



**THE DIGITAL CURRENCY AND THE CHALLENGES BEYOND THE NEW GLOBAL
WORLD'S BLOCKCHAIN PARADIGM**

A FINANCIAL AND TAX OVERVIEW ON THE VIRTUAL CURRENCY EFFICIENCY

Maurício Portieri Pignatti

Career Focused Master's Programme in Financial and Tax Law

Prof. Dr. Carlos Manuel Baptista Lobo

University of Lisbon School of Law

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Abstract

The Blockchain technology that revolutionized the world was launched in 2008 with the publication of the paper undertitled 'Bitcoin: A Peer-to-peer Electronic Cash System', by the enigmatic pseudonym of Satoshi Nakamoto, which described a version of electronic cash that allowed online payments to be directly made from one party to another. Succeeding the groundbreaking transformation that was carried out, cryptocurrencies commenced to shift the monetary system to a predominantly digital one, more adapted to the reality of a fast, technological, audacious and computerized world, interconnected by the largest and worldwide network ever seen. Behind this ingenious structure comes the concept of Blockchain, Virtual Currencies and Distributed Ledger Technology (DLT), innovative and high-tech tools of security and storage that aim to reduce mistakes, frauds and costs. Decentralization, transparency and immutability are the three pillars that allow the safekeeping of private relations in order to generate confidence, reduction of finance transaction costs as well as reinforce any and all public relations involved. On the other hand, these revolutionary novelties follow an unregulated social pattern, fostering an unbridled advance by generating vast uncertainties, diversity and asymmetries. In order to reduce its vulnerabilities, these technologies are in most need of a financial and tax regulatory effort to align them under a uniform concept, as well its main characteristics and aptitudes. Beyond the legislative and conceptual approach, the challenges of a digital era and the financial revolution lead the world to innovative methods to solve issues that have arisen. The Blockchain, DLT and Virtual Currencies provide transformation and key answers that might contribute to efficient, scientific and solid solutions in real-time to governmental activities, specially tax administrations. Considering its foremost democratic and accountable features, they can be used in e-identities, personal records, assets inventories, citizenships, border control, tax transparency, financial and tax compliance, and especially smart contracts on public administration. From this perspective, it is key to scrutinize the efficiency of the new world's Blockchain paradigm in order to verify its utmost reliability prospective.

Keywords: Cryptocurrencies; Virtual Currencies; Bitcoin; Blockchain; Distributed Ledger Technology.

Resumo

A tecnologia Blockchain que revolucionou o mundo foi lançada em 2008 com a publicação do artigo intitulado 'Bitcoin: A Peer-to-peer Electronic Cash System', pelo enigmático pseudônimo Satoshi Nakamoto, que descreveu uma versão do dinheiro eletrônico que permitia pagamentos online a serem feitos diretamente de uma parte para outra. Sucedendo a transformação inovadora que foi realizada, criptomoedas começaram a mudar o sistema analógico para um predominantemente digital, mais adaptado à realidade de um mundo rápido, tecnológico, audacioso e informatizado, interconectado pela maior e mundial rede já vista. Por detrás desta engenhosa estrutura surge o conceito de Blockchain, Moedas Virtuais e Distributed Ledger Technology (DLT), ferramentas inovadoras, de alta tecnologia de segurança e armazenamento que visam reduzir erros, fraudes e custos. Descentralização, transparência e imutabilidade são os três pilares que permitem a salvaguarda das relações privadas, a fim de gerar confiança, reduzir os custos de transação financeira e reforçar todo e qualquer relacionamento público envolvido. Por outro lado, essas inovações revolucionárias seguem um padrão social desregulado, promovendo um avanço desenfreado, gerando vastas incertezas, diversidade e assimetrias. A fim de reduzir suas vulnerabilidades, essas tecnologias estão necessitam de um esforço de regulamentação financeira e tributária para alinhá-las sob um conceito uniforme, assim como suas principais características e aptidões. Além da abordagem legislativa e conceitual, os desafios de uma era digital e da revolução financeira levam o mundo a métodos inovadores para resolver problemas que surgiram. O Blockchain, o DLT e as Moedas Virtuais fornecem transformação e respostas-chave que podem contribuir para soluções eficientes, científicas e sólidas em tempo real para atividades governamentais, especialmente administrações fiscais. Considerando suas principais características democráticas e responsáveis, elas podem ser usadas em identidades eletrônicas, registros pessoais, inventários de ativos, cidadanias, controle de fronteiras, transparência fiscal, conformidade financeira e tributária e, especialmente, smart contracts na administração pública. A partir dessa perspectiva, é fundamental analisar a eficiência do novo paradigma mundial Blockchain para verificar sua máxima prospectiva confiabilidade.

Palavras-chave: *Criptomoedas; Moedas Virtuais; Bitcoin; Blockchain; Distributed Ledger Technology.*

Resumo

O contexto histórico mundial revelou vários aspetos e facetas da integração entre os países e, conseqüentemente, do crescimento tecnológico. As finanças e a tecnologia, antes do século XIX, foram combinadas para produzir o primeiro período de globalização financeira que durou até a eclosão da Primeira Guerra Mundial e gerou uma tendência internacional de promover a interação entre os países por meio da tecnologia. O período pós-guerra permitiu uma evolução exponencial das comunicações e da tecnologia da informação e a revolução industrial possibilitou o avanço da economia em escala global.

A Internet foi outro fator que inquestionavelmente contribuiu para um processo acelerado de integração global e conseqüente aprimoramento da comunicação e do comércio. Foi precisamente nessa conjuntura histórica que a Moeda Virtual surgiu em decorrência da evolução tecnológica desenfreada. A este respeito, a Moeda Virtual melhorou muito o modo como as pessoas conhecem o dinheiro, revelando um novo formato para o mundo, quebrando os paradigmas econômicos e sociais existentes e acompanhando o desenvolvimento geral de tecnologias como a computação e a *World Wide Web*.

Foi exatamente neste conceito evolutivo que, em 2008, com a publicação do artigo intitulado 'Bitcoin: A Peer-to-peer Electronic Cash System', o enigmático autor conhecido como Satoshi Nakamoto descreveu uma versão do dinheiro eletrônico que permitiria pagamentos online realizados diretamente de uma pessoa para outra, sem a necessidade de partes interpostas, quebrando todos os paradigmas da história financeira mundial e criando um sistema difuso, anônimo, não legitimado por qualquer governo ou outra entidade legal e independente. Esta tecnologia possui três características principais, quais sejam, descentralização, transparência e imutabilidade, que permitiram seu grande sucesso, rápida evolução, ganho de valor e aceitação.

Por trás desse conceito abrangente e inovador, a Moeda Virtual precisa de uma regulamentação extremamente eficaz, sustentável e eficiente. Neste campo, há um imenso esforço de algumas instituições e países, especialmente a nível da UE, para produzir regulações sobre a gestão e o uso de moedas virtuais. Embora muitos países se esforcem para aplicar a legislação existente ao assunto, um padrão uniforme é necessário para fornecer uma estabilidade mínima às moedas.

Considerando a ausência de um consenso conceitual, no tratamento tributário, nas legislações nacionais e no mercado financeiro, há uma nítida assimetria e, conseqüentemente, uma profunda fragilidade do sistema financeiro. Tendo em vista este problema, a regulação das Moedas Virtuais deve passar por uma purificação conceitual, bem como um alinhamento mundial sobre a forma de legitimação dessa nova moeda e uma nova maneira de ver o mundo. Diante disso, as Moedas Virtuais devem passar por pelo menos três abordagens uniformizadoras diferentes: uma regulatória, uma jurisdicional e uma conceitual.

O caso *Skatteverket versus David Hedqvist*, aplicado pela maioria das jurisdições europeias e não-europeias, busca uma uniformização a respeito da incidência do IVA em uma transação financeira relacionada ao Bitcoin. A questão principal trazida pelo precedente é se o Sr. Hedqvist, através de uma empresa, deve pagar o IVA sobre a troca de moeda fiduciária pelo Bitcoin e vice-versa? Nesse caso, o artigo 135(1) da Directiva 2006/112/EC de 28 de novembro 2006 deve ou não isentar a tributação do IVA nessas trocas? A decisão tomada no processo é no sentido de não incidir IVA nas transações que envolvam troca de moedas tradicionais por unidades da moeda virtual, nomeadamente o Bitcoin, nos termos do artigo 135(1)(e) da Directiva e incidir o referido imposto em transações envolvendo depósitos de fundos, contas correntes, pagamentos, transferências, créditos, cheques e outros efeitos de comércio, com exceção da cobrança de dívidas prevista no artigo 135(1)(d) da Directiva, assim com o em negociações relativas às acções, participações em sociedades ou em associações, obrigações e demais títulos, com fulcro no artigo 135(1)(f) da Directiva.

