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BITCOINS, A NEW FRONTIER OF MONEY?

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Innovations bring forth potential revolutions in a variety of fields, including the legal one. The advent of the Internet posed a threat to the traditional legal framework, challenging the sustainability of the established legal institutes and regulations worldwide. Nonetheless, after an initial phase of 'legal inertia', legal systems resorted to regulate the innovations of the digital era through the existing legal instruments.

Over the past years, the virtual world has given rise to a new conceptualization of money and currency exchanges, fostered by the ongoing progress in the field of Information Communication and Technology (ICT). Cash payments seem to be obsolete, supplanted by mobile payment systems, electronic money and the flourishing category of virtual currencies and cryptocurrencies, whose most debated example is represented by Bitcoin.

Presently, another regulatory challenge lies ahead: identifying the proper legal framework – if any - applicable to cryptocurrencies.

So, the essay aims at analyzing the main features characterizing these innovative 'currencies', the risks inherent in their architecture as well as the benefits they offer, with a specific focus on the case of Bitcoins.

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1. Introduction

Right now a various forms of virtual currencies are being exchanged all over the world; the European Banking Authority in 2014 estimated that more than 200 virtual currencies schemes were in circulation and that it was reasonable to expect that many more would be developed¹.

To properly regulate this phenomenon it is necessary to thoroughly understand it. This essay aims to provide a possible starting point.

Notwithstanding all the buzz surrounding Bitcoins, it cannot be overlooked that they only account for a tiny minority of transactions taking place every day which may help to explain why so far so little attention has been paid to them by the institutional operators².

The following analysis seeks, therefore, to shed some light on how the germ of the new means of payment may be incorporated into the current legal systems by investigating the latest developments in the domain of digital payment systems, addressing specifically Bitcoins, their architecture as well as the potential advantages and disadvantages. The analysis pauses then on the challenges currently faced by the legal domain in dealing with such innovations, taking into account the contingent developments³.

2. E-Money And virtual currencies

In economic literature, scholars traditionally attributed three characteristics to money: they hold it is a store of value, a unit of account

¹The peculiarity of these new forms of virtual currencies is that unlike their predecessors they can be exchanged for traditional currencies which the previous ones could not. See, for instance, World of Warcraft Gold, frequent flyer miles, Facebook Credits or Linden Dollars, E-gold or Liberty Reserve). «Originally, the desire for these currencies arose because members of a virtual community, such as a video game, were looking for a convenient way to reward the users, as well as to enable other financial transactions with the users». See EBA/Op/2014/08 4 July 2014 EBA Opinion on ‘virtual currencies’ available at <https://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf>, 8

² This is due also to the «uncertain reliability of the data sources. However, even if interpreted very generously, the number of Bitcoin transactions, which accounts for the vast majority of VC transactions, has never exceeded 100 000 per day across the globe, compared to approximately 295 million conventional payment and terminal transactions (i.e. credit transfers, direct debits, e-money transfers, cheques, etc.) per day in Europe alone». Id.

³ PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*, 14 *Chi. J. Int'l L.*, 2013, 377.

and a medium of exchange; and, apparently, at first glance, cryptocurrencies seem to meet such criteria though, as we will see here in after, this is not necessarily true⁴.

And the legal analysis of the concept of money does not offer much help because, nowadays, the notion of money is much more linked to economy, and in particular, to the monetary policies adopted by governments, rather than to the law, which consequently complicates the task of providing a clear-cut definition or outline of it⁵. It follows that even though money is something we are familiar with, its inner character remains almost unknown.

In light of these difficulties, currently economic and legal scholars focus mainly on the functions of money rather than on its inner character⁶.

Historically, before the introduction of credit money, it was held that monetary units were as material as their corresponding monetary pieces; this is still the case today⁷, though the advent of credit money has added a further

⁴ SWARTZ, *Bursting the Bitcoin Bubble: The Case To Regulate Digital Currency as a Security or Commodity*, 17 *TUL. J. TECH. & INTELL. PROP.*, 2014, 329-330. In particular, they can be considered a store of value, even a volatile one, they can be used a unit of account even though a not so intuitive one, and, finally, a medium of exchange but only in regard to those who accept them (they can be accurately divided digitally in any size and they avoid the fees charged by credit card companies). These kind of 'currencies' are characterized by having no legal tender status, they have decentralised scheme, convertible but non-redeemable.

⁵ The complexity of this concept is apparent also in the very definitions of 'money' provided for by encyclopedias, such as for instance, that of the *Encyclopaedia Britannica*, according to which money is «a commodity accepted by general consent as a medium of economic exchange. It is the medium in which prices and values are expressed; as currency, it circulates anonymously from person to person and country to country, thus facilitating trade, and it is the principal measure of wealth». Moreover, «[t]he basic function of money is to enable buying to be separated from selling, thus permitting trade to take place without the so-called double coincidence of barter. » This represents the «'medium of exchange' function of money». However, the «[s]eparation of the act of sale from the act of purchase requires the existence of something that will be generally accepted in payment. But there must also be something that can serve as a temporary store of purchasing power, in which the seller holds the proceeds in the interim between the sale and the subsequent purchase or from which the buyer can extract the general purchasing power with which to pay for what is bought. This is called the 'asset' function of money». Finally, it is noteworthy that «[a]nything can serve as money that habit or social convention and successful experience endow with the quality of general acceptability». The full definition and description of the entry is available at <http://www.britannica.com/EBchecked/topic/389170/money>.

⁶ BRECCIA, *Le Obbligazioni*, in IUDICA & P. ZATTI (EDS.), *Trattato di Diritto Privato*, Milan, 1991, 266.

⁷ Every methods of payment equivalent to cash (namely, dematerialized payments whereby no delivery of money actually occurs, e.g. bank transfers) must always be convertible into a tangible sum of money.

facet to the preceding conceptualization of money. Nowadays, in fact, the latter has a twofold nature: it is an abstract unit of measurement and, at the same time, a means of payment if redeemed in the corresponding amount of ‘monetary pieces’ (paper money or coins)⁸.

Due to the broad impact of these latest innovations on the traditional credit systems and the significant transformations stemming from their implementation in many Countries⁹, in 2009 the EU resorted to an *ad hoc* regulation of such subject matters. The E-Money Directive (2009/110/EC)¹⁰, «on the taking up, pursuit of and prudential supervision of the business of electronic money institutions», was adopted, in fact, «in response to the emergence of new pre-paid electronic payment products and was intended to create a clear legal framework designed to strengthen the internal market while ensuring an adequate level of prudential supervision»¹¹. Hence, the Directive aimed at «lay[ing] down the rules for the pursuit of the activity of issuing electronic money»¹², underlining in so doing the need for a distinct regulation of e-money transactions so that they would not pose a threat to traditional credit patterns.

However, the 2009 E-Money Directive was not the EU’s first attempt to bridle the phenomenon of electronic payment systems.

A first definition of ‘electronic money instrument’ was already included in the EU Commission Recommendation of 30 July 1997, defining it as any «reloadable payment instrument other than a remote access payment instrument, whether a stored-value card or a computer memory, on which

⁸ For an overview of Bitcoin and the regulatory issues stemming from it, see GRINBERG, *Bitcoin: An Innovative Alternative Digital Currency*, 4 *Hastings Sci. & Tech. L.J.*, 2012, 159.

⁹ A clear proof of the globalized character of Bitcoin is the fact that, curiously, this phenomenon is regulated by a legislation which is rarely in the limelight of international research. As a matter of fact, under Kenya’s E-money regulation, e-money is defined as «a monetary value as represented by a claim on its issuer, that is (a) Electronically, including magnetically stored; (b) Issued against receipt of currency of Kenya and; (c) Accepted as a means of payment by persons other than the issuer» (cf. E-money regulation clause 4, Kenya). According to this definition, under Kenyan law, bitcoins obtained by purchasing them via fiat currencies would fall under the definition of e-money. For a thorough analysis of the Kenyan legal framework that is applied to e-money, m-payment systems, like M-PESA, and might be also applied to Bitcoins, see SIRILA, *The Pleasures and Perils of New Money in Old Pockets: M-PESA and Bitcoin in Kenya*, Harvard Law School, April 2014.

¹⁰ The 2009 Directive amended Directives 2005/60/EC and 2006/48/EC and repealed Directive 2000/46/EC.

¹¹ E-Money Directive (2009/110/EC), available at <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0110> (Last visited 15 July, 2014).

¹² *Id.*

value units are stored electronically, enabling its holder to effect transactions of the kind specified in Article 1 (1)»¹³.

