about Mt. Gox's crisis, The Wall Street Journal, 25 February: and The Troubling Holes in MtGox's Account of How It Lost $600 Million in Bitcoins, MIT Technology Review, 4 April 2014.

[64] Williams, R. (2014), *MtGox returns to allow users to check Bitcoin balance*, *The Telegraph*, 18 March.
[65] Last seen on November 8, 2015: http://coinmarketcap.com/

Finally, we have already debated driver (s) when we debated VC definition[66].

Regulatory approach

After analyzing the risks and benefits of VCs, the EBA report concludes with the potential long and short term regulatory approach.

For the long term EBA suggests:

- Scheme governance authority
- Customer due diligence (CDD) requirements
- Fitness and probity standards
- Mandatory incorporation
- Transparent price formation and requirements against market abuse
- Authorization and corporate governance
- Capital requirements
- Separation of client accounts
- Evidence of secure IT systems
- Payment guarantee and refunds
- Separation of VC scheme from conventional payment systems
- Miscellaneous requirements
- Clear and transparent regulation
- A global regulatory approach
- Risks drivers that remain deliberately unaddressed

A few notes on the most relevant of these suggestions.

EBA starts by suggesting the creation of a "scheme governance authority" which would be responsible for the scheme's integrity and act as the supervisor of the network. This would be a direct contradiction to the spirit of decentralized VCs. EBA justifies its position by claiming that this central entity will not jeopardize the decentralized feature since this entity would not be responsible for issuing the currency, but only act as the financial clearing house. However, we argue that EBA belittles the negative effect that would have on the users, since it would destroy one of the benefits of VCs: the limited interference by the public authorities. After browsing for hours through endless online

[66] In chapter 2. c: *It does not have the status of legal tender*

forums and threads, one cannot avoid to conclude that the users feel somehow empowered and responsible for the destiny of the different VCs schemes. A measure like this would have a negative impact on that feeling, decreasing it. It is important to bear this in mind when drafting regulation form VCs as their strength is deeply connected with the trust their supporters have on them.

Secondly, EBA suggests "costumer due diligence" requirements on exchange and VC business. This measure would also collide with the anonymity feature, since the user of those market participants would be obliged to share personal information. However, we believe that this measure would not affect so negatively the network since users that would still want to preserve their anonymity could avoid those third parties and still be part of the network. This would be an active measure to fight money laundry since the users interested in exchanging VC for FC will always need to resort to the services of an exchanger.

Next suggestion is the establishment of fitness and probity standards on individuals and market participants relevant to the scheme. This test of suitability would be important to avoid cases like the Mt. Gox, where the largest exchanger in the world went bankrupt, which reveals a lack of quality governance. In the same way, "authorization and corporate governance" would help strengthen and stabilize companies that provide VC services.

Furthermore, EBA suggests "mandatory incorporation in an EU member state" as a legal person for market participants (*e.g.* exchangers) so that they can be accountable for their actions. This is an important step for consumer protection and overall market stability, although we believe we should not limit business to be incorporated only on EU member states. We believe that EBA should broaden the list to include other States that offer guaranties of persecution in case of crimes or other unlawful conduct from the VC business (such as the United States, for example). The goal is to oblige VC businesses to be incorporated and operate in jurisdiction that can make them accountable for their actions.

EBA clarifies that "transparent price formation and requirements" would fight obscure price formation, focusing on enforcing exchanges requirements to prevent insider dealing and market manipulation. However, we cannot perceive how this would operate in practice. One may argue that the price formation is already a clear process, since it is

mainly based on demand and supply and that any type of regulation on this matter would actually only have a negative impact on the price formation.

The establishment of "Capital requirements" is also an EBA suggestion and considering the history of bankruptcy in VC, it would strengthen companies that hold VC for their users. The capital should be held in FC so that it is not susceptible to VCs volatility.

Additional, EBA suggest the establishment "Evidence of secure IT" is extremely important in an industry that works exclusively on the Internet. This is important for every market participant, but mostly for companies that hold their users' VC, and so, are in a position of trust.