Ainda referente à necessária uniformização ora discutida, os Estados devem se mover para uma posição mais defensiva da ordem pública, delineando um caminho regulatório mínimo que possa estabelecer parâmetros razoáveis em relação às Moedas Virtuais e *Initial Coin Offers* (ICOs).

Ademais, as instituições reguladoras, como o Banco Central Europeu, a ESMA, o GAFI, o FinCEN, a CFTC, a SEC, a BMF, o Banco de Portugal, o Banco Nacional da Bulgária, a CBC, a CNB, a BaFin, a Banca d'Italia, FCA e a OCDE devem promover esforços que criem um conceito uniforme em relação às Moedas Virtuais, permitindo um tratamento tributário alinhado.

No contexto europeu, a AMLD 5 – Directiva (UE) 2018/843 – gerou uma grande revolução no que tange à tipificação das Moedas Virtuais, demonstrando a preocupação prodigiosa da União Europeia em observar uma diligência mínima vinculada às transações

financeiras envolvendo novas plataformas digitais. Este quadro regulamentar surge em resposta à fragilidade do sistema digital e às aberturas que se desenvolvem principalmente devido ao anonimato, à informação assimétrica e ao risco do branqueamento de capitais (lavagem de dinheiro), financiamento do terrorismo e evasão fiscal.

A AMLD 5 adota um conceito bem definido e abrangente sobre as moedas virtuais e isso denota um avanço e uma intenção de desenvolver uma regulamentação sobre o assunto. Faz-se necessário, no entanto, buscar saber se a referida Diretiva é suficiente para garantir segurança às novas transações financeiras digitais e as questões relacionadas às Moedas Virtuais. Sobre o referido assunto, pode-se concluir que, apesar de não abordar situações limítrofes nem regular todas as transações envolvendo as Moedas Virtuais, a compreensão conceitual estabelecida na Diretiva, a respeito das Criptomoedas, corresponde ao seu conceito atual, que são caracterizadas por serem descentralizadas; por possuírem uma representação digital de valor; não serem ligadas a uma moeda legalmente estabelecida; não possuírem um *status* legal de moeda ou dinheiro; e serem eletronicamente transferíveis, armazenáveis e negociáveis.

Apesar das questões relativas à regulamentação das Moedas Virtuais e os problemas ligados ao alto consumo energético de sua produção, a tecnologia fornece muitas ferramentas para solucionar os problemas antigos, atuais e futuros. A tecnologia Blockchain e a *Distributed Ledger Technology*, quando investidas em estruturas financeiras e governamentais, têm um alto potencial de simplicidade e eficiência. Elas também podem fornecer melhoria de eficiência regulatória, permitindo o monitoramento dos processos financeiros, proporcionando uma redução do tempo de risco, transparência na obtenção de liquidez e pode resolver os novos problemas vinculados à Moeda Virtual.

Neste sentido, as citadas tecnologias podem reduzir a possibilidade de fraude e custos operacionais, promover a inclusão financeira, diminuir a opacidade e as assimetrias de informação, promover o crescimento econômico, proteger os dados e aumentar a segurança. Também podem criar a possibilidade de rastrear o dinheiro gasto, reduzir a evasão fiscal, além de apoiar políticas anti-lavagem de dinheiro, combater o terrorismo, ajudar na identificação de indivíduos e empresas e facilitar as trocas de informações, gerando, portanto, um sistema científico.

Os usos das referidas tecnologias também pode gerir a administração tributária no setor público, para melhorar os processos de identificação individual, assim como a exploração

do que hoje é conhecido como Regtech e podem dar uma solução para os problemas atuais e futuros relacionados às instituições financeiras e às moedas virtuais. Portanto, o uso da própria ferramenta permite dar resposta eficaz às falhas criadas pelas inovações, visando a máxima eficiência e o menor custo. A urgência pela inovação, a necessidade de reforçar a segurança e a efetividade do serviço, abrem espaço para a Blockchain, como um método atual de regulação, monitoramento e proteção da soberania, valores e sistemas.

Apesar do longo caminho à frente de necessária estabilização e adaptação de seus conceitos à sociedade e ao mundo, é possível que as moedas digitais sejam, muito provavelmente, o futuro dos padrões monetários. As tecnologias incorporadas e desenvolvidas para a propulsão de moedas digitais, como o Blockchain, são o elemento-chave para o avanço e a mudança de padrão do antigo sistema financeiro. Portanto, em uma breve análise, o Bitcoin é apenas o começo, enquanto o Blockchain e outras tecnologias inovadoras sem dúvida, são o futuro.

List of Abbreviations

ACPR	<i>Autorité de Contrôle Prudentiel et de Resolution</i>
AEoI	Automatic Exchange of Information
AMF	<i>Autorité des Marchés Financiers</i>
AML	Anti-Money Laundering
AML/CFT	Anti-Money Laundering/Combating the Financing of Terrorism
AMLA	Anti-Money Laundering Act
AMLD	Anti-Money Laundering Directive
AMLD4	Fourth Anti-Money Laundering Directive
AMLD5	Fifth Anti-Money Laundering Directive
BaFin	Federal Financial Supervisory Authority
BMF	<i>Bundesministerium der Finanzen</i>
BOFiP	<i>Bulletin Officiel des Finances Publiques-Impôts</i>
CFT	Countering the Financing of Terrorism
CFTC	Commodity Futures Trading Commission
CIFs	Cyprus Investment Firms
CNB	Czech National Bank
CONSOB	<i>Commissione Nazionale per le Società e la Borsa</i>
CRS	Common Reporting Standard

DAOS	Decentralized Autonomous Organizations
DLT	Distributed Ledger Technology
EBA	European Banking Authority
ECB	European Central Bank
ESMA	European Securities and Markets Authority
EU	European Union
FATCA	Foreign Account Tax Compliance Act
FATF	Financial Action Task Force
FCA	Financial Conduct Authority
FFI	Foreign Financial Institutions
FinCEN	Financial Crimes Enforcement Network
FINMA	Swiss Financial Market Supervisory Authority
FIU	Financial Intelligence Units
FMA	Financial Market Authority
FSMA	Financial Services and Markets Authority
GFSC	Gibraltar Financial Services Commission
GST	Goods and Services Tax
ICO	Initial Coin Offering
IRS	Internal Revenue Service
JFSC	Jersey Financial Services Commission
MIT	Massachusetts Institute of Technology

NFFE	Non-Financial foreign Entities
NPPS	New payment products and services
OECD	Organisation for Economic Co-operation and Development
PSD	Directive on Payment Services
SEC	Securities and Exchange Commission
SKAT	Danish Tax Authority
SMSG	Securities and Markets Stakeholders Group
VC	Virtual Currencies
WEF	World Economic Forum

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PART I – INTRODUCTION

1.1. A general presentation

Historically, few financial matters were as global and as widespread as the Blockchain and Virtual Currencies concepts and its applications. Curiosity and speculation on this subject helped to improve evolution and fostered the spectre of its use.¹

The Blockchain is the result of a digital era, its rapid need to develop new financial instruments and an innovative way of building the world. This technology assists with the primacy and promptness of transparency², traceability of values and transactions, keeps data organized and secure, facilitates access to markets, improves transactions efficiency and ensures an organized and decentralized system.

Known for its application in digital currencies, Blockchain has been increasing its development and application in many other areas³ especially in the public and private sectors⁴, with e-identities, smart contracts, health, transportation, agriculture, environment, production management, and especially in the tax system.⁵

Nevertheless, the condition *sine qua non* for the financial world to be able to operate is the security of its transactions, and this is the element that precisely supports Blockchain technology. By an avid approach to science and regardless of the state management and centralization of decisions and control, it initiates a precise, transparent and reliable system,

¹ More information on: Kharpal, Arjun (2018). *Beyond bitcoin: How the world is experimenting with the blockchain*. CNBC. Retrieved from: <https://www.cnbc.com/2018/08/29/bitcoin-world-is-experimenting-with-blockchain.html>.

² OECD (2018). *The OECD Blockchain Primer*, OECD Publishing, Paris, pp. 3; 9. Retrieved from: <https://www.oecd.org/finance/OECD-Blockchain-Primer.pdf>.

³ Berryhill, Jamie; Bourgery, Théo; Hanson, Angela (2018), *Blockchains Unchained: Blockchain Technology and its Use in the Public Sector*, OECD Working Papers on Public Governance, N°. 28, OECD Publishing, Paris, pp. 24-28. Retrieved from: <http://dx.doi.org/10.1787/3c32c429-en>.