The 2009 Directive provides, however, a more thorough definition of e-money which reads:

*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 Directive 2007/64/EC, and which is accepted by a natural or legal person other than the electronic money issuer*¹⁴.

A few significant points emerge from the abovementioned definition.

In the first place, the individual receiving e-money holds a claim on the issuer and electronic money can be issued only upon receipt of the equal amount of funds. It follows that e-money is the outcome of a conversion process of other forms of money (e.g. fiat money, credit money), which is attained by storing the corresponding value on an electronic device.

Moreover, the Directive sets the e-money shall be accepted as method of payment by «natural or legal person[s] other than the electronic money issuer», drawing in so doing a distinction between debit cards and electronic money, for the former can be employed only to purchase items or supply services provided for by the issuer.

¹³ See 97/489/EC, Commission Recommendation of 30 July 1997 concerning transactions by electronic payment instruments and in particular the relationship between issuer and holder (Text with EEA relevance), available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31997H0489:EN:HTML>.

¹⁴ Cf. <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0110>. According to Perugini and Maioli, Bitcoins fall outside the purview of the Directive since they do not fit the definition of e-money provided for therein due to their decentralized nature, and, furthermore, they add that only in case of an expressly equation of Bitcoins with e-money, the former may be subjected to said regulation. Cf. PERUGINI & MAIOLI, *Bitcoin tra Moneta Virtuale e Commodity Finanziaria*, available at SSRN: <http://ssrn.com/abstract=2526207>. On the same vein, the EBA in its opinion after the definition of virtual currencies as «a digital representation of value that is neither issued by a central bank or public authority nor necessarily attached to a fiat currency, but is used by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically» maintains that « [A]lthough some of the features resemble activities or products that are already within the remit of the EU E-Money Directive, these products are not intended to be included here, as e-money is a digital representation of fiat currency, which virtual currencies are not». EBA opinion, 7.

It is evident, so, that e-money and credit money cannot be equated, for, above all, the latter requires the existence of a bank account through which money transfers can be accomplished, while e-money does not, provided that it arises from the immediate conversion of monetary funds.

Moreover, even if the employ of e-money is contractually bound to be connected with an account, it is different from any other traditional instruments of payments, such as bank transfers or credit cards, for these rely on the direct intervention and support of credit institutions¹⁵.

In case of payments with electronic money the transfer of funds is not accomplished through the mediation of a bank, which, on the contrary, merely guarantees, initially, that funds are convertible, and, subsequently, that e-money can be reimbursed.

So, once e-money is issued, it could autonomously circulate, without requiring any intermediary, among an indefinite number of users and, above all, in an anonymous manner; hence, electronic money, rather than being likened to credit money, can be better compared to paper money, or, at least, be considered its electronic counterpart¹⁶.

Issues arising from the general notion of e-money are pushed even further in case of one of the latest innovation of said domain, *i.e.* Bitcoin¹⁷.

¹⁵ In particular, under Italian law, mediation in case of payments is required by law. Cf. art. 12 of decree law of 6 December 2011, n. 201, converted into law on 22 December 2011, law n. 214 and art. 15 of decree law of 18 October 2012, n. 179, on electronic payments, mandating that both public and the private creditors are required to accept payments made through different instruments other than the fiat money. See ONZA, *La « Trasparenza » Dei « Servizi Di Pagamento » In Italia (Un Itinerario Conoscitivo)*, Banca Borsa Tit. Cred., 2013, 577. Another issue which has been raised in relation to e-money concerns the doctrine of the transparency of methods of payment, which is not always applied in its entirety in case of e-money payments. The transparency issue is addressed (alongside other topics pertaining to EU law) by SANTORO, *I Servizi Di Pagamento*, Ianus, n.6, 2012; see also, VARDI, *The Integration Of European Financial Markets: The Regulation Of Monetary Obligations*, UT Austin Studies in Foreign and Transnational Law, Routledge, 2010.

¹⁶ OLIVIERI, *Appunti Sulla Moneta Elettronica Brevi Note In Margine Alla Direttiva 2000/46/CE Riguardante Gli Istituti Di Moneta Elettronica*, Banca Borsa Tit. Cred., 2001, 809.

¹⁷ Bitcoins have been debated not only from the viewpoint of the legal and financial issues they raise, but also from a specific economic-mathematic perspective; in this regard, see the paper authored by Saito, SAITO, *Bitcoin: A Search-Theoretic Approach*, available at SSRN: available at: <http://ssrn.com/abstract=2405013>.

3. Bitcoins

Bitcoins represent the ultimate and successful outcome of a number of (failed) attempts, starting from the 1990s, to create an online decentralized 'currency'.

Bitcoin has been described by the ICT experts as a «masterpiece of technology», in other words, a work of genius whose beauty lies in its architecture¹⁸ and whose peculiarity consists in being a purely market-based cryptocurrency¹⁹.

In 2009, Satoshi Nakamoto (a pseudonymous hacker(s)) provided the algorithm and the concept of Bitcoin²⁰ and concretely implemented the project by establishing a network of computers running a special software that enabled each machine (called 'miner') to solve specific algorithms and be consequently awarded Bitcoins²¹.

This first aspect evidently draws a distinction between Bitcoin and conventional commodity-backed currencies: as a cryptocurrency, Bitcoin is not backed by any commodity or asset and therefore cannot be redeemed for goods or services²². Furthermore, Bitcoins are not denominated in an existing currency, the price of each Bitcoin is uniformly determined by the market price, and there is no fixed exchange rate between them and conventional currencies²³.

In practice, Bitcoin is a private digital 'resource' that can be traded online via the established peer-to-peer network. It is noteworthy that, even though

¹⁸ DOGUET, *The Nature of the Form: Legal and Regulatory Issues Surrounding the Bitcoin Digital Currency System*, *Louisiana Law Review*, 2013.

¹⁹ IWAMURA, KITAMURA & MATSUMOTO, *Is Bitcoin the Only Cryptocurrency in the Town? Economics of Cryptocurrency and Friedrich A. Hayek*, February 28, 2014.

²⁰ For a detailed description of the system's design, see the original paper of Nakamoto, NAKAMOTO, *Bitcoin: A Peer-to-Peer Electronic Cash System*, 2009, available at <http://www.bitcoin.org/bitcoin.pdf>.

²¹ FARMER JR., *Speculative Tech: The Bitcoin Legal Quagmire & the Need for Legal Innovation*, 9 *J. Bus. & Tech. L.*, 2014, 85. Available at <http://digitalcommons.law.umaryland.edu/jbtl/vol9/iss1/6>. Specifically, each computer runs the program named 'Bitcoin miner', and once it is connected to the Bitcoin network, «the computer uses its processing power to compute the Bitcoin encryption function and Bitcoins are awarded to the computer that deciphers the puzzle and constructs the proper block. Miners are then incentivized to contribute CPU power in exchange for their own Bitcoins». WALLACE, *The Rise and Fall of Bitcoin*, *Wired Magazine* (Nov. 23, 2011), available at www.wired.com/magazine/2011/11/mf_bitcoin/.

²² DE FILIPPI, *Bitcoin: A Regulatory Nightmare To A Libertarian Dream*, *Internet Policy Review*, 2014, 3(2).

²³ BOLLEN, *The Legal Status Of Online Currencies, Are Bitcoins The Future?*, 2013.

Bitcoins are digital, «every individual bitcoin is unique and can only be held by one entity at any given time».²⁴ Besides, the amount of available Bitcoins is finite, that is that only 21 million are planned to be produced²⁵.

Once a Bitcoin has been mined or purchased, it becomes «similar to a computer file that can be visualized as a coin on a desktop»²⁶ (within a virtual wallet) and transferred as easily as e-mails via the Internet. Security protocols embedded in the online Bitcoin network provide users with the necessary protection against (many types of) fraud, while ensuring the system's proper functioning.

Moreover, the peer-to-peer network serves a twofold purpose: mining Bitcoins and recording Bitcoin transactions.

Hence, the entire network keeps tracks of all transactions, including those that occur between individuals and those which instead take place through market exchanges²⁷, as if it were a huge public ledger²⁸.

So far so good.

Yet, all fuss about Bitcoin is 'justified' by a noteworthy peculiarity of the system: it was expressly designed to function without any interference or control by a third party (be it either a bank or a credit card company) or a

²⁴ DOHERTY, *Bitcoin and Bankruptcy - Understanding the Newest Potential Commodity*, 33-7 *ABIJ* 38, 2014.