The "payment guarantee and refunds" will contradict one of the characteristics of most VCs nowadays, irreversibility of payments. To overcome this barrier that is inherent to most VC protocols, EBA suggests three alternative proxies: one that would make the merchant have a deposit amount with that proxy that would be used to reverse transactions, if needed; another, where the proxy would send an "unbaked IOU document"[67], but that would only go through the payment after it had been cleared; lastly, the proxy would receive the payment and only forward it to the merchant after the customers had received their part of the transaction. This measure would only be applied to transactions with merchants, and as EBA states "effectiveness of each approach would require further assessment".

"Separation of VC schemes from conventional payment systems" aims at minimizing the impact of VC on the traditional financial system. Therefore, it would require existing regulated financial institutions to create different entities to provide VC services.

Further adding to list, EBA has "miscellaneous requirements" where it includes all the standards that would be demanded from market participators in terms of governance, complain mechanism, reports to a superintendent and disclosure.

EBA acknowledges that the global nature of VC demands a global action: international coordination is necessary to achieve a "successful regulatory regime".

For the short term, EBA's suggestion differs from the long term one. It is not a list of suggestions that addresses the risk drives. Instead, it makes only two suggestions to

[67]A document that would acknowledge the debt to the merchant (IOU = I owe you).

address the drives arising from the interaction between VC and the traditional financial system.

Firstly, it recommends national supervisors to discourage current and regulated financial institutions to interact with VC (buying, holding or selling VC).

Secondly, it recommends that EU legislators apply the anti-money laundering and counter terrorist financing requirements from the EU Anti Money Laundering Directive to VC exchanges.

They further add that extend current financial regulation to VC business would lend them credibility that they do not deserve, since they cannot be quite compared to traditional payment services or other financial institutions.

For the above, it is clear that, for the short-term, EBA advocates for a "wait and see" stand. It is the realization that a hasty regulation can be more negative than positive. In its own words: "this immediate response will allow VC schemes to innovate and develop outside of the financial services sector". VCs still have a small impact on world economy, first of all because they are not very well-known by the general public yet, as consequence, and in this development stage, heavy regulation can asphyxiate it. We also highlight the fact that EBA leaves prohibition out of its regulatory approach.

b. United Kingdom

Her Majesty Treasury made a report, "Digital currencies: response to the call for information", aiming at "*looking into the benefits and risks associated with digital currencies and underlying technology, with a particular focus on the question of regulation*"[68]. Therefore this report is of most importance for anyone studying VC from a regulatory point of view. Any sharp reader has already realized that the UK has decided to use the "Digital" denomination over "Virtual"; however, this must not be of any confusion after reading the second chapter, since we know that we are still talking about the same digital representation of value.

Early in the introduction, the report states that "*the government wishes to foster a supportive environment for the development of legitimate businesses in the digital*

[68] HM Treasury, *Digital currencies: response to the call for information,* March 2015.

currency sector so that UK can see some of the benefits of digital currencies, while also creating a hostile environment for illegal activity."[69] So, the UK government shows a positive attitude towards VC, realizing that even if VC can be used, as they also are, for illegal activities, there are benefits worth exploring. The reports reveal not an intention to ban VC, but rather develop their legitimate business.

It also does a Benefits/Risk analysis to understand where the potential of this technology lies, and where regulation should act to avoid the dangers. That analysis is quite similar to the one done by EBA: low transaction fees, allowing micropayments; no need to exchange personal information; transparency of the blockchain; financial inclusion (mostly for countries lacking banking structures). They also dedicate a specific chapter just to analyze the potential of the blockchain technology that can be applied to any case where keeping a record is needed.

Then the report lists the "barriers to digital currency firms". Those being "*the lack of a regulatory framework for digital currencies", "uncertainty negatively impacts business*"; and "difficulties in opening bank accounts in the UK", which can be linked to the first (banks do not want to work with VC companies because they are not reliable) or banks see in VC companies a competitive threat.

On the side of risks, the report starts with the crime risk. As we said before, the anonymity factor and the fact VCs operates outside the government scope potentiates criminal activities. The following is the risk to users, mainly the risk of being hacked and being deprived of their VCs or losing them on a bankruptcy case like the one of Mt. Gox. Finally, the last risk identified is the monetary and financial stability. It considers it a low level risk because of the current small volume of transactions around the world.