⁴ The blockchain technology can be used for instance in the Public Sector on e-identities, credentials, licenses, personal records health, insurance, financial services and banking, land title registries, supply chain management, asset tracking, inventorying, benefits, entitlements, contract and vendor managements, energy utilities, copyrights, voting, mitigating and identifying fraud, streamlining interagency and cross-sector processes.

⁵ Kharpal, Arjun (2018). *Beyond bitcoin: How the world is experimenting with the blockchain*. CNBC, cit.

thus uniting a concept already known in accounting – Distributed Ledger Technology (hereinafter: DLT)⁶ to encryption within a group of users.⁷

However, whereas this new technology and the aspiration for novelties advances as data speeds; society, legislation and governments are evolving conservatively on the subject. This is due to the fact that the amalgamation and management of so many innovations and trends generate often unsolvable and insurmountable issues that arises from this complex technology, which may obscure its continuity or prevents its growth rate. For this problem to be solved, the theme under analysis must be evaluated under a regulatory, efficiency and sustainability approach.

Undeniably, the world historical environment allowed the rise of a technological and monetary evolution that breaks with all imaginable archetypes.⁸ In view of this, the creation of digital currencies, through the application of Blockchain technology, became a very still unknown reality, but widely diffused and which started being part of the most diverse discussions and speculations.

1.2. A digital currency overview

To better comprehend the arise of the digital currency beyond the new global world's Blockchain paradigm, it is of most importance to uncover the relevance, seriousness and reliability of this new world configuration.

The revolutionary power of the Virtual Currency arose through social longing and the adaptation of the so-called ‘analog’ system to the ‘digital’ system, more adjusted to the reality of a fast, audacious and computerized world, interconnected by the largest and worldwide network ever seen.

⁶ The principal tool of the blockchain is the DLT, which is preserved by all nodes in the network.

⁷ Nakamoto, Satoshi (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, pp. 1; 3. Retrieved from: <https://bitcoin.org/bitcoin.pdf>.

⁸ Denery, Keegan F. (2017). *Blockchain: The Fifth Disruptive Computing Paradigm*. Academia, pp 2-3. Retrieved from: https://www.academia.edu/33147652/Blockchain_The_Fifth_Disruptive_Computing_Paradigm.

The rise of this unbridled technology impacts the world and its social relations, as well as industries and businesses. With the upsurge of different scientific applications and adaptations, a full scope of new regulations is required.

The gradual shift that technological innovation promotes benefits the society by generating opportunities, modifying the *status quo* that is rooted in cultures and social configurations – thus its prejudices and blockages – and challenges the most solid and fundamental limits of a nation and even groups of countries, such as the European Union.

It is precisely in this context that several issues emerge, such as conflicts of jurisdictions, possible intergenerational repercussions difficulties related to the liability, property, enforceability and data privacy, which require a new approach and solutions.

In response to this, governments gradually create regulations⁹ in an attempt to impose limits to the complex and boundless power of global networks and technology. For this reason, it is necessary to analyse the most frequent and delicate legal issues associated to the Blockchain and Cryptocurrencies, in the current financial and tax frameworks.

In light of this, the application of Blockchain technology in one hand promotes more effectiveness and better performance of the system as a whole, through self-verification and execution, tamper resistance, autonomy and therefore unnecessary of third parties, accuracy, cost reductions, enforcement of legal obligations and security. On the other hand, it can compromise the energy consumption on the Virtual Currency mining, generate doubts about its confidence and also antagonize a conservative position on financial and tax matters.

From this perspective, it is key to scrutinize the efficiency of the digital currency in its aforementioned aspects of lack of coverage and legitimacy, as to verify its utmost reliability prospective.

In order to estimate its possible sustainability and evaluate its efficiency, it is primarily required a historical digression through the financial globalization process, with the aim of revealing the ballast and context in which the digital currency, the Blockchain systems and Virtual Currencies, such as the Bitcoin, have been developed.

⁹ For example, the Fourth and Fifth Anti Money Laundering Directives that will be further evaluated.

PART II – HISTORICAL EVOLUTION

2.1. A financial and technological background

In the final years of the 18th century, economy and technology merged to produce the first period of financial globalization that lasted until the outbreak of World War I. In the wake of this time, a growing worldwide tendency towards interaction between countries namely through the telegraph, railways, radio and steamships supported cross-border interconnection by promoting the transmission of global information. The financial sector, at the same time, has provided the resources indispensable to develop these ground-breaking innovations.¹⁰

In the post-war phase, financial globalization and technological improvements – particularly those arising from conflict – have evolved exponentially, remarkably in communications and information fields.¹¹

Beginning in one of the first countries to exhibit industrial activities, England¹², the Industrial Revolution was an incontestably relevant historical landmark for worlds society. The transformations that took place in Western Europe in the eighteenth and nineteenth centuries made conceivable, through its assorted phases and moments, the birth of the world as we know it today.

¹⁰ On the subject, John Maynard Keynes gives a clear picture of the interconnection between economy and technology in this first phase of globalization: “*The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he could see fit, and reasonably expect their early delivery upon his door-step; he could at the same moment and by the same means his adventure in the natural resources and new enterprises of any quarter of the world, and share, without exertion or even trouble.*” (Keynes, John Maynard (1920). *The Economic Consequences of the Peace*. Cambridge. New York. Retrieved from: <https://oll.libertyfund.org/titles/303>).

¹¹ Arner, Douglas W.; Barberis, Janos N. and Buckley, Ross P. (2015). *The Evolution of Fintech: A New Post-Crisis Paradigm?*. University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62, p. 8. Retrieved from: <https://ssrn.com/abstract=2676553>.

¹² In the words of Eric J. Hobsbawm, “*The very name of industrial revolution reflects its relatively late impact on Europe. The thing existed in England before the end. The English and French socialists - themselves a group without predecessors - only invented it around the 1820s, probably by analogy with the political revolution in France. Still, it would be well advisable to consider it first, for two reasons. First, because in fact it "exploded" - using the expression as an axiom - before the Bastille was assaulted; and second, because without it we cannot understand the impersonal volcano of history upon which the most important men and events of our period were born, and the uneven complexity of its rhythm.*” (Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 28).

For the first time in history, the productive power of societies was allowed to become capable of fast, unlimited and exponential growth. The speed of the processes of accumulation and production, from the mid-eighteenth century on, was intensified and proved irredeemable. Nonetheless, historians took as decisive the 1780s as the time frame qualified of generating relevant statistical indicators. In the words of Eric J. Hobsbawm, “*The economy became, as it were, airborne.*”¹³

Nevertheless, what could be the connection of the referred historical moments to the transformations of the current economy, namely the ones brought by the advent of the Virtual Currencies and other technologies?

The Accelerated Evolution or Industrial Revolution was never an event of origin and purpose, so it is not possible to delimitate when it was completed, because, in fact, this time frame extends to the present day. At most, “*we can ask when the economic transformations had gone far enough to establish a substantially industrialized economy, capable of producing, broadly speaking, anything it wanted within the range of the available techniques, a 'mature industrial economy'*”.¹⁴

Under all prisms one looks at matter: the Revolution described was one of the most important events in history that, for non-accidental reasons, allowed the growth of the economy on a global weighbridge.¹⁵

In this sense, introducing the key element of this scenario, Hobsbawm remembers that the economy, at this time, was for part of Europe a moment of great prosperity and growth, emphasizing that the business activities, due to the period, were in a place of opulence and economic expansion, engaged in the interest of raising money and flourishing, particularly in the eighteenth century. On these premises, Hobsbawm elucidates that “*sooner or later this expansion, assisted by a gentle inflation, would have pushed some country across the threshold which separates the pre-industrial from the industrial economy.*”¹⁶

The financial ramifications of the industrial revolution has also brought to modern times the approach between economy and currency, and therefore, its unfolding structure,

¹³ Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 28.

¹⁴ Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 29.

¹⁵ In this regard, Hobsbawm points out that: “*By any reckoning this was probably the most important event in world history, at any rate since the invention of agriculture and cities. And it was initiated by Britain. That this was not fortuitous, is evident.*” (Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 29).

¹⁶ Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 32.

indicating that there was a preoccupation in maintaining a slightly stability.¹⁷ Now rampant, uncontrolled, and very well shaped, the whole economy has developed based on the parameters that began in the times of industrialization and was subsequently triggered by the wars. Although the moment has been accompanied by additional inflation, the legacy left by the period is admirable.¹⁸

Contrary to the idea thus described, today's economy depends on a myriad of other cost-effective aspects. The era of revolutions, as well as the unbridled globalization brings to the present an uncontrollable variety of dynamics, news and information, at a speed never seen as well as the need for an efficient and sustainable model.¹⁹

The economy has straightforwardly developed, as has technology and all the elements we know today. As a result, information technology tools were developed commercially in computers and calculators, and for companies, credit cards were introduced as a means of payment, in the 1950s. A telex-global network took place, providing fundamental communications necessary to build the stages of a global financial development. The fax was introduced in 1964, and in 1967, in the United Kingdom, the first ATM was implemented.²⁰

Currency, as expected, obeyed the basic rule of financial power and has evolved to be the world's inherent monetary standard.