²⁵ *Id.* The automatically limited number of Bitcoins is directly generated by the system itself: at the beginning miners received 50 Bitcoins for every proper block, but «as the computational problems become more difficult and the number of transactions increases, the payouts are cut in half. » VELDE, *Bitcoin: A Primer*, The Federal Reserve Bank of Chicago, Number 317, (2013), at 2, available at http://www.chicagofed.org/digital_assets/publications/chicago_fed_letter/2013/cfldecember2013_317.pdf. Blocks are added at a rate of six times per hour and every 210,000 blocks the payout is cut in half and this results precisely “in a pre-determined Bitcoin limit of twenty one million». VELDE, *Bitcoin: A Primer*.

²⁶ WALLACE, *The Rise and Fall of Bitcoin*.

²⁷ Bitcoins can be mined or acquired from another user by «using exchanges to purchase them with traditional currencies, or to be connected directly with an individual for trading». WALLACE, *The Rise and Fall of Bitcoin*. On the basis of such exchanges speculation enters the Bitcoin market, since they provide «a trading platform for futures and options contracts specifically on Bitcoins, or based in Bitcoins». *Futures Market*, ICBIT BITCOIN EXCHANGE, <https://icbit.se/futures> (last visited Nov. 16, 2012), in FARMER JR., *Speculative Tech*.

²⁸ Each Bitcoin is essentially “a chain of digital signatures which, when decoded, provide the entire transactional history of the bitcoin.” The members of the network who verify new transactions (called miners) are rewarded for their service with additional Bitcoins. MIDDLEBROOK & HUGHES, *Regulating Cryptocurrencies In The United States: Current Issues And Future Directions*, 40 *Wm. Mitchell L. Rev.*, 2014, 813.

central issuing authority, which could manipulate the system²⁹; in light of this, we may hazard a comparison: «currency [. . .] is exactly like religion. It's based entirely on faith»³⁰.

Given the architecture of the Bitcoin system, individuals engage in transactions with each other directly, without any intermediary and, in some cases, even anonymously³¹, without third party's oversight³².

As a matter of fact, all 'cryptocurrencies', like Bitcoin, may «have the potential to challenge government supervision of monetary policy by the disruption of current payment systems and the avoidance of existing regulatory schemes»³³. Furthermore, since such 'currencies' offer the possibility to do transactions anonymously, they could be employed not only for licit privacy reasons, but also to accomplish unlawful (and even despicable) activities, such as tax evasion, money laundering, terrorism, child pornography, human trafficking, and so on³⁴. Besides, some argue that

²⁹ Even though no authority has control over the network, «the sheer size of the network of miners helps to prevent unauthorized manipulation or implantation of data in the system». Along with this security and the «ability of exchanges to pinpoint and correct abnormalities in Bitcoin trading», the bitcoin network appears to be safer than other traditional systems. YIN, *Which Bitcoin Exchange Can You Trust?*, PCMAG (June 20, 2011.), <http://www.pcmag.com/article2/0,2817,2387279,00.asp>, in FARMER JR., *Speculative Tech*.

³⁰ YEOMANS, *The Quest for a Global E-Currency*, CNN (Sept. 28, 1999), http://articles.cnn.com/1999-09-28/tech/9909_28_global.e.currency.idg_1_credit-card-debit-global-internet-project/3 (quoting Jack Weatherford, author of *The History Of Money*). This statement is especially true in relation to Bitcoin, for this digital 'currency' is not asset-backed neither is it issued by any government or financial institution. DOGUET, *The Nature of the Form*.

³¹ Bitcoin is defined as an anonymous method of payment, because parties are identified only by a 'bitcoin address'. DOGUET, *The Nature of the Form*.

³² *Id.*, and PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*.

³³ MIDDLEBROOK & HUGHES, *Regulating Cryptocurrencies*.

³⁴ Specifically, the anonymity connected to virtual currencies facilitate a number of various crimes, making the systems of such currencies, profitable marketplaces for: assassins, attacks on businesses, children exploitation (including pornography), corporate espionage, counterfeit currencies, drugs, fake IDs and passports, investment and financial frauds, sexual exploitation, stolen credit cards and credit card numbers, and weapons. (Cf. TRAUTMAN, *Virtual Currencies Bitcoin & What Now After Liberty Reserve, Silk Road, and Mt. Gox?*, 20 *RICH. J.L. & TECH.*, 2014, 13, available at <http://jolt.richmond.edu/v20i4/article13.pdf>.) A notable case of misuse of Bitcoins in USA in 2013 was the crackdown on Silk Road. Silk Road was a largely known online marketplace for drugs, erotica, fake IDs, and other illegal goods. In October 2013, the FBI shut down the website and arrested the owner of the website, William Ulbricht; and, according to the reports, by the end of the same month, U.S. government authorities «had seized more than 33.6 million USD worth of bitcoins belonging to Ulbricht».

cryptocurrencies do not grant the necessary protection to consumers, especially in relation to consumers' rights to prompt and full redemption of funds³⁵.

Finally, a further strand of argument should be added.

National governments would never allow a massive storage of value in a 'currency' beyond their control, because this would undermine their exclusive *seignorage* rights arising from the issuance of the legal tender.

It follows that States are having a hard time in deciding how to handle this issue, and, specifically, whether or not they should resort to its (stringent) regulation.

3.1. May Bitcoin Actually Compete With Fiat Currencies Or Other 'Conventional' Payment Systems?

The development of Bitcoin has been primarily fueled by the dissatisfaction with the *status quo*. This cryptocurrency was created, in fact, in response to the economic and financial crisis of the new millennium and, specifically, with the purpose of avoiding the high transaction costs charged by financial institutions. Moreover, Bitcoin's proponents claim that the fast, affordable and decentralized service supplied by this cryptocurrency may succeed in meeting the different needs of people in various areas of the globe which cannot rely on the mainstream banking system³⁶.

By virtue of such, alleged, qualities, it is argued that Bitcoins may compete with traditional products that facilitate e-commerce^{37,38}.

Whereas, a second example of alleged misdeed involving Bitcoins was the asset seizure of Mt. Gox. The latter was one of the largest Bitcoin exchange worldwide, and the U.S. authorities seized its assets in May 2013 on the basis of suspicions that Mt. Gox did not have an appropriate license to engage in money transfer services according to the provisions of the FinCEN guidance document on virtual currencies. Following the asset seizure, in February 2014, Mt. Gox shut down its website and filed for bankruptcy «after losing approximately 750,000 of its customers' bitcoins following a security breach". KIEN-MENG LY, *Coining Bitcoin's "Legal-Bits": Examining The Regulatory Framework For Bitcoin And Virtual Currencies*, 27 *Harv. J. Law & Tec*, 2014, 587. Both cases are described also by Trautman. TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

³⁵ MIDDLEBROOK & HUGHES, *Regulating Cryptocurrencies*.

³⁶ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*.

³⁷ For an overview of the reasons for the success of electronic payment systems and the dynamics inherent in the domain of e-commerce, see J.- SAHUT, *Internet Payment and Banks*, *International Journal Of Business*, Vol. 13, no. 4, 2008.

So far, though, Bitcoin is not likely to supplant traditional e-commerce products because the major advantage it offers is the potential anonymity, which, however, is not so appealing within the domain of electronic payment systems. There are two main reasons for such lack of attractiveness: on the one hand, individuals prefer to compare the prices of goods and services in a currency they 'understand', such as US dollars, and, on the other hand, they want to be protected against electronic frauds - a kind of protection that Bitcoin's architecture cannot completely ensure. That is precisely for these reasons that the field of electronic payment systems or e-commerce is dominated by PayPal, which, as opposed to other competitors, simply enables users to fund their accounts through their credit cards or bank transfers, while the company itself has made huge investments in anti-fraud systems³⁹.

Nonetheless, it might be affirmed that in a few years people may eventually become familiar with Bitcoins as the latter continue to circulate throughout the globe and, in the meantime, the technological improvements may also increase the safety of the system's structure so that the two aforementioned shortcomings affecting this cryptocurrency may eventually be overcome⁴⁰.

Contrariwise, Bitcoins may actually be competitive in relation to a specific portion of the e-commerce domain, that is, micropayments⁴¹ and virtual markets. As a matter of fact, accomplishing micropayments through traditional electronic payment systems⁴² has very high transaction costs

³⁸ Moreover, some argue that Bitcoins may gain foothold among users of gold-backed currencies for the latter do not trust central banks. Therefore, since Bitcoins are not subject to a central authority and, additionally, are going to be produced only in a limited amount, it is maintained that they may - eventually - constitute an 'alluring' finite set and a scarce good to this group of users. GRINBERG, *Bitcoin: An Innovative Alternative Digital Currency*.