After the benefits/risk analysis, the report finishes with the "Conclusion and next steps". In this chapter, the report explores the measures that the government is going to implement to deal with the risks of VCs. Firstly, to address the criminal use, "*the government intends to apply anti-money regulation to digital currency exchange*"[70]. It also intends to empower law enforcement bodies to able them to identify and persecute criminal activity, "*including the ability to seize and confiscate digital currency funds*

[69] *Idem*., cit. page 3.
[70] *Idem.,* page 19.

where transactions are for criminal purposes."[71] Secondly, to address the consumer protection issues, UK wants to create a "*framework for best practice standards*". This light way approach aims at raising consumer protection without creating too many costs of compliance which can suffocate young start-ups that populate the VC industry. Lastly, the report announces a government research initiative of £10 million in this area in addition to the research set by the Bank of England that is already in place, seeking the possibility of creating a "*central bank-run system*".

We can conclude that the UK is really committed to developing a safe environment for VC to develop and to collect its benefits. It is the first European country taking a major position in favour of developing VC. However, outside Europe there is a country that went even further: the United States of America.

c. New York's Bitlicense

The United States has been leading VCs regulation. On June 3, 2015, the New York Department of Financial Services (NYDFS) issued "BitLicense", the first piece of financial regulation on VCs.

It is divided into the following sections: introduction; definitions; license; application; application fees; action by superintendent; compliance; capital requirements; custody and protection of customer assets; material changes to business; change of control; merger and acquisitions; book and records; examinations; reports and financial disclosures; anti-money laundering program; cyber security program; business continuity and disaster recovery; advertising and marketing; consumer protection; complaints; transitional period and severability

This piece of legislation "*contains regulations relating to the conduct of business involving Virtual Currency*"[72]. Therefore, the first conclusion one can take is that NY State did not aim at regulating everything related with VCs, but just VCs' business. We shall understand exactly what that means and the problems related with that description.

This regulation defines VCs business activities as a group of activities such as:

[71] *Idem.*, page 19.
[72] New York State Department of Financial Services, Title 23 Chapter I, Regulations of the Superintendent of Financial Services, Part 200 Virtual Currencies, Section 200.1 Introduction.

- "*receiving Virtual Currency for Transmission or Transmitting Virtual Currency, except where the transaction is undertaken for non-financial purposes and does not involve the transfer of more than a nominal amount of Virtual Currency;*
- *storing, holding, or maintaining custody or control of Virtual Currency on behalf of others;*
- *buying and selling Virtual Currency as a customer business;*
- *performing Exchange Services as a customer business; or*
- *controlling, administering, or issuing a Virtual Currency*."

We can see that miners are left out of this regulation. Businesses that act as trusty intermediaries are the ones covered by Bitlicense. The ones who "*walk and quack like a money transmitting duck*"[73].

Coin Center criticizes this choice of wording since it is believed to be misleading. Firstly, they are strong supporters of the term "Digital" over "Virtual" as we have already pointed out. Secondly, they argue that "business activities" suggest that all businesses surrounding VCs are covered by this regulation when, in fact, it is only the ones related with "transmitting money". So, they conclude that "digital currency transmission" would be a more appropriated wording to describe those covered by this regulation.

They further criticize the NY department choice of determining who shall apply to the license by saying that "*the determination of which business warrant regulation and which do not should be made by reference to what harm the business is capable and incapable of doing, rather than whether they "hold" or "store" units of digital currency*"[74]. This means that the businesses that have access to their costumers' VCs, and therefore are in special trust position, are the ones that need regulation.

Although we agree that "*virtual currency business activities"* is not the best expression to determine which businesses needs to apply for this license, the enumeration quoted above clarifies that it is the businesses in position of trust in their relation with the customers that need to apply.

[73]Vankenburgh, Peter and Jerry Brito. *State Digital* … cit. page 3.
[74]New York State Department of Financial Services, Title 23 Chapter I, Regulations of the Superintendent of Financial Services, Part 200 Virtual Currencies, Section 200.2 Definitions.

There is a second tier to determine who is covered by this regulation, which is the relation with the State of New York. Nevertheless, we are not going to analyze the problem relating to this requirement, since we feel it is not relevant for our work.