2.2. Technological evolution

Internet, which definitely boosted the acceleration of globalization and the creation of a collateral virtual world – e-commerce, social networks, Virtual Currencies, among other

¹⁷ In Hobsbawm words: “Nor was there any difficulty about the technique of trade and finance, private or public. Banks and banknotes, bills of exchange, stocks and shares, the technicalities of overseas and wholesale trade, and marketing, were familiar enough and men who could handle them or easily learn to do so, were in abundant supply. Moreover, by the end of the eighteenth-century government policy was firmly committed to the supremacy of business. Older enactments to the contrary (such as those of the Tudor social code) had long fallen into desuetude, and were finally abolished—except where they touched agriculture—in 1813-35.” (Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 51).

¹⁸ Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books, p. 32.

¹⁹ Hobsbawm, Eric J. (1996). *The Age of revolution, 1789-1848*. New York. Vintage Books.

²⁰ Arner, Douglas W; Barberis, Janos N.; and Buckley, Ross P. (2015). *The Evolution of Fintech: A New Post-Crisis Paradigm?*. University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62, p. 4, cit.

infinite instruments – arose in the 1960s²¹. A series of memos written by Joseph Carl Robnett Licklider of MIT, in August 1962, discussed the idea of a ‘Galactic Network’ which translated the idea of a globalized network intercommunication.²² The Arpanet, a packet switching system emerged as a result of those introductory fundamentals.²³

In 1970, the first online information providers – Lexis and Dialog – as well as the first global network data to connect users, were developed. The progress of computerized banking networks has also emerged, allowing the transmission and exchange of data to establish business for companies and industries.

In the 1980s, computer network services were even more open, enabling the first consumer networks, such as CompuServe and Prodigy, as well as the establishment of commercial e-mail services and other derivative technologies. Two decades later, internet was popularized by the World Wide Web technology, which had a huge cultural and social impact, modifying even interpersonal relations and communications, finance, commerce, among others, much seen nowadays.²⁴

Transcribing this historical evolution into numbers, we can see the geometric growth of internet activity from 16 millions of users in 1995 to 4383 millions in March 2019, as can be seen from the Appendix A²⁵, which demonstrates the undeniable and known permeability of technology in society and its potential to change the world paradigms.

It’s in this precisely historical environment that the Blockchain technology and Virtual Currencies were developed, following the unrestrained technological evolution, triggered by the referred periods. This new landscape, derived from financial globalization, has initiated a series of social, legal and economic challenges under the prism of a new era of electronic commerce transactions, much more efficient, cost-effective, fast and borderless.²⁶

²¹ Campbell-Kelly, Martin and Garcia-Swartz, Daniel D. (2005). *The History of the Internet: The Missing Narratives*. Retrieved from: <https://ssrn.com/abstract=867087>.

²² Leiner, Barry M.; Cerf, Vinton G.; Clark, David D.; Kahn, Robert E.; Kleinrock, Leonard; Lynch, Daniel C.; Postel, Jon; Roberts, Larry G.; Wolff, Stephen (1997). *A Brief History of the Internet*. Retrieved from: <https://www.internetsociety.org/internet/history-internet/brief-history-internet/>.

²³ ARPANET was one of the main proposals for the concept of internet and was shaped by public and private initiatives.

²⁴ Campbell-Kelly. Martin and Garcia-Swartz, Daniel D. (2005). *The History of the Internet: The Missing Narratives*, cit. pp. 3, 4.

²⁵ See Appendix A.

²⁶ Campbell-Kelly; Martin and Garcia-Swartz, Daniel D. (2005). *The History of the Internet: The Missing Narratives*, cit. 4; 21.

PART III – BLOCKCHAIN, BITCOIN AND VIRTUAL CURRENCY CONCEPTS

3.1. The Blockchain concept

Blockchain is a mass sequence that comprises a historical list of operation records, such as the standard public book. It is also the technology behind the Bitcoin that allows people who do not know or trust each other to build a consistent accounting record. In other words, it is the revolutionary way to use the internet to construct a trust-based relationship.²⁷

The encryption methods and the application of successions of mathematical algorithms provide the data structure. In this context, the data recorded cannot be modified, removed nor transformed, which generates transparency and security to the block's transactions mainframe.

Blockchain, essentially, is a specific kind or subset of the so-called Distributed Ledger Technology (DLT). DLT is a distribution system across numerous computers in the network with identical data records, cooperatively preserved and structured by a disseminated arrangement of computer servers.²⁸

Therefore, one of the main characteristics of the Blockchain concept is the existence of a public digital ledger network of an encoded and certified cross-checked recording. This structure uses the notion of distribution of information in order to share a Blockchain-based-system which eliminates third parties ensuring the integrity and clarity of the transmitted data. The distribution and sharing of data over the Blockchain network is immutable²⁹ and

²⁷ Blockchain is a “tamper-evident, shared digital ledger that records transactions in a public or private peer-to-peer network”. Sloane Brakeville, Bhargav Perepa (2018). *Blockchain basics: Introduction to distributed ledgers*. IBM Developer. Retrieved from: <https://developer.ibm.com/tutorials/cl-blockchain-basics-intro-bluemix-trs/>.

²⁸ Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain – Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee. Belgium, p. 15. Retrieved from: <http://www.europarl.europa.eu/supporting-analyses>.

²⁹ In this sense: “In general, once a transaction is added to a Blockchain ledger, it cannot be undone. This immutability is one of the principle aspects that contribute to the trustworthiness of Blockchain transactions. With a traditional, centralized database when a user adds or modifies data, they connect with the server to make their changes, and the data remains on the server. Because all of the data is held in one place, if the security of the server or the authority that runs the server is compromised, data can be modified or deleted (Ray, 2017).” (Berryhill, Jamie; Bourgery, Théo; Hanson, Angela (2018),

automatically synchronized. It also generates, in its core, complete transparency, confidence and cost-reductions over the users and transactions³⁰.

In this regard, the OECD Working Papers on Public Governance³¹ defines the Blockchain technology as a type of DLT that spreads systematized information across the world wide web, countries and/or institutions, which are deposited one by one in a constant ledger, that works as an open and trusted record of transactions from one side to another.³²

All these transactions are cryptographed converting this data into a format (hash) that can only be read by certified operators.³³ In practice, Blockchain is a shared ledger of transaction, like an old notary's book, that records all transactions historically, as shown in the image of Appendix B³⁴.

Hence, it can be deduced that the Blockchain and therefore the Bitcoin mainframe depends on (i) a node, that is an individual computer on a Blockchain network that collects new transitions into a block; (ii) a ledger record, which is a collection of all the transactions made on the Blockchain; (iii) a block, which organizes a group of transactions; and (iv) a hash, which constitutes a singular line of letters and numbers created from text using a mathematical equation.³⁵ This transaction can be analysed by a visual representation of the Blockchain technology on the Appendix C³⁶.

All the frameworks described provide to the Blockchain technology three main characteristics, which are decentralization, transparency and immutability, and have allowed its great success, fast evolution, rapid gain of value and acceptance.

The Blockchain technology is decentralized due to the node, which autonomously creates the records and spread through the web many copies of the same ledger. Thus, those copies, which are all identical, are preserved through the nodes and cross-checked by the system

Blockchains Unchained: Blockchain Technology and its Use in the Public Sector, OECD Working Papers on Public Governance, N° 28, OECD Publishing, Paris, cit. p. 12.)

³⁰ Berryhill, Jamie; Bourgery, Théo; Hanson, Angela (2018), *Blockchains Unchained: Blockchain Technology and its Use in the Public Sector*, OECD Working Papers on Public Governance, N° 28, OECD Publishing, Paris, cit pp. 24-28.

³¹ DLT also known as distributed ledger or shared ledger or distributed ledger technology.

³² Berryhill, Jamie; Bourgery, Théo; Hanson, Angela (2018), *Blockchains Unchained: Blockchain Technology and its Use in the Public Sector*, OECD Working Papers on Public Governance, N° 28, OECD Publishing, Paris, cit. p. 11.

³³ OECD (2018). *The OECD Blockchain Primer*, OECD Publishing, Paris, cit. p. 7.