³⁹ *Id.*

⁴⁰ BLUNDELL-WIGNALL, *The Bitcoin Question: Currency versus Trust-less Transfer Technology*, *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 37, OECD Publishing, 2014, 7.

⁴¹ Practically, micropayments are very small electronic payments made to purchase digital goods. So, for instance if one has to pay one US dollar, the impact of the transaction cost in proportion to such a small amount is exorbitant.

⁴² Payment systems have been broadly defined as "the infrastructure (comprised of institutions, instruments, rules, procedures, standards, and technical means) established to effect the transfer of monetary value between parties discharging mutual obligations" (BOSSONE & CIRASINO, *The Oversight Of Payment Systems: A Framework For The Dev. And Gov'n Payment Sys In Emerging Economies*, *Centre De Estudio Monetarios Latinoamericanos & The World bank*, 2001, in SIRILA, *The Pleasures and Perils of New Money in Old Pockets*). This definition is particularly important for it does not imply the

which make such payments impractical, whereas, the use of Bitcoins would help overcome this hurdle thanks to their low transaction cost.

As to virtual worlds (e.g. Second life) and online games, the decentralized nature of Bitcoin may represent a profitable alternative to game-related currencies⁴³ which are instead subject to the discretionary control of the central game authority (which, for instance, may decide to issue new coins and depreciate the value of the game currency)⁴⁴.

4. How To Effectively Handle Digital Currencies, And, Above All, Bitcoins?

The financial and economic breakdown has resulted in a decrease in trust towards the financial institutions on the part of the consumers, and the decentralized nature of the cryptocurrencies, the lack of a provider or issuer that may be held accountable, as well as a central database, both of which are replaced by a community of users which exists ‘merely’ in the cyberspace have worked in their favour.

But, as already mentioned, Bitcoins pose new challenges for regulators if compared to the previous digital means of payment since Bitcoin system evades the traditional patterns of State regulation.

necessary presence of a central bank at the core of any payment system. In fact, non-bank-led payment systems, such as mobile payment systems, have developed especially «because of a need of the rural unbanked costumers to transfer money as well as receive money when banks were unwilling to provide these services at affordable prices» (SIRILA, *The Pleasures and Perils of New Money in Old Pockets*). For instance, Kenya has developed the most successful mobile payment platform, *i.e.* M-PESA, which is regulated by the National Payment System Act of 2011 governing both mobile and other types of electronic payments. Prior to the enactment of the NPSA, M-PESA had to comply with the Financial Action Task Force (FATF) Recommendation, whose primary scope was to fight money-laundering activities. SIRILA, *The Pleasures and Perils of New Money in Old Pockets*.

⁴³ It is worth highlighting that often digital currencies developed by and used in virtual games (for instance, Linden Dollars in Second Life) are convertible into fiat currencies. For an overview of how virtual worlds actually are profitable ventures, see E. CASTRONOVA, *Virtual Worlds A first-Hand Account of Market and Society on the Cyberian Frontier*, (December 2001), CESifo Working Paper Series no. 618. Available at SSRN: <http://ssrn.com/abstract=294828>.

⁴⁴ GRINBERG, *Bitcoin: An Innovative Alternative Digital Currency*.

In light of this, it is worth examining which regulatory alternative would actually be the most efficient in terms of interests of both Bitcoins' users and National governments⁴⁵.

Three potential regimes are therefore investigated: (i) prohibition, (ii) self-regulation and (iii) intermediary regulation⁴⁶.

- (i) Typically, prohibitive measures are adopted only when the harm that may derive from the use of a technology outweighs the social benefits resulting from it.

Hence, in all likelihood, regulators may take prohibitive measures against Bitcoins only if this cryptocurrency were exclusively used for unlawful purposes, and no advantages were widely acknowledged. Besides, Bitcoins may be outlawed if they actually posed a threat to an existing fiat currency, and, in particular, to the *seignorage* income of governments. However, according to the proponents of this alternative system, so far, none of the aforementioned reasons actually exists: Bitcoins are used mainly for legitimate purposes, and the economy created by the system is still too small to compete with national currencies or undermine the international economic stability. Furthermore, the recourse to prohibition commonly leads to inefficiencies from the viewpoint of economics. In the first place, banning Bitcoins would result in ruling out also its inherent benefits; moreover, the prohibition of its use may inhibit the evolution of technology in the domain of e-commerce, and, additionally, enforcing such a prohibition would entail very high costs and turn out to be a legal fiasco because it would restraint the use of the system solely on the part of law-abiding citizens, but not on the part of criminals. It follows that,

⁴⁵ According to the document 'Bitcoins: a first assessment', that was published by Merrill Lynch Bank of America in 2013, the issue of Bitcoins requires a uniform international regulation, which however, on the domestic level, shall not impose too stringent restrictions, which would increase the cost of the transactions and consequently decrease one of the major benefits of the system. Furthermore, the analysis warns against the system's lack of forms of protections on deposits and investors which are typical of the banking system, highlighting, though, that the implementation of such mechanisms would, in all likelihood, raise the transaction costs as well. Cf. MERRILL LYNCH BANK OF AMERICA, *Bitcoin: a first assessment*, 2013, available at <https://ciphrex.com/archive/bofa-bitcoin.pdf>. Cf. PERUGINI & MAIOLI, *Bitcoin tra Moneta Virtuale e Commodity Finanziaria*.

⁴⁶ Cf. DOGUET, *The Nature of the Form*.

presently, the prohibition of Bitcoins would be not only unnecessary, but also harmful⁴⁷.

- (ii) Generally, if a market is faced with the threat of prohibition, it commonly reacts through self-regulation, and this is precisely the ‘regulatory pattern’ presently characterizing the Bitcoin system. Many maintain, in fact, that the relationships among users within the cyber-space shall be governed by «social norms and market mechanisms [...] without the need for state intervention»⁴⁸. Nonetheless, since the Internet has evolved over the decades and has mainly become a medium for commercial exchanges, self-regulation may no longer be the best solution, for inequities are bound to arise. Moreover, as regards Bitcoins, a specific problem lies in the fact that the system’s transactions are virtually irreversible owing to the computer power which secures them. This however may be a double-edged sword, for honest merchants and retailers are safeguarded against fraudulent practices carried out by dishonest buyers, but, at the same time, buyers are not protected against dishonest merchants or retailers. The only means developed by the network to ensure part of said protection to consumers are reputation systems and escrow services. The former enables the defrauded buyer to publicly complain about the merchant on a forum, so that the other community members will no longer trust him. However, this mechanism cannot prevent frauds from occurring, and the potential for anonymity⁴⁹ provided for by the Bitcoin system is likely to exacerbate this problem. As to large-scale criminal activities, the self-regulation attitude of the system has resulted in the development of specific software programs, named ‘autonomous agents’, that permit to prevent such activities by scanning large amount of financial transactions involving the exchange of Bitcoins in search for irregularities. However, such programs are not largely applied by Bitcoin exchanges. Furthermore, the major shortcoming of the system lies in the fact that it cannot tackle small-scale criminal

⁴⁷ *Id.*

⁴⁸ DOGUET, *The Nature of the Form*.

⁴⁹ For an analysis of Bitcoin’s potential users in relation to the anonymity offered by the system, and its potential for abuses, like the case of Silk Road website, see WILSON & YELOWITZ, *Characteristics of Bitcoin Users: An Analysis of Google Search Data*, available at SSRN: <http://ssrn.com/abstract=2518603>.

activities. So, since «Bitcoin software provides no way to punish its users or to stop them from using it criminally, state action will be necessary to prevent such uses.»⁵⁰ Hence, self-regulation has a limited impact which is sustainable only within small groups, therefore, this solution appears to be rather ineffective.

- (iii) In light of the unviability of the two abovementioned proposals, a third solution arises, that is the ‘intermediary regulation’, which in the case of Bitcoin involves all activities surrounding the ‘Bitcoin world’, and, above all, Bitcoin exchanges. As a matter of fact, the most part of the operations involving Bitcoins is accomplished through Bitcoin exchanges, namely entities that facilitate the conversion of the cryptocurrency to and from traditional currencies. It follows that also criminals who want to exploit the Bitcoin system for money-laundering purposes or similar illicit aims should have to rely on these exchanges. As a result, Bitcoin exchanges may constitute the starting point for the implementation of anti-criminal mechanisms, which in turn represent the major concern expressed by legal systems as regards the otherwise almost ‘neutral’ Bitcoin phenomenon. Hence, to reach said objective, States may apply existing regulatory frameworks to the Bitcoin system; for instance, in the case of the USA, the system may be governed by the Act regulating Money Service Businesses, since Bitcoin exchanges may be classed as ‘money transmitters’. If such regulation were applied, Bitcoin exchanges would have to comply with a number of requirements, such as the registration with the FinCEN⁵¹, the compilation of reports or records pertaining to criminal, tax or regulatory investigations, and the implementation of anti-money-laundering programs, along with the need to keep records of customers’ identities.