In an overview of the Bitlicense[75] we outline three main areas of this regulation, namely Consumer Protection; Anti-Money Laundering (AML); Cyber Security. One may argue that those are the reasons why the regulation was created in first place[76]. Parallel to these areas, we also take a look at other important aspects of this regulation.

Starting with Consumer Protection, section 200.19 is entirely dedicated to it. Additionally, other rules throughout the diploma can be labelled as consumer protection rules.

The first aspect to point out is the relevance given to disclosure. VCs business under Bitlicense have high standards for disclosure that go from the terms and conditions of the products and services offered, to the risks associated with use of VCs (not having legal status, irreversibility of transaction, volatility, so on and so forth).

Secondly, businesses need to establish an efficient complaint mechanism that allows consumers to be heard and have their problems addressed in a timely manner. Also, it is required that the licensee has a written anti-fraud policy, although it is not crystal clear – and it should–, it is stated that "*each licensee shall take reasonable steps to detect and prevent fraud*".

Outside the section 200.19, but still in the area of consumer protection, this regulation also demands from the licensees a written policy on how to deal with complains.

Advertisement and marketing are also restricted to protect costumers. Each licensee needs to keep their ads for at least seven years for examination by the superintendent seeking for false or misleading advertising.

Anti-Money Laundry measures are the following main group of requirements we will overview. Bitlicense requires a comprehensive AML program[77]:

[75] Because we do not have enough space to thoroughly go through every section.
[76] *New York's BitLicense: Discussion with Davis Polk*, Hosted by Digital Currency Group, cit. page 4.
[77] POLK *Kew York's Final "BitLicense" Rule: Overview and changes from July 2014 Proposal,* cit. pages 41 and 42.

- Risk Assessment (one initial assessment and, at least, additional annual risk assessments);
- Compliance Function (need for intern controls, designated AML compliance officer, for example);
- Audit Function (internal and external audition that must be submitted to NYDFS);
- Prohibitions (of relation with shell companies that have no country, of purposely conceal the identity of costumers or evading report duties);
- Records (licensee need to keep records for at least 7 years, details of what this records should include are also specified);
- Reports (of suspicious transactions and all the transactions of the equivalent to over $10,000);
- Office of Foreign Assets Control Compliance (costumers need to be checked against the *special designated nationals list* of this office);
- Customer Identification Program (effective *Know Your Costumer* polices need to be in place).

Next, Cybersecurity is truly relevant with VCs, more than other banking or payment services that use online products, since they are a digital representation of value (just ones and zeros on a computer) they are more susceptible to hackers' attacks. Recent history, namely Mt Gox case, shows that cyber security is central for a VC businesses sustainability.

Therefore, Bitlicense got a whole section on cybersecurity, section 200.16. Here, we do not find technical requirements that the licensees need to respect. Instead, it refers to the core functions and areas that the cybersecurity system needs to act upon. They need to have security programmes that effectively identify and react to risk, to respond and recover form security events; they also need to implement a written policy about procedures to protection of its electronic systems, detailing for example customer data privacy, business continuity and disaster recovery planning and resources or access controls. Also, the same as in AML programme, a Chief Information Security Officer has to be appointed in order to implement and respond for the security of the business. There is also a number of functions that are needed to be included in audit, and requirements to the employees' qualification on this matter.

Outside this main area there are other requirements typical from a financial business. Reports and financial disclosures, for example, despite being part of the AML program as regards the reports of suspicious transaction, are boarder and demanding. VC businesses have the obligation of keeping the superintendent updated of their financial wealth. Section 200.14 imposes quarterly and annually financial statements to be submitted by the licensee; an assessment of compliance with laws and regulations; the need for notification to the superintendent of criminal action or insolvency proceeding against the licensee.

Capital requirements are also part of this regulation and can be seen both as consumer and creditor protection. There is no established capital requirement. Instead, it must be determined by the superintendent based on the licensee risk profile. This regulation lists some of the factors that superintendents must take into account when determining it, like compositions of assets and liabilities, volume of activities, amount of leverage, among others. It also determines that this capital requirement must be hold in the form of cash, VC or high-quality and high-liquid investment-grade assets.