³⁴ See: Appendix B.

³⁵ OECD (2018). *The OECD Blockchain Primer*, cit., p. 4.

³⁶ See: Appendix C.

for confirmation and authentication. As a consequence of the veracity of the information, the ledgers are synchronized using a majority or consensus mechanism.

For that reason, the technology increases the system's security by using many sources of information, always re-checked and synchronized, making necessary, in order to change the data, to modify all or a vast majority of the nodes. The unfolding of security is the transparency.³⁷ In other words, the technology behind the Blockchain, by its nature, assures transparency, trustworthiness, security and efficiency.

The immutability, one of the main characteristics of Bitcoin and Blockchain, is one of the principle aspects that contribute to the integrity of the system and it is owed to the cryptography and storage into a solid block tied in a chain of information that cannot be undone.³⁸

Blockchain and other DLTs provide an innovative and high-efficient form of historical storage and security. They also offer a large impact on the nowadays changing business models supplying a very innovative approach and methods to solve the financial and governance issues³⁹, helping to reduce mistakes, frauds and costs.⁴⁰

3.2. Bitcoin, Virtual Currencies and participants

The development of the proposed theme must necessarily go through the approach of the fundamentals and representatives from the Virtual Currencies. The intricate structure involved in the transactions depends on several agents that will be identified and conceptualized in the next lines in a more substantive way, allowing a better interpretation and intelligibility of the subject.

The present section will be divided into two and will tackle, in this first part, the initial concepts of Virtual Currencies and Bitcoin. The second part will explain the actors involved in the transactions (participants).

³⁷ OECD (2019). *Blockchain at the OECD*. OECD Going Digital Policy Note, OECD, Paris, p. 1. Retrieved from: <http://www.oecd.org/going-digital/blockchain-at-the-oecd.pdf>.

³⁸ OECD (2019). *Blockchain at the OECD*. OECD Going Digital Policy Note, cit., p. 1, 2.

³⁹ OECD (2019). *Blockchain at the OECD*. OECD Going Digital Policy Note, cit., pp. 2 – 4.

⁴⁰ Berryhill, Jamie; Bourgery, Théo; Hanson, Angela (2018), *Blockchains Unchained: Blockchain Technology and its Use in the Public Sector*, cit., p. 7.

3.2.1. Bitcoin and Virtual Currency definitions

The Blockchain was first defined in the original Bitcoin source code. Therefore, Blockchain and Bitcoin are familiarly connected with regard to the advent of both.

A scientist whose pseudonym is Satoshi Nakamoto created Bitcoin in 2008. The emergence of this phenomenon began in October of that year when the enigmatic author published a paper undertitled “Bitcoin: A Peer-to-peer Electronic Cash System”, which described the upsurge of a purely peer-to-peer version of electronic cash that allows online payments to be directly made from one party to another without mediators.⁴¹

As explained by the author, Bitcoin provides a solution to exclude the third intermediate, such as financial organizations and banks, using what has been labelled as ‘peer-to-peer network’, in order to enable “the network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work.”⁴²

Bitcoin can be characterized as a private Virtual Currency traded online by a specific network, which can be accumulated or transferred by email or even stored as electronic files on the hard disk of a computer.⁴³

Objectively, what is proposed by Satoshi Nakamoto’s paper is the formation of an electronic currency composed by a chain of digital signatures, where someone transfer the value to the subsequent, by signing the preceding operation and the public key of the next. To verify the chain of ownership, the beneficiary can control the cross-checked signatures.⁴⁴

In this sense, by suppressing financial institutions, the certification and control of the Blockchain would be spread across the network through many different computers, which eliminates the figure of the administrator, giving larger freedom to payments, reducing

⁴¹ Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, cit. 1; 2; 3.

⁴² Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, cit. p. 1.

⁴³ Grinberg, Reuben (2011). *Bitcoin an Innovative Alternative Digital Currency*. *Hastings Science & Technology Law Journal*, Vol. 4, p.160. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1817857.

⁴⁴ Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, cit., p. 2.

transaction costs, protecting data, personal information (in an ‘*a priori*’ analysis) and leading inflation to zero.⁴⁵

In other words, the proposal was the creation of a Virtual Currency which would allow online transactions carried out directly from one party to another, without the intermediation of a bank. In this case, digital signatures would provide secure solution to the system using the so-called equal basis network.⁴⁶

For the improvement of the system, the network records timestamps transactions, transforming them into a continuous hash-based proof of work, forming a record that cannot be modified without reworking.⁴⁷ Other elements such as incentives to generate the block, network steps, simplified payment verifications, smart contracts, ledger and nodes were created.

Furthermore, the author proposes a system that prevents an owner from spending more than once the currency, by introducing “a trusted central authority, or mint, that checks every transaction for double spending. After each transaction, the coin must be returned to the mint to issue a new coin, and only coins issued directly from the mint are trusted not to be double-spent.”⁴⁸

Taking those notions into account, the Blockchain and therefore, the Bitcoin are decentralized, partially anonymous, not legitimized by any government or other legal entity, and totally independent of a financial counterweight, such as a central bank, a commercial bank,

⁴⁵ Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, cit., p. 4.

⁴⁶ Nakamoto, Satoshi (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. cit. p. 1.

⁴⁷ The process is described by the author as: “*A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.*” (Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*, cit., p. 1.)

⁴⁸ Nakamoto, Satoshi. (Pseudonym) (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. cit. p. 2.

or a company credit card, to transfer it.⁴⁹ Instead, users interact with each other directly and anonymously⁵⁰, without the possibility of third-parties intervention.⁵¹

3.2.2. Participants

There are several participants in the operations involving Virtual Currencies, among them the Cryptocurrency users, the miners, the Cryptocurrency exchanges, the trading platforms, the wallet providers, the coin inventors and the coin offers, which will be defined below to better understand the need of a uniform regulatory framework.

⁴⁹ According to Hileman, Garrick and Rauchs, Michel (2017). *Global Blockchain Benchmarking Study*, p. 13. University of Cambridge. Retrieved from: <https://docplayer.net/87586522-Global-blockchain-benchmarking-study.html>, “A blockchain is a new type of database that enables multiple parties to share the database and to be able to modify that in a safe and secure way even if they don’t trust each other.”

⁵⁰ Grinberg, Reuben (2011). *Bitcoin an Innovative Alternative Digital Currency*. Hastings Science & Technology Law Journal, Vol. 4, p.160. Retrieved from: <http://ssrn.com/abstract=1817857>.

⁵¹ According to Hileman, Garrick and Rauchs, Michel (2017). *Global Blockchain Benchmarking Study*, cit., p. 13, “The principal way in which a blockchain is different from other distributed databases is that a blockchain is designed to achieve consistent and reliable agreement over a record of events (e.g., “who owns what”) between independent participants who may have different motivations and objectives.⁴ Put in a slightly different way, participants in a blockchain network reach consensus about changes to the state of the shared database (i.e., transactions amongst participants⁵) without needing to trust the integrity of any of the network participants or administrators. The agreement between blockchain network participants over the state of the database is achieved through a consensus mechanism, which ensures that each participant’s view of the shared database matches the view of all other participants. The combination of the consensus mechanism with a specific data structure allows blockchains to solve the so-called ‘double spending’ problem – the same digital file being ‘copy-and-pasted’ and transferred multiple times – without requiring a centralized ledger or party that prevents users from duplicating/spending the same digital file twice. Blockchains can thus facilitate the transfer of assets and other data without needing a trusted central authority. Blockchains enable the transfer of digital files without relying on a central authority The elimination of a central third-party administrator brings further benefits. Put simply, participants can independently verify that what they see (i.e., the content of the database at a specific moment in time) is consistent with what every other participant also sees. This ensures that all participants have a consistent view of the shared database state. As a result, any improper alteration of the data (e.g., tampering by a malicious actor) will be immediately detected and rejected by all participants. This ability of blockchain network participants to independently verify the integrity of the shared database without having to rely on a trusted third party is one of the main value propositions of using a blockchain.”

3.2.1.1. The Cryptocurrency users

The Cryptocurrency users are one of the key players⁵². They are the ones responsible to move the system and give legitimacy to currencies and financial movements. Without users, the Crypto system wouldn't make sense or allow the growth of any Crypto-asset.

Users consist of natural or legal persons and are also the most important players in the regulatory issue, because they move large amounts of money aimed at all kinds of operations, from the more simpler to the more complex ones, such as the use of Virtual Currencies as a means of investment, as a form of peer-to-peer payment, or to purchase goods and services, as well as any kinds of illegitimate purposes, for instance, money laundering, terrorist financing and tax evasion.