⁵⁰ DOGUET, *The Nature of the Form*.

⁵¹ The FinCEN (Financial Crimes Enforcement Network) is an Agency of the U.S. Department of Treasury which in 2013 issued guidance concerning the applicability of its regulations to persons administering, exchanging or using virtual currencies so as to clarify which individuals or entities could be regarded as money services businesses (MSBs) for the purposes of the Bank Secrecy Act and would therefore have to comply with FinCEN’s requirements, such as registration, reporting and keeping records of transactions and clients. For an overview of FinCEN regulations, see HUGHES & MIDDLEBROOK, *Virtual Uncertainty: Developments in the Law of Electronic Payments and Financial Services*, 69 *BUS. LAW.*, 2013, 263.

The most evident advantage of the application of a pre-existing legal framework like the one just described is the fact that no additional undertaking is necessary to draw a new and *ad hoc* regulation of Bitcoins, for the existing provisions would achieve the sought-after purpose without any need for amendments.

Nonetheless, since Bitcoins constitute a transnational phenomenon, domestic regulatory frameworks are not suitable to handle all issues of private international law which may arise in relation to Bitcoin transactions⁵².

Indeed, a fourth resolution may be envisaged: the so called ‘legal interoperability’, that is a regulatory mechanism which does not imply the regulation through State direct action. The concept of ‘legal interoperability’ has been defined by Urs Gasser and John G. Palfrey as «the working-together among legal norms, either within a given legal system of a nation state (e.g. Federal and State legislation) or across jurisdictions or Nations»⁵³. Within an increasingly intertwined digital society and economy, policy-makers should make attempts to increase the interoperability of policies and rules, in view of the fact that we are heading towards a multi-level governance system, within which cooperation and interconnection of the various layers are unavoidable elements. This standpoint is shared also by Trautman who affirms that «by optimizing the international governance of virtual currency, this legal interoperability should ‘enable the flow of goods, services, and information across legal systems’»⁵⁴. According to the aforementioned scholars, achieving legal interoperability would bring forth the following three advantages: (i) the reduction of costs associated with cross-jurisdictional business transactions; (ii) the further promotion of innovation, competition, trade and economic growth (at least in the ICT domain); and, (iii) incentives for the worldwide recognition of fundamental values and rights, such as information privacy and freedom of expression⁵⁵.

In short, these authors acknowledge that more and more legal institutes fall outside the scope of States’ regulation, and support therefore the

⁵² *Id.* Anyway, the aforementioned US regulatory approach may be exported also abroad as a viable blueprint.

⁵³ GASSER & PALFREY JR., *Fostering Innovation and Trade in the Global Information Society: The Different Facets and Roles of Interoperability*, *Berkman Ctr. Res. Pub. No. 2012-20*, 8 (December 12, 2012), available at <http://ssrn.com/abstract=2192647>.

⁵⁴ TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

⁵⁵ GASSER & PALFREY JR., *Fostering Innovation and Trade*.

adoption of a regulatory system which shall be not only stateless but also cut off from the usual borders of single States. In other words, they advocate in favour of a supranational legal framework which may provide, at least, a first regulation of said phenomenon, since in case of vast and significant domains the law (or at least, some branches of it) can do without the support of the State itself⁵⁶.

5. Cryptocurrencies' Pros And Cons

The importance of Bitcoins and the conjoint need to take measures in that regard stems from the acknowledgement that Bitcoins, alongside other cryptocurrencies, are progressively gaining foothold among users thanks to a number of favourable qualities.

We shall therefore sum up both advantages⁵⁷ and disadvantages of cryptocurrencies, and in particular Bitcoins, so as to consider both sides of the coin.

Starting off with the **strengths** of cryptocurrencies:

- (i) the **physical presence** of both the payer and the payee is **not required** in transactions through these digital means. Obviously, this feature is likewise shared by all online payment systems (e.g. electronic fund transfers, Paypal⁵⁸, etc.). Moreover, such

⁵⁶ GAMBARO & SACCO, SISTEMI GIURIDICI COMPARATI, in R. SACCO, TRATTATO DI DIRITTO COMPARATO, 1996, 27.

⁵⁷ According to Kaplanov, « [t]he bitcoin technology ensures that online transactions are: (1) secure; (2) efficient; and (3) free of third party presence—whether that third party is a government, bank, payment network, or clearinghouse» and, furthermore, « [b]y creating a two-party payment system for online transactions, the cost of the transaction is reduced, thereby nearly eliminating the added costs to the consumer». KAPLANOV, *Nerdy Money: Bitcoin, the Private Digital Currency, and the Case Against Its Regulation*, 25 *Loy. Consumer L. Rev.*, 2012, 116.

⁵⁸ As opposed to a traditional system, such as those established through online banks or the one implemented by PayPal, in which «the third party keeps track of all of the transactions on their own servers», the Bitcoin's 'public ledger' – also known as block chain - permits to keep records without the involvement of the third party, and, furthermore, by allowing individuals to engage in transactions without any third party's supervision. NAKAMOTO, *Bitcoin: A Peer-to-Peer Electronic Cash System*. Furthermore, as opposed to the Bitcoin system, common online payments executed through credit cards or services like PayPal entail automatic transaction costs. Specifically, «businesses that accept credit cards are required to pay a fee equivalent to a percentage of the total transaction, or, in some circumstances, a flat fee» (FARMER JR., *Speculative Tech*). Such fees, however, may actually impede the accomplishment of small transactions, whose amount is lower than the fee charged. Bitcoins

transactions can occur at anytime and anywhere⁵⁹; it follows that «Bitcoin network never sleeps, even on holidays»⁶⁰. Linked to this first advantage, there are substantial **economic benefits**: the cost of production, transportation, storage and management of paper money is largely reduced. So, the first concrete strength is an **overall decrease in the cost of transactions** on the part of both individuals and financing institutions, coupled with the possibility to **enhance the efficiency** of the payment system that is faster than the traditional. However these lower transaction costs are a byproduct of the absence of intermediaries which may end up causing problems to consumers who are more vulnerable to fraud and to governments who cannot monitor these transaction to make sure they are not illicit. And any efforts to introduce intermediaries would probably in an increase in the transaction costs⁶¹.

- (ii) Proponents of Bitcoins affirms that these cryptocurrency may help **foster access to basic financial services among the poor**: thanks to their low cost, Bitcoins may assist small businesses which, rather than relying on expensive credit cards, may use this cryptocurrency as payment system or to facilitate micropayments. Furthermore, Bitcoins have been promoted also as an efficient and **cheaper alternative for international money remittances**⁶², as opposed to

permit to avoid such transaction costs, especially in case of micropayments, because the system does not rely on any third party provider which may establish such fees.

⁵⁹ PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*. As explained by Bitcoin.org there is «[n]o need to sign up, swipe your card, type a PIN, or sign anything», hence no need to go personally to the venue of a financial institution or to search for an ATM, and, additionally, you can use the kind of software or service provider you prefer for they are all compatible with the Bitcoin network because all of them use the same open technology.

⁶⁰ Cf. <https://bitcoin.org/en/>.

⁶¹ In its Report, the EBA points out that the average transaction cost for a Bitcoin transaction cost equals to 0.0005 BTC, or 1% of the transaction amount, as opposed to the «2%-4% for traditional online payment systems or an estimated 8%-9% for remittance without involving bank accounts via money transmitters». See EBA Opinion, 16.

⁶² The potential benefits of the use of Bitcoins in relation to remittances is due to the possibility to avoid the fees that are normally charged for transmitting money from industrial to developing Countries and converting the amounts remitted in the local currency, due also to the lack of transparency affecting the system which does not permit migrant workers to choose the most convenient methods of remittance. As stated by the World Bank in its report on remittances, «[r]emittance prices are high for many reasons, including underdeveloped financial infrastructure in some countries, limited competition, regulatory obstacles, lack of

the services commonly used to send money back to homeland, such as Western Union and MoneyGram. Both of them tend to have the monopoly over the system of remittances in Countries where the most part of the population is unbanked (except for the share relying on the informal fund transfer systems, such as *Hawala* in Muslim Countries, or *Hundi* in regions of India)⁶³; nonetheless, their transaction costs are high, therefore, the use of Bitcoin within the system of international remittances could actually be a profitable alternative, if implemented⁶⁴.