A final aspect deserving analysis is the application process. Any applicant must pay a non-refundable fee of 5 000 $ (five hundred dollars) (this is owed whether or not the applicant receives the license). Yet NYDFS can grant a conditional license to applicants that do not meet all the necessary requirements for 2 years (although it can be renewed). Its main aim is to allow start-ups and small businesses to adapt to the new regulation without overwhelming them with compliant costs[78], offering a flexible environment to these companies.

It is easy to draw comparison with this piece of regulation and other ones applicable to financial institutions like payment services. Even if you look in Europe, you can find the directive 2007/64/ec of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market with similar capital requirements, book record requirement or even authorization process. However, VCs particularities do not let them fall easily into the scope of such regulation. This is argue by New York Superintendent of Financial Services, Benjamin Lawskys who states, regarding Bitlicense: "*The rules also generally mirror the types of requirements that banks; financial institutions, and*

[78] Superintendent Lawsky's Remarks at the Bipartisan Policy Center on Regulating Virtual Currencies and Payments Technology, 2014: http://www.dfs.ny.gov/about/speeches/sp1412181.htm

money transmitters have to live by – with some alterations owing to the unique nature of virtual currencies."[79]

The economic impact of this license is only now beginning to be measured. Regulation brings compliance costs, and these are reportedly too heavy in the case of Bitlicense[80]. This may led to an "exodus" of start-ups out of NY. Only the time will dictates the success and failure of this new regulation, although it already set a premise to other regulators. Although this type of impact will take time to reveal, this should not impend our conclusion that Bitlicense is a step on the right direction.

d. Towards Regulation

Firstly, let us start by stating that regulation of VCs is inevitable. The only hypothetical scenario that we conceive where regulation do not occur is one where this technology stop to grow and eventual disappears completely. However we argue that this hypothetical scenario is extremely unlikely to occur taking in consideration the course of our tech-savvy society. Even if Bitcoin is dead tomorrow, VCs are here to stay.

Secondly, allows us to take prohibition out of the way. Regulation should not have the role of stop the winds of change. A top-down approach to prohibit this technology all together would surely fail. The decentralized nature of VCs makes it really difficult to shut it down, since there is no specific entity that you can target. To prohibit a decentralized VC with the size of Bitcoin might as well shut down the Internet. Besides, probation will only renegade VC to dark side of the web, turning it into an instrument for illegal activity and destroying the potential benefits it may offer. Relating to the three pieces of work we analysed, not even EBA, which one may argue have a more conservative approach, defends prohibition.

Thirdly, both EBA and the UK government recognize benefits inherent to VCs which can be enhance with the right regulatory approach. However, they also understand the risks that of this technology which need to be minimized by regulation. Nevertheless, both of them are quite conservative on short term measure. EBA prefers a "wait and see" position just recommending national supervisors to discourage current and regulated financial

[79] *Idem.*
[80]Roberts, Daniel (2015), Behind the "exodus" of bitcoin startups from New York, Fortune, August 14: http://fortune.com/2015/08/14/bitcoin-startups-leave-new-york-bitlicense/

institutions to interact with VCs and the application of anti-money laundering and counter terrorist financing requirements to VC exchanges. The UK government prefers a light approach by suggesting the creation of a *framework for best practice standards*. We argue that a different regulatory approach is needed right now so that we can truly benefit from VCs and that we can steer its growth away from the risks and away from its illegal usages.

Finally, we argue that NY's Bitlicense is a step in the right direction. Because VCs do not fit in our traditional legal concept and have technological particularity which make them truly unique compared to any other payment method, we argue that is necessary to create specific regulation, as NY did, and not just try to apply existing financial regulation. We further state that Central Banks are the financial organization that should step ahead and create this type of regulation on their jurisdiction. VCs business are mirror of financial institutions that already fall in the scope of Central Banks, so it makes sense them being the authorities to set VC regulation. If we take a look into Europe, we know that this is not the position of ECB, since it already stated that "*the ECB does not see the need to amend or expand the current EU legal framework*"[81]. Nevertheless, we stay by our statement also because, in the likely case of continued growth of VCs, will force traditional financial institutions, like banks and other payment services, to adjust to this new reality. Therefore it only makes sense that Central Banks begin to follow this process from the start. As Benjamin Lawskys put it, "*My guess is that banks will eventually adjust. (…)And they will probably co-opt or acquire some of the most promising technology after a period of trial and error. Regulators, for their part, will have to keep up and find ways to permit innovation and improvements* (…)"[82].