3.2.1.2. The Miners

The miners are essential players in the process of reinforcing security⁵³ and support the network. The word 'miner' is used in analogy to the people who spend time and effort to find gold on earth.

Transactions are confirmed through complex math problems which are solved throughout one computer or a network of super computers. The probabilities of this 'cryptographic puzzle' are one in six trillion⁵⁴. After the discovery of the result of the equation,

⁵² At the end of December 2018 there were nearly 32 million Blockchain wallet users. (Source: Lielacher, Alex (2019). *How Many People Use Bitcoin in 2019?*. Retrieved from: <https://www.bitcoinmarketjournal.com/how-many-people-use-bitcoin/>)

⁵³ In this regard: "*Who voluntarily make computer processing available in order to validate a set of transactions (called a "block") made with a decentralised VCS and add this to the payment ledger (called a "blockchain"); without miners, the decentralised VCS would not run smoothly, since double-spent or false units could easily be introduced.*" (European Central Bank (2015). *Virtual currency schemes a further analysis*, Retrieved from: <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf>, p. 7).

⁵⁴ Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee. Belgium, cit. p.18.

there is the emergence of a new block as a reward, that is, a new coin (as one Bitcoin), which is responsible for making the operation trustworthy.⁵⁵

3.2.1.3. The Virtual Exchange

The virtual exchange is a market for trading, buying and selling Virtual Currencies that allows the user to make transactions with fiat currencies, Bitcoins and Altcoins⁵⁶. They perform as intermediaries between buyers and sellers, thus allowing negotiation. As a matter of facts, they represent third parties which usually charge administration fees and commissions from the users.

3.2.1.4. The Trading Platforms

The trading platforms are virtual boards that function as a bazaar, interconnecting buyers and sellers. Such platforms are operated exclusively through software and do not have the role of intermediaries, but to interconnect the business interests without their effective inclusion in the negotiation.

This means that the platform does not buy or sell assets.⁵⁷ In this regard, they “function as marketplaces, bringing together buyers and sellers of virtual currencies by providing them with a platform on which they can bid among themselves. Hence, they are in contrast to exchanges, however, the trading platforms do not engage in the buying and selling themselves.”⁵⁸

⁵⁵ Fortney, Luke (2019). *Bitcoin Mining, Explained*. Investopedia. Retrieved from: <https://www.investopedia.com/terms/b/bitcoin-mining.asp>.

⁵⁶ The Virtual Currencies that were created after Bitcoin.

⁵⁷ Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*, cit, p. 29.

⁵⁸ European Central Bank (2015). *Virtual currency schemes a further analysis*. cit, p. 8

3.2.1.5. The Wallet Providers

The wallet provider constitutes another important actor on the Virtual Currencies market. In the definition of the Fifth Anti-Money Laundering Directive (AMLD 5), it is “an entity that provides services to safeguard private cryptographic keys on behalf of its customers, to hold, store and transfer virtual currencies”⁵⁹.

According to the Tax Study on Cryptocurrencies, there are many types of providers, such as hardware wallet providers, software wallet providers and custodian wallet providers. Basically, a wallet provider is a regular real wallet, in which the money is stored, where it’s possible to check the account, withdraw money to make payments and store the keys.⁶⁰

3.2.1.6. The Coin Inventors

The coin inventors are individuals, groups or organizations that create a new currency, that is, a new virtual monetary system such as Bitcoin, Ethereum, Litecoin, Cardano, Monero, etc. They also create their rules, their purposes and technical foundations.⁶¹

3.2.1.7. The Initial Coin Offers

To start a currency and make it popular and financially sustainable, a minimum supply of currencies already created is needed, which are developed and funded by supporters and enthusiasts⁶². Such people take the initial risk and buy the coins, likewise buying shares of a company.

⁵⁹ Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing and amending Directives 2009/138/EC and 2013/36/EU. cit. Recital 2(d)(19).

⁶⁰ Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. cit., p. 27.

⁶¹ European Central Bank (2015). *Virtual currency schemes a further analysis*, cit.

⁶² According to the definition provided in Godtus, Laurent (2018). *Initial Coin Offerings - Legal qualification and regulatory challenges*. Laga. Retrieved from:

In this regard, there are many legal problems associated to the launching of a new currency. Particularly, the lack of regulation and legal protection of an Initial Coin Offer (ICO), exposes the users to fraud and can also be used for money laundering, terrorism, and other illegal purposes. Further to this, the subscriptions are totally digital and complex; the valuation of the ICOs are set subjectively and arbitrarily by the developers; and there are no guarantees, in addition to many other security risks associated.⁶³

PART IV – REGULATORY APPROACH ON VIRTUAL CURRENCIES

4.1. Financial Regulatory efforts

The regulation of activities related to the Virtual Currencies and Blockchain by States and international agencies has always been a well-established objective. The evolution of technology has led to the immediate regulatory evolution of financial activity.

The European Central Bank (ECB) was the first major institution to indicate the need for the development of studies on further discussions.⁶⁴ The Report produced by the ECB listed as a subject of study ‘The Bitcoin Scheme’ and ‘The second Life Scheme’, describing the Virtual Currency 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.”⁶⁵

The ECB Report⁶⁶ alerted about an innovative technology that presents potential impacts regarding the following Central Bank tasks: a) price stability; b) financial stability; c) payment system stability; and finally, d) reputational risks arising from security incidents

<https://www.slideshare.net/fintechbelgium/fintech-belgium-meetup-on-icos-080318-laurent-godts>, the enthusiasts are defined as “*crowdfunding with cryptocurrencies*”.

⁶³ Frankenfield, Jake (2018). *Initial Coin Offering (ICO)*. Investopedia. Retrieved from: <https://www.investopedia.com/terms/i/initial-coin-offering-ico.asp>.

⁶⁴ Vondráčková, Aneta (2016). *Regulation of Virtual Currency in the European Union*. Charles University in Prague Faculty of Law Research Paper No. 2016/III/3. Retrieved from: <https://ssrn.com/abstract=2896911> or <http://dx.doi.org/10.2139/ssrn.2896911>.

⁶⁵ European Central Bank (2012). *Virtual currency schemes*, Retrieved from: <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf>, p. 6.

⁶⁶ See also: European Central Bank (2014). *Opinion on virtual currencies*. Retrieved from: <https://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf>.

involving Virtual Currency schemes. It ranks them as contrasting schemes with traditional unregulated payment systems that could be used by criminals, fraudsters and money launderers to perform their illegal activities.⁶⁷

In this view, the ECB alerts about the absence of a legal framework support to these ‘no physical’ counterpart: “The absence of a distinct legal framework leads to other important differences as well. Firstly, traditional financial actors, including central banks, are not involved. The issuer of the currency and scheme owner is usually a non-financial private company. This implies that typical financial sector regulation and supervision arrangements are not applicable. Secondly, the link between Virtual Currency and traditional currency (i.e. currency with a legal tender status) is not regulated by law, which might be problematic or costly when redeeming funds, if this is even permitted. Lastly, the fact that the currency is denominated differently (i.e. not euro, US dollar, etc.) means that complete control of the Virtual Currency is given to its issuer, who governs the scheme and manages the supply of money at will.”⁶⁸

The alarming Report has led to the production of studies and European legislative developments to shield institutions and to urge EU legislative bodies to regulate the financial activities of virtual platforms in the 4th Anti-Money Laundering Directive (AMLD 4) in 2015.⁶⁹

In the years of 2013 and 2014, the Commission expressed its intention to regulate Virtual Currencies by the European Banking Authority (EBA). The first measure implemented was to aware the consumers that, in the absence of regulation, they could incur on significant risks if they decided to use Virtual Currencies, such as the Bitcoin.

In this sense, the EBA Report of 2014 underlined that they had issued a public warning on 13 December 2013 to make consumers aware that Virtual Currencies were not

⁶⁷ In accordance to the ECB, “*Although these schemes can have positive aspects in terms of financial innovation and the provision of additional payment alternatives for consumers, it is clear that they also entail risks.*” (European Central Bank (2012). *Virtual currency schemes October 2012*, Retrieved from: <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf>. p. 11).

⁶⁸ European Central Bank (2012). *Virtual currency schemes October 2012*. cit. p. 5.

⁶⁹ Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC, cit.

regulated, and they could lead to unmitigated risks as a result. Following the advices, “many national supervisory authorities across the EU tracked suit issuing similar warnings”.⁷⁰

The second measure was to strengthen the role in underpinning the security and integrity of the banking sector by the revised Directive on Payment Services (PSD 2) and the AMLD 4.⁷¹

The terrorist attacks⁷² that happened in Europe in 2015 raised the need to combat terrorism and its financing⁷³. To cut the funding sources of eventual new terrorist attacks, as well as the dismantling of criminal organizations, was established as the key to fight the support of criminal organization, including those linked to the virtual assets.⁷⁴

Facing the related issue, the Communication from the Commission to the European Parliament and the Council proposed a measure to enhance transparency and the fight against tax evasion, tax avoidance, money laundering and terrorist financing in the context of the first amendment to the AMLD 4.⁷⁵

⁷⁰ European Central Bank (2014). *Opinion on virtual currencies*, p. 8. Retrieved from: <https://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf>.