- (iii) The third benefit may arise in the form of «**learning spillovers**»⁶⁵. Since digital currencies function by means of computers and software, the transition from a paper-based to a digital currency system would imply an increase in the use of software systems by

access to the banking sector by remittance senders and/or receivers, and difficulties for migrants to obtain the necessary identification documentation to enter the financial mainstream.» Additionally, «the single most important factor leading to high remittance prices is lack of transparency in the market. It is difficult for consumers to compare prices because there are several variables that compose remittance prices». WORLD BANK, *Remittance Market Outlook*, Financial & Private Sector Development, <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTFINANCIALSECTOR/0,,contentMDK:22121552~menuPK:6127416~pagePK:210058~piPK:210062~theSitePK:282885~isCURL:Y,00.html> (last visited Sept. 10, 2014). See also BORRONI, *A Sharia-compliant Payment System Within the Western World*, Ianus, *Review of the Business and Law Department of the University of Siena, Special Issue "Building up an EU-based Payment System"- Workshop, 23-25 October 2014, Siena, 2015*.

⁶³ For an overview of informal fund transfer systems, like *hawala* and *hundi*, see EL QORCHI, MUNZELE MAIMBO, WILSON, *Informal Funds Transfer Systems, An Analysis of the Informal Hawala System*, IMF Occasional Paper No.222, 2003.

⁶⁴ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*. In 2013, Kenya passed the Money Remittance regulation aimed at governing international money transfer by creating a better environment for remittances and enhancing the use of formal delivery channels, as opposed to informal ones which are less transparent and escape State supervision. Under the aforementioned regulation, money remittance is defined as «a service for the transmission of money or any representation of monetary value without any payment accounts being created in the name of the payer or the payee, where (a) funds are received from a payer for the sole purpose of transferring a corresponding amount to a payee or to another payment service operator acting on behalf of the payee; or (b) funds are received on behalf of , and made available to the payee». On the basis of this definition, under Kenyan law, any kind of exchange, and especially the informal (e.g. *hawala*) or anonymous (Bitcoin) ones, which imply the transfer of a 'value', would be subject to this regulation.

⁶⁵ PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*.

common users. «This, in turn, could help improve the skills and knowledge of users regarding personal finance software and finance optimization technologies»⁶⁶. This is regarded as a positive externality, for in a society in which technology has a growing role to play, enhancing users' knowledge of software-based finance may produce long-lasting and significant effects.

- (iv) Then again, the market for cryptocurrencies contributed directly to emergence of entirely novel industry gravitating around the mining, exchange, conversion in fiat currencies and storage of Bitcoins and so to economic growth and to incentives for innovation in the IT and financial sectors.
- (v) Additionally, the **three main functions** that distinguish **traditional currencies** (*i.e.* being a medium of exchange, acting as a unit of account and the measure of value, and being a store of value for prospective expenditures) may be **performed** – and in some cases even more efficiently achieved - **by cryptocurrencies** and virtual currencies as well.
 - (1) As a **medium of exchange**, their essential advantage is to **avoid the costs of transaction imposed on the exchange of currencies thanks to the fact that they are ‘universal’ currencies** inherently «designed to be used transnationally via the Internet»⁶⁷.
 - (2) As **unit of account** and measure of relative worth, given the complexity of Bitcoin's production process, coupled with its scarcity (which will be no longer produced after 2025 when the threshold of 21 million will be definitively met)⁶⁸, Bitcoins shall be regarded as «**intrinsically and intuitively valuable**»⁶⁹.
 - (3) As a store of value, since Bitcoin is not influenced by the policies adopted by governments, its worth depends exclusively

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ <https://bitcoin.org/en/faq#economy>.

⁶⁹ PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*. Besides, since digital currencies are not linked to State governments, their legitimacy in the eyes of their users cannot be affected by perceived injustice or wrongdoings carried out by National central banks. This is particularly true in relation to Bitcoin, which lacks a third party authority in charge of issuing and managing it.

on the market; for this reason, the issuers of digital currencies, like Bitcoin, commit to making their currencies the most stable and reliable as possible, for only in that way, they can succeed in becoming a store of value and concurrently attracting investments⁷⁰.

At this point, let us enumerate the **disadvantages and weaknesses**.

- (i) First of all, we should address the issue of **anonymity** of the Bitcoin system, which is generally regarded as one of its most attractive features. In this regard, it is worth clarifying that there are generally two types of Bitcoin exchanges: (i) one which requires the submission of a valid ID or passport or proof of residence (depending on the registration requirements set by the exchange) so as to register and subsequently obtain a Bitcoin account, and (ii) others which do not set any registration requirements. It is evident that carrying out Bitcoin transactions by relying on the first type of exchanges represents a more traceable method, which is evidently less anonymous. Whereas, purchasing Bitcoins through exchanges which do not require registration permits to safeguard anonymity. However, the achievement of complete anonymity chiefly depends on the «method the customer uses to transfer money to the Bitcoin Exchange for purchase of Bitcoins»⁷¹. Moreover, the Bitcoin network keeps record of the transactions that occur within it by means of block chains: each block chain is a transaction database that is shared by all nodes which participate in the Bitcoin system, therefore, on the basis of the information contained in each block chain it is possible to discover «how much value belonged to each address at any point in history»⁷². Besides, according to a MIT research, the so called ‘reverse tracing’ process permits to map out and find out the origin of all Bitcoin operations by starting from the

⁷⁰ *Id.* Additionally, in relation to Bitcoins, a further advantage lies in the very architecture of system: the operational rules of the peer-to-peer network are transparent, and everyone can, at least in theory, become a ‘miner’, and, consequently, receive incentives for mining (the so called, proof-of-work procedure) and through transaction fees (once the total amount of Bitcoins will be reached, incentives will totally fall on transaction fees). IWAMURA, KITAMURA & MATSUMOTO, *Is Bitcoin the Only Cryptocurrency in the Town*.

⁷¹ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*. For instance, using a payphone to purchase Bitcoins with cash ensures a high level of anonymity.

⁷² BITCOIN WIKI, *What Is A Block Chain*, cf. https://en.bitcoin.it/wiki/Block_chain.

end point of the transaction.⁷³ Although the recourse to such process is rather expensive, it nonetheless demonstrates that the potential anonymity of the system may actually be ‘dismantled’, if so required by security reasons. On the hand, anonymity has also been the main boon and boast which made cryptocurrencies; for example, for what regard the security of personal data, since virtual currency payments do not ask for personal or sensitive data, (that is the normal pattern with credit cards) or passwords⁷⁴.

- (ii) Economists warn about the **uncertainty** surrounding the transactions through digital currencies and their future development. Scholars face difficulties in determining whether and how such currencies will ever be largely accepted by the general public due to the lack of reliable sources of information. Moreover, such uncertainty is enhanced by the fact that investing in a currency which has neither an intrinsic value, nor is it asset-backed, can be rather risky⁷⁵. However, for the time being, Bitcoin has conquered only a tiny share of the global financial system, consequently, its widespread use is unlikely to occur anytime soon. Nonetheless, it might be expected that in the future other cryptocurrencies with a similar - though improved - architecture and security structure may prevail⁷⁶ over Bitcoins, whose main deficiency lies, in fact, in **the lack of an**

⁷³ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*. Problems arising from the geographic location of Bitcoin transactions may be tackled by means of the geolocation technology. Such software has, in fact, the capacity to locate electronic usage within physical geographical spaces, by identifying the subject party’s IP address and, in so doing, it permits to determine what Country, enterprise or individual user such address has been assigned to.

⁷⁴ According to the EBA Opinion, «[I]n this sense, VC units can be considered to be like cash: whoever possesses them also owns them, removing a source of potential identity theft». EBA opinion, 19. This leads also to a limited interference by public authorities.

⁷⁵ In particular, investment risks concerning Bitcoins are linked to the latter’s high price instability, the lack of an authority which may intervene in order to manage both inflation and deflation, as well as the fact that interest rates which may be earned through such cryptocurrency are quite volatile. (IWAMURA, KITAMURA & MATSUMOTO, *Is Bitcoin the Only Cryptocurrency in the Town*). In particular, «the price of a bitcoin is susceptible to massive swings, unlike conventional currency» (DOHERTY, *Bitcoin and Bankruptcy*) which is also confirmed by the figures and charts provided by the website bitcoinaverage.com. According to its price index, on January 16, 2015, the USD market average of a Bitcoin is equivalent to \$ 215,43, and its highest price in 24 hours amounted to \$ 228,61, while, its lowest to \$ 198.08 (cf. <https://bitcoinaverage.com/#USD>).