[81] European Central Bank, *Virtual currency schemes – a further analysis*, February 2015, cit. page 33.
[82] Superintendent Lawsky's Remarks at the Bipartisan Policy Center on Regulating Virtual Currencies and Payments Technology, December 18, 2014

4. Conclusion

Throughout this thesis, we review the current framework VC from a regulatory standpoint. But where we stay regarding our research question: Where should regulation start in order to create a healthy environment for innovation, while protecting the traditional financial system and fight illegal activities?

So, as we mention above, prohibition is not an option, therefore we stand aside the UK government wishes of "foster a supportive environment for the development of legitimate businesses in the digital currency sector (…) while also creating a hostile environment for illegal activity."[83] Regulation, therefore, need to find a balance between being supportive of innovation and disproving of illegal activities. Institution must be conscious that regulation imposes costs on market participants, but also introduces confidence in the system and in the general public. In addition, a deep, board and heavy regulation, at this point of early development, could likely destroy this technology.

So which market participants should regulation target?

Finished the overview of EBA's Opinion on VCs, UK call for evidence and NY's Bitlicense we can conclude that some market participants are constantly left outside the regulatory impetus. They are the users, the merchants and the miners. These are all participants that should not be regulated since they are intrinsic to the system. Without them there is no VC. We need users to hold and spend them, we need miners to validate the transactions and create more coins and we need merchants willing to accept them as mean of payment so that they can have value, otherwise they worthless. Being core to the system, any regulation will deeply disrupt the essence of VCs. This kind of impact is definitely not welcome since will change the DNA of the technology.

Therefore we need to look to the extrinsic market participants. Most of the risks identified by EBA materialize on VCs businesses that make the contact point between the virtual world and the traditional financial world. In alignment with this, the majority of its regulatory approach are aiming for this type of businesses. They are the businesses that put themselves in a position of trust regarding their customers, holding and storing VCs in their name and facilitating its transmission. This is also the aim of NY's Bitlicense, and we argue that it must be the first step of a successful regulation. Businesses like

[83] HR treasury, call for evidence, page 3

exchangers or wallet providers (and others with similar characteristics) should be the first subjects of regulation.

We argue that regulation should focus on three main areas: (i) Anti-money laundry requirements; (ii) consumer protection, and (iii) Technological requirements or Cybersecurity. Once again, in line with Bitlicense.

AML requirements are of the most important aspect since money laundry is one of the main threats for VCs credibility, and its main illegal use.

Costumer protection should also be central at any regulation at this point so that cases like Mt Gox are not repeated. If businesses like exchanges platform are in a position of trust relative to their customers, they should implement mechanisms to protect that trust.

Finally, cybersecurity is fundamental for any Internet base technology. Hackers that access and steal VCs are one of the worst enemies to the progress of this technology.

In conclusion, it is too early to put VCs into a box. What VCs are today, are not necessarily what it will be tomorrow: "If we conceive of bitcoins simply as tokens, then other applications become apparent. For example, we could agree that a particular bitcoin (or, indeed, an infinitesimally small fraction of a bitcoin so as to allow for many tokens) represents a house, a car, a share of stock, a futures contract, or an ounce of gold"[84]. Therefore excessive regulation can limited what this technology can become. We should, in alignment with UK government convictions, have a regulatory approach that aims to create a fertile field so that they can grow. Like a wild animal on protected wild reserve, VC need to feel free enough to develop their full potential, since they are, by nature, anti-institutional and anti-supervision but regulation should act on the border between this wild reserve and the real world to minimize negative impacts.

[84] Brito, Jerry, speech on Meeting of the CFTC's Global Markets Advisory Committee, October 9, 2014: http://www.cftc.gov/idc/groups/public/@aboutcftc/documents/file/gmac_100914_brito.pdf

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