⁷¹ The 2014 EBA Annual Report explained that: “*We also achieved important tangible results in the area of consumer protection, where our monitoring of consumer trends and financial innovation has driven a number of products on responsible mortgage lending, product oversight and governance, security of internet payments and innovative practices and tools such as crowd-funding and virtual currencies. The mandates entrusted to the EBA by the re-vised Directive on Payment Services (PSD2) and the fourth Anti-Money Laundering Directive (AMLD) will further strengthen our role in underpinning the security and integrity of the banking sector*” (European Banking Authority (2014). *Annual report 2014*. EBA, p. 10. Retrieved from: http://businessdocbox.com/77466227-Human_Resources/Annual-report-issn.html.)

⁷² The main attack occurred on 13th of November, in Paris, where 129 people died and 350 were wounded, due to terrorist endeavors. (News broadcasted by: Newspaper Le Monde (2015). *What you need to know about Paris attacks and the situation in France*. Retrieved from: https://www.lemonde.fr/attaques-a-paris/article/2015/11/14/what-you-need-to-know-about-paris-attacks-and-the-situation-in-france_4810074_4809495.html.)

⁷³ See also: Council of the European Union (2016). *Council conclusions on the fight against the financing of terrorism*. Retrieved from: <http://www.consilium.europa.eu/en/press/press-releases/2016/02/12/conclusions-terrorism-financing/>.

⁷⁴ European Commission (2016). *Communication from the Commission to the European Parliament and the Council an Action Plan for strengthening the fight against terrorist financing*. European Commission. Strasbourg. COM(2016) 50 final, Retrieved from: https://eur-lex.europa.eu/resource.html?uri=cellar:e6e0de37-ca7c-11e5-a4b5-01aa75ed71a1.0002.02/DOC_1&format=PDF.

⁷⁵ European Commission (2016). *COM (2016) 451 final. Communication from the Commission to the European Parliament and the Council*. European Commission. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0451&from=EN>.

On this opportunity, the Commission emphasized the need of an enhanced due diligence for the exchange of Virtual Currencies and the necessity of an increased verification and controls on pre-paid instruments, concerning the domestic market and relating to cross-border activities, known as the ‘Supranational Risk Assessment’⁷⁶. The Commission also adopted an EU list of high-risk third countries evincing deficiencies in their anti-money laundering (AML) and counter-terrorism financing (CFT) regimes, as well as outlined the need to embrace a harmonized list of due diligence measures that financial institutions must carry out on financial flows.⁷⁷

These works are also reinforced by the Financial Action Task Force (FATF), an intergovernmental organization founded in 1989, responsible for accentuating the need to impose legal procedures to prevent the criminal and illicit use of the financial system in the money laundering and counter terrorism financing fields.

The technical contextualization and concepts related to the technology applied to the digital currency enabled a breakdown of the previously known paradigms. The employment of Blockchain framework technology is guaranteed by the use of complex mechanism such as the DLT, which brings the monetary and financial concept closer to a scientific criteria, eliminating losses and unnecessary parts of the process.

However, as with any new technology implemented, there are serious issues and barriers related to the lack of regulation, conceptualization, ethics, efficiency, political and jurisdictional problems.

In the present study and following subchapters, the main legal instruments concerning the technology referred will be presented mainly in the European context. The investigation will be based on the contextualization of Blockchain and Virtual Currencies, regulations and efforts of legal parameters of Virtual Currency, and the evaluation of the role

⁷⁶ Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, p. 9, cit.

⁷⁷ European Commission (2016). *COM (2016) 451 final. Communication from the Commission to the European Parliament and the Council*. European Commission, cit., p.5.

⁷⁷ According to the FATF, its definition is: “an independent inter-governmental body that develops and promotes policies to protect the global financial system against money laundering, terrorist financing and the financing of proliferation of weapons of mass destruction. The FATF Recommendations are recognized as the global anti-money laundering (AML) and counter-terrorist financing (CFT) standard.” (Publish by FATF (2014). *Virtual Currencies Key Definitions and Potential AML/CFT Risks*. FATF. Paris. France. Retrieved from: <http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>)

of international bodies and other legal institutes on the use of the financial system for the purpose of money laundering, such as the European Central Bank (ECB), the Financial Action Task Force (FATF), the European Parliament and the Council of the EU.

4.1.1. FATF's regulatory plan on Virtual Currencies

As previously mentioned, the necessity of supervision and the call for a swift and effective implementation of Crypto-assets standards worldwide are vindicated by the Financial Action Task Force which aims to combat the money laundering and terrorist financing hazards, as well as foster improvements to the current regulation.

Among the main arguments that are put forward in the FATF's Report on Virtual Currencies – Key Definitions and Potential AML/CFT Risks, is that the decentralized system does not allow efficient screening and identification of transactions, due to its anonymity.

Considering the “Bitcoin protocol does not require or provide identification and verification of participants or generating historical records of transactions that are necessarily associated with real world identity⁷⁸, this means that the identity of the agent can frequently be masked or hidden⁷⁹, thus increasing the risk of money laundering and terrorist financing threats.⁸⁰

For instance, the use of unidentified or unverified accounts of participants in Bitcoin protocols generates asymmetry of information and a significant level of anonymity compared

⁷⁸ FATF (2014). *Virtual Currencies Key Definitions and Potential AML/CFT Risks*. FATF. Paris. France. p. 9 Retrieved from: <http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>.

⁷⁹ In this regard: “More generally, VC payments are (to a greater or lesser extent) anonymous, which makes detection, detection, investigation, and prosecution of ordinary crimes more difficult. This is evident in the use of VCs for illicit activities including fraud, narcotics, child pornography, arms dealing, and terrorism in recent years. (...) VCs may also help to facilitate tax evasion by providing ‘virtual tax havens’. This underscores the direct challenge VCs pose to national sovereignty, as they may undermine the tax base even while their users enjoy the benefits provided with tax revenues. In light of recent public scandals and the public dissatisfaction with corporate tax evasion, and to the extent that the money supply relies on the sale of government debt underwritten by governments’ power to tax, the tax implications of VCs should be recognized as having potentially systemic importance.”. (European Parliament (2019). *Virtual currencies in the Eurosystem challenges ahead. Monetary Dialogue*. European Parliament Committees. p. 36. Retrieved from: <http://www.europarl.europa.eu/committees/en/econ/monetary-dialogue.html>.)

⁸⁰ FATF (2014). *Virtual Currencies Key Definitions and Potential AML/CFT Risks*. FATF. Paris. France, cit.

to other old digital transaction media. The decentralization of the system and the structure involved in the technology also allows the disassociation of the origin between diverse jurisdictions, augmenting the inherent risks to the financial system.⁸¹

According to the FATF's Report to the G20 Finance Ministers and Central Bank Governors of July 2018, the increasing use of Virtual Currency activities for money laundering and terrorist financing demands a higher level in overseeing these undertakings. It means that worldwide countries must become aware of the issues associated to the digital currency and develop consistent regulations on these matters.⁸²

Therefore, several measures are specified by the intergovernmental body as necessary, such as the development of a program to alert countries of the need to regulate Crypto-assets. The intergovernmental body has also highlighted the imperativeness to promote actions in order to mitigate risks related to money laundering, terrorist financing, drug trafficking and fraud; to monitor the risks and activities associated to products and services connected to Virtual Currencies, Bitcoin and ICOs; and to identify regulatory responses among countries.

In addition to these actions, the FATF, in its 2015 Guideline Risk-Based Approach (RBA) on Crypto-assets, began to review its standards to promote more effective support on the issue and to continue assisting in the implementation of risk mitigation measures.⁸³

As a result of the works carried out and the activities conducted by the FATF, the main strategies related to the regulation of Crypto-assets were reported in its Plenary meeting, which took place between the 17th and 19th October 2018. The main strategy adopted regarding the virtual economy was to combat the financing of terrorism through the interruption and new modalities of capital transfers as well as other financial flows that propitiate criminal accomplishments.