⁷⁶ TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

economic rationale, which in the long run is necessary for the sustainability of every economic system⁷⁷.

- (iii) Furthermore, one of the major weaknesses of the Bitcoin system stems from the **lack of regulation and the third party's oversight**: in general, the systems created by digital currencies are devoid of an underlying legal framework, therefore, the transactions executed through them may be «subject to credit, liquidity, and operational risks, as well as risk of fraud»⁷⁸. Moreover, it is well-known that cryptocurrencies represent an attractive means of exchange for criminals. According to the U.S. Secret Service, in fact, virtual currency and cryptocurrency systems are frequently employed to move and hide funds, transmit money derived from illicit activities, like terrorism or money-laundering, due to the following reasons: (a) anonymity for both users and transactions; (b) the quick and confidential transfer of funds from one Country to another; (c) its widespread adoption throughout the global network of criminals; (d) trustworthiness⁷⁹.
- (iv) In addition, concerns have been expressed as to the **vulnerability** of the system, and the need to improve cyber-security so as to avoid any breach or violation of users' accounts. Moreover, the degree of vulnerability of the system is further enhanced by the fact that Bitcoin transactions do not occur at the same time, namely with «an instantaneous debit and credit of the payer and the payee, respectively»⁸⁰. The period of time between the payment and the receipt of such payment depends, in fact, on the mining activity⁸¹. The non-simultaneous occurrence of Bitcoin payments may lead to

⁷⁷ IWAMURA, KITAMURA & MATSUMOTO, *Is Bitcoin the Only Cryptocurrency in the Town*. Additionally, the authors propose the schema for the development of an alternative cryptocurrency whose improved properties would enable it to flourish.

⁷⁸ *Id.*

⁷⁹ TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

⁸⁰ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*.

⁸¹ Miners use the computational power and software to solve the transactions, and are subsequently rewarded through Bitcoins: the more miners exist within the system, the faster a transaction is decoded. The problem however lies in the fact that mining is expensive, and since the value of Bitcoins is subject to wide price fluctuations, miners may not have enough incentives to mine, and this may slow down the overall system and lead to a loss of confidence in the cryptocurrency. SIRILA, *The Pleasures and Perils of New Money in Old Pockets*.

the so called ‘double spending’⁸²: since such transactions are not completed in real time, fraudulent Bitcoin users may employ the same Bitcoin to purchase two different goods or pay two different people, splitting, in so doing, one Bitcoin transaction into two (which is named ‘fork transaction’)⁸³. Furthermore, Bitcoins, as any other asset in which people invest, are not exempt from loss of confidence, which in turn may lead to a sharp decrease in its demand. Confidence may collapse for a number of reasons: «unexpected changes in the inflation rate imposed by the software developers or others, a government crackdown, the creation of superior competing alternative currencies, or a deflationary spiral[...] [,] because of technical problems: if the anonymity of the system is compromised⁸⁴, if money is lost or stolen, or if hackers or governments are able to prevent any new transactions from settling»⁸⁵.

- (v) Lastly, all digital currencies have to deal with the issue of ‘**network externalities**’. The benefits that may arise from their use depend mostly on the involvement of other people in the network: if a digital

⁸² However, according to Bitcoin’s developer, the system’s inner structure offers a solution to the problem of double-spending (which generally affects all monetary systems and is commonly tackled through the activity of a central authority or mint). In short, a user transfers his Bitcoins (each of which is a chain of digital signatures) to another user «by digitally signing a hash of the previous transaction and the public key of the next owner and adding these to the end of the coin. A payee can verify the signatures to verify the chain of ownership.» Hence, the solution that the Bitcoin system suggests to the double-spending problem consists in relying on «a timestamp procedure on a peer to peer basis»: each block of Bitcoins transactions contains the cryptographic hash of the preceding block enabling therefore anyone to verify whether the previous block has been modified. IWAMURA, KITAMURA & MATSUMOTO, *Is Bitcoin the Only Cryptocurrency in the Town*, and see also NAKAMOTO, *Bitcoin: A Peer-to-Peer Electronic Cash System*.

⁸³ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*. For a thorough analysis of the double spending process, see KROLL ET AL., *The Economics Of Bitcoin Mining, Or Bitcoin In The Presence Of Adversaries*, Princeton University, vol. 8, (2013).

⁸⁴ As a matter of fact, Bitcoin transactions are public even though they are regarded as ‘anonymous’ for the accounts that are identified in these transactions are not directly linked to an individual or an organization. Nonetheless, at times Bitcoin users post their account number online on Bitcoin forums in ways that it might be possible to discover their online identities. Besides, by using statistical techniques and identified accounts the anonymity of the Bitcoin system may be undone. GRINBERG, *Bitcoin: An Innovative Alternative Digital Currency*.

⁸⁵ *Id.*

currency is not accepted by a large number of individuals or merchants, then all the advantages that may derive from it in comparison to paper money are likely to fade away⁸⁶. This is even more true in case of Bitcoin, for its distributed protocols must operate and remain stable in time so as to guarantee the success of the system. And, to achieve such an objective, three types of consensus are required: (i) the consensus about rules, *i.e.* about the criteria determining the validity of transactions, which in turn will be memorialized in the Bitcoin log; (ii) the consensus about which transactions have really occurred so that to determine who owns a coin at any given time; (iii) the consensus about Bitcoins' worth, because if users ascribe a value to Bitcoins, more users would do the same and the Bitcoin economy would continue to spread⁸⁷. However, there exist many threats which may undermine the consensus about Bitcoins, such as deflation, the decrease in the price of Bitcoins due to disincentive to mine them, the hoarding of Bitcoins rather than their use, inner attacks stemming from groups of miners (e.g. 51% attack and Goldfinger attack)⁸⁸ as well as privacy concerns⁸⁹.

In short, the Bitcoin system requires both confidence and legitimacy on the part of its users to flourish as an alternative payment system. But trust and legitimacy may be undermined if undertakings associated with the

⁸⁶ *Id.*

⁸⁷ TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

⁸⁸ For a description of such kind of attacks and their effects, see TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

⁸⁹ As a matter of fact, researchers have found out that «the current measures adopted by Bitcoin are not enough to protect the privacy of users if Bitcoin were to be used as a digital currency in realistic settings . . . [I]f Bitcoin is used as a digital currency to support the daily transactions of users in a typical university environment, then behavior-based clustering techniques can unveil, to a large extent, the profiles of 40% of Bitcoin users, even if these users try to enhance their privacy by manually creating new addresses.» ANDROULAKI, GKARAME, ROESCHLIN, SCHERER & CAPKUN, *Evaluating User Privacy in Bitcoin*, in AHMAD-REZA SADEGHI (ED.), *Financial Cryptography And Data Security, 17th International Conference, FC 2013, 2013, available at* http://book.itep.ru/depositary/bitcoin/User_privacy_in_bitcoin.pdf. Cf. TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

Bitcoin system are shut down because they have been hacked or found to be in violation of the law⁹⁰.

It follows that the process of legitimization of Bitcoins shall involve a «clean up of the current image associated with criminal activities»⁹¹; this, however, shall be complemented with the endorsement of Bitcoins by large companies (which decide to accept the cryptocurrency as a means of payment) as well as by transnational financial institutions, such as, for instance, the International Monetary Fund, which, as maintained by Plassaras, may «mitigate the impact of Bitcoins on foreign currency markets»⁹². by bringing [Bitcoins] within its reach under the category of ‘separate currencies’⁹³.

⁹⁰ The EBA in its opinion is far more critical identifying more than seventy risks associated with the use of virtual currencies. Though, this list appears artificially inflated since they include some risks which are shared by any means of payment relying on technology or investment products. This opinion divided the risk in five categories risks: to users, to other market participants, to financial integrity, to payment systems in fiat currencies, and to regulators. See for a detailed clarification the EBA opinion, 21 ff.

⁹¹ SIRILA, *The Pleasures and Perils of New Money in Old Pockets*.

⁹² PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*.

⁹³ The global spread of virtual and cryptocurrencies is likely to hit, above all, the International Monetary Fund (IMF). The IMF is a specialized agency of the United Nations that was founded in 1944 and whose primary objective is to coordinate the international monetary policy, especially the foreign currency exchange market, so as to promote international economic cooperation among its Member Countries and to foster the global economic stability (<http://www.imf.org/external/about/overview.htm>). In practice, the IMF sets standards, provides economic policy advice and, in some cases, also financing to its Member States in economic difficulties. Its rules apply only to its Members, and since Bitcoins are not backed by any State government, such cryptocurrency does not have to comply with IMF’s regulations. (PLASSARAS, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*). It follows that Bitcoin and similar digital means of payment may pose a threat to the stability policies of the IMF, for they fall outside the organization’s regulatory framework and, as a consequence, the IMF cannot acquire them directly. So, IMF has a very limited power in relation to Bitcoins or any other cryptocurrency, especially in case of speculative attacks against conventional weak (depreciated in value) currencies. Such an attack may further depreciate the value of the currency affected, and in so doing, it would destabilize the whole international foreign currency exchange market. Thus, if the value of Bitcoins continued to increase, turning it into a ‘hard currency’ on international markets, then the possibility to carry out speculative attacks by means of it would increase as well, unless the IMF acts so as to bring Bitcoins under its control and obtain the necessary amount of such cryptocurrency (prior to its price surge) to possibly counter speculative attacks. Nonetheless, the IMF is currently ill-equipped to face any speculative attacks executed through Bitcoins. In order to remedy such deficiency, the institution may rely upon its founding document, *i.e.* the Articles of Agreement, and enlarge the scope of application of

In so doing, Bitcoins may not only be legitimized but may also find the strength to 'ensure' their endurance over time, since every virtual currency is based on a mathematically devised protocol and, as such, it «is vulnerable to superior future cryptography advances»⁹⁴. So, Bitcoin's widespread acknowledgment goes also hand in hand with the capacity of the Bitcoin's system to constantly improve itself in order to keep up with the technological developments so as to definitively secure its position over its competitors.

6. Conclusions

The cyber-space and the various activities occurring inside it amount to a diverse world as opposed to the 'real one': namely, a world which is virtual and is not identified by geographic features, and which, as such, may also be classed under different legal institutes and be governed by specific provisions.

By virtue of this understanding, in the past, it has been suggested that online activities ought to be regulated by laws which should not be linked to specific legal or geographical areas, such as for instance the *lex electronica*⁹⁵.

Nonetheless, this proposal has proved to be inherently defective for it implied the necessity to establish a sort of *super partes* international body which would have promulgated said laws – a rather unfeasible solution on the part of National legislations⁹⁶.

certain provisions so as to encompass also digital currencies, or, as an alternative, the Articles of Agreement may be «amended to grant Bitcoin quasi-membership status in the IMF itself». Obviously, such an official recognition on the part of IMF would represent a sheer legitimization of Bitcoins.

In any case, thus far, IMF has not taken measures in relation to Bitcoins, on the basis of the fact that this electronic means of payment is going to be produced in such a limited amount that cannot destabilize the monetary policies of the organization. Nonetheless, Bitcoins may be regarded as a first alarm bell in view of the possibility that new and more advanced cryptocurrencies might be developed in the next years which may actually undermine IMF' activity.

⁹⁴ TRAUTMAN, *Virtual Currencies Bitcoin & What Now*.

⁹⁵ See in this regard, BARLOW, *A declaration of the Independence of Cyberspace*, available at <http://homes.eff.org/~barlow/Declaration-Final.html>.

⁹⁶ It is clear that the nature of cyberspace creates the need for Countries to negotiate in order to meet their respective aims by finding common grounds and avoiding conflict. This understanding may serve as a precursor for the establishment of an international regulatory

In truth, under such circumstances the most common initial reaction is the recourse to prohibitive measures. However, as it emerged also from our analysis, radical prohibition is not considered beneficial. Seeking to halt the Bitcoin phenomenon by outlawing it would, in fact, represent a demanding undertaking given the decentralized, private and potential anonymous nature of Bitcoins coupled with the almost unlimited access to the Internet in the current 2.0 digital era. Moreover, the forbiddance of Bitcoins, and similar cryptocurrencies, even though implemented for rightful reasons, (e.g. anti-money laundering activities), would deprive individuals of the advantages that are inherent in such a system. It is also worth highlighting that cryptocurrencies, and virtual currencies in general, are increasingly gaining ground; so, it might even be expected that the constant ‘dematerialization’ of money currently affecting our economy may eventually lead to the establishment of a ‘cash-less society’⁹⁷, characterized not only by virtual transfers of money but also by the full - though gradual - disappearance of paper money.

In light of this potential outcome, resorting to a fierce opposition to Bitcoins appears to be not only impractical but, as maintained by the proponents of Bitcoin’s legalization, even detrimental to States, which, on the contrary, could benefit from their regulation in terms of revenues (e.g. through taxation⁹⁸) and crackdown on organized crime.

framework encompassing permissive, restrictive and hostile States rather than a case-by-case legislation or sector-specific solutions.

⁹⁷ There are however authors who maintain that even though e-money and in general the world of electronic payment systems were initially enthusiastically embraced as means for a quick passage to a cashless society, this outcome is unlikely to be achieved. For one thing, e-money and virtual or cryptocurrencies amount to a mere additional means of payment used by a small share of market actors, and, on the other hand, even though the current society is characterized by a minimal use of cash, there will always be the need for a common means of exchange that would serve as a unit of account for all such new ‘currencies’ will be denominated in national fiat currencies. See, respectively, PAPADOPOULOS, *Electronic Money and the Possibility of a Cashless Society*, (February 2007). Available at SSRN: <http://ssrn.com/abstract=982781> or <http://dx.doi.org/10.2139/ssrn.982781>, and also KRUEGER, *Towards a Moneyless World?*, University of Durham, Department of Economics, Working Paper Series No. 9916, 1999. Available at SSRN: <http://ssrn.com/abstract=1121843> or <http://dx.doi.org/10.2139/ssrn.1121843>.

⁹⁸ In this regard, different interpretations have been given by EU member States as to the possibility to include Bitcoins under the exemptions from VAT laid down in article 135, paragraph 1, letter (e) of the Council directive 2006/112/EC on the common system of value added tax stating that the following transactions shall be exempted, that is «transactions, including negotiation, concerning currency, bank notes and coins used as legal tender, with the exception of collectors' items, that is to say, gold, silver or other metal coins or bank notes

At the same time, though, careful thought shall be given to the consequences of Bitcoin regulation as well, because if governments and international organizations exceeded in overregulating this domain, the benefits attached to it would definitely disappear⁹⁹.

Perhaps, it might be argued that the adoption of the ‘wait and see attitude’ may be a valid alternative, at least for the moment, notwithstanding the potential economic benefits arising from the regulation of Bitcoins. This option would in fact enable States to observe the evolution of Bitcoins over time before taking the appropriate measures. Actually, it is still too early to predict Bitcoin’s future and we may even witness an unexpected – though not so unusual – development: the Bitcoin system may eventually implode (due to market forces) or be replaced by either more advanced cryptocurrencies or new and still unknown means of payments, and this would make any attempt to regulate the system basically useless¹⁰⁰.

In the end, leaving aside the unproductive effort to categorize and regulate Bitcoins themselves, the law, and in particular legislators, shall in the first place acknowledge the existence of Bitcoins and focus on what surrounds them and how they can make provisions for it, since, for the time being, the issue of digital currencies’ regulation is far from being solved¹⁰¹.

which are not normally used as legal tender or coins of numismatic interest» (cf. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0112>). In June 2014, the EU Court of Justice received a preliminary ruling (C- 264/14) which was lodged by the Swedish Supreme Administrative Court, raising the issue of the applicability of the art. 135, paragraph 1 of the aforementioned directive to virtual currency exchanges. (<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62014CN0264>). So far, the Court has not decided the case yet; it is however noteworthy that it is debating the possibility to define Bitcoins as ‘services’.

⁹⁹ PERUGINI & MAIOLI, *Bitcoin tra Moneta Virtuale e Commodity Finanziaria*.

¹⁰⁰ The development of innovations and the relevant products (e.g. Bitcoins, as well as new technologies, games, etc.) may be described by referring to the upside down form of the letter ‘J’. This peculiar curve represents the initial phase of interest and circulation of innovations, which is followed by a surge (after their mainstream acknowledgment) up to the saturation point; thereafter, due to various reasons (such as, drop in interest or consensus, rise of new and more advanced technologies, etc.) the demand for the innovation at issue starts shrinking and continues to decrease unless initiatives are taken so as to bring it back in line with the market’s needs.

¹⁰¹ MIDDLEBROOK & HUGHES, *Regulating Cryptocurrencies*. A growing amount of literature has been published recently on this subject. See, for instance, MARIAN, *A Conceptual Framework for the Regulation of Cryptocurrencies*, 81 *U Chi Rev Dialogue*, 2015, and that by TU & MEREDITH, *Rethinking Virtual Currency Regulation in the Bitcoin Age*, 90 *Wash L Rev*, 2015.