⁸¹ In this sense, the FATF points out that “*Virtual currency systems can be accessed via the Internet (including via mobile phones) and can be used to make cross-border payments and funds transfers. In addition, virtual currencies commonly rely on complex infrastructures that involve several entities, often spread across several countries, to transfer funds or execute payments.*” (FATF (2014). *Virtual Currencies Key Definitions and Potential AML/CFT Risks*. FATF. Paris. France, cit.).

⁸² FATF (2018). *FATF Report to G20 Finance Ministers and Central Bank Governors*. FATF. Paris. France. Retrieved from: www.fatf-gafi.org/publications/fatfgeneral/documents/report-g20-fm-cbg-july-2018.html.

⁸³ FATF (2018). *FATF Report to G20 Finance Ministers and Central Bank Governors*. FATF. Paris. France, cit.

The Plenary concluded that several actions should be taken on some fronts such as the implement of a tactic for effective condemnation of terrorist financiers, especially regarding intangible and virtual activities involving sensitive jurisdictional issues. It was also concluded that measures should be engaged to aid countries to better understand the risks of terrorist financing and its new digital format as well as train jurisdictions to take effective actions to stop the digital financing of terrorism.

Moreover, the FATF Recommendations were amended to address the regulation of virtual assets. For this extent, the group addressed and clarified what activities should be held by virtual assets, in order to implement rules related to the due diligence, regarding the license, register and supervision by national authorities.⁸⁴

Some other actions were explored, for instance, the identification of jurisdictions with strategic anti-money laundering and countering the financing of terrorism (AML/CFT) deficiencies as well as new jurisdictions that must be subject to continue monitoring, regarding Crypto-assets⁸⁵.

As to evaluate the implementation of risk-mitigation measures, the Plenary underlined the importance of the risk-based approach (RBA) guidance on Virtual Currencies, as a form of support to the public and private sectors. It was also accentuated the necessity of the update on the Fintech and Regtech initiatives.

Finally, the FATF emphasized the importance of a future work on e-identity, which can improve and overcome the identification of errors that allow data asymmetry to be adjusted by a reliable system, and to be regulated and supervised by a certified authority.⁸⁶

⁸⁴ FATF (2018). *Outcomes FATF Plenary, 17-19 October 2018*. FATF-XXX. Paris. Retrieved from: <http://www.fatf-gafi.org/publications/fatfgeneral/documents/outcomes-plenary-october-2018.html>.

⁸⁵ On this regard: “*The FATF Plenary discussed and adopted amendments to the FATF Standards to respond to the increasing use of virtual assets for money laundering and terrorist financing and at the request of the G20 Ministers. This includes an amendment to the FATF Recommendations and glossary to clarify to which businesses and activities the FATF requirements apply in the case of virtual assets. Exchanges and wallet providers will be required to implement AML/CFT controls, and to be licensed or registered and supervised or monitored by national authorities. Strengthening the standards is part of a comprehensive approach that the FATF has developed to prevent the misuse of virtual asset activities for money laundering and terrorist financing.*” (FATF (2018). *Outcomes FATF Plenary, 17-19 October 2018*. FATF-XXX. Paris, cit. p.1,2.).

⁸⁶ FATF (2018). *Outcomes FATF Plenary, 17-19 October 2018*. FATF-XXX. Paris, cit. p.1.

4.1.2. Financial Regulations at the European Level

In this subchapter it will be discussed the regular structures currently adopted at the European level. Among the most prominent EU regulations, are the Fourth Anti-Money Laundering Directive (AMLD) and the Fifth AMLD, being the last one the apex of the system's revolutionary and disruptive legislative effort of regulating the rising of current technological advances.

4.1.2.1. The Fourth Anti-Money Laundering Directive

Although relevant discussions were raised in the AMLD 4, which reinforced the basic guidelines on money laundering and the need to combat terrorism, the examination under the Directive did not tackled the need for an AML/CFT regulation on Cryptocurrencies.

The urgency and relevance of combating money laundering and terrorist financing related to Crypto-assets led to a doctrinal debate about the application of the AMLD 4 to the Virtual Currencies.

Bearing in mind that Article 3(2)(a) of the referred Directive⁸⁷ indicated that the term ‘monetary exchange offices’ included financial institutions, it was first considered that Cryptocurrency exchange platforms could be included under this concept.

The argument in favour was that the concept of property, defined in Article 3(3)⁸⁸ as “assets of any kind, whether corporeal or incorporeal, movable or immovable, tangible or

⁸⁷ The definitions for financial institution are established at the Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC. Article 3 (2) (a), cit.: “*Article 3 For the purposes of this Directive, the following definitions apply: (...) (2) ‘financial institution’ means: (a) an undertaking other than a credit institution, which carries out one or more of the activities listed in points (2) to (12), (14) and (15) of Annex I to Directive 2013/36/EU of the European Parliament and of the Council (23), including the activities of currency exchange offices (bureaux de change)*”.

⁸⁸ Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC. cit. Article 3(3).

intangible, and legal documents or instruments in any form including electronic or digital, evidencing title to or interest in such assets” encompassed the hypothesis of Cryptocurrencies and therefore, it could include the legal guardianship of Crypto-assets.

However, Crypto-assets could not be considered as obliged entities, as well as Virtual Currency exchange platforms or custodian wallet providers, according to article 2(1) of the Directive (EU) 2015/849.

In this sense “it is fair to say that it is very difficult, if not impossible, to stretch the scope of AMLD 4 so far as to include Cryptocurrency transactions”. Consequently, it was established that the AMLD 4 could not be applied to Cryptocurrencies nor to wallet providers. In the words of Houben and Snyers, “the AMLD 4 framework simply cannot be attached to the Crypto scheme, exempting it fully from the AMLD 4 scope”⁸⁹.

Considering the European Parliament and the Council did not regulated money laundering and counter-terrorism financing in Cryptocurrencies regards, another regulatory effort was in most need and was modestly provided by the successive instrument which will be examined next.

4.1.2.2. The Fifth Anti-Money Laundering Directive

The Directive 2018/843 of the European Parliament and of the Council of 30 May 2018 (AMLD 5)⁹⁰ that amended Directive 2015/849 (AMLD 4) is mainly focused on the issue of Virtual Currencies and existing technologies related to the use of the financial system for the purpose of money laundering and the financing of terrorism.

This Directive, first of all, retitles DLT financial operations as ‘Virtual Currencies’, being this a broader classification when comparing with the previous used term ‘Cryptocurrencies’.

⁸⁹ Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, p. 62, cit.

⁹⁰ Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing and amending Directives 2009/138/EC and 2013/36/EU, cit.

In the Houben and Snyers words, “Cryptocurrencies are a subcategory of Virtual Currencies, more particularly that kind of Virtual Currencies that have a bi-directional link to the real economy. Therefore, when throughout this analysis of the regulatory framework we refer to Virtual Currencies, this includes Cryptocurrencies. Moreover, when we look at the exact scope of the definitions included in the various policy documentation, there is a clear tendency towards targeting Cryptocurrencies with these definitions and not or only to a lesser extent other kinds of Virtual Currencies that have only a one directional or no link to the real economy.”⁹¹

Furthermore, the AMLD 5 tackles the illicit use of the financial system, especially concerning the Virtual Currencies and the potential risk of hiding the physical identity of the agents involved in the successive transactions and jurisdictions.

The development of the systems and the social opportunity for new monetary paradigms, as the Crypto-assets generated, beyond the activities carried out by the FATF, a need to undermine the transparency of the electronic economic world, as well as to strengthen the structures to avoid the occurrence of money laundering on this subject. This provision is supported by AMLD 5, which aims to standardize measures of combating terrorism and adapt the legislation to the new threats that use technology, to finance terrorism.⁹²

According to this Directive, one of the focal points is to delineate a generic understanding about the concept of Virtual Currency and its characteristics, defined as “a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of exchange and which can be transferred, stored and traded electronically.”⁹³

Hence, by interpreting the AMLD 5, Virtual Currency is sharpened as “(i) digital value representation” that indicates, in essence, that its creation and representation are generated from a digital model; (ii) "not issued or guaranteed by the central bank or the public authority" which denotes the main feature of the Virtual Currency, which is the lack of ballast and guarantee given by the legitimating institutions of the economy, otherwise it would be a currency, as the currencies adopted by the sovereign states guaranteed by their nominal value;

⁹¹ Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee. cit.pp. 62-63.

⁹² AMLD 5, cit.

⁹³ AMLD 5, cit., Article 1(2)(d)(18).

(iii) “accepted by natural or legal persons as a means of exchange and which can be transferred” therefore, it can be used to obtain goods and payment for services in the private sphere; and (iv) “stored and traded electronically”, not excluding the possibility of transactions involving physical actions. Hence, the definition adopted by the Directive brings an extensive, but also subjective interpretation of the digital currencies.⁹⁴

The AMLD 5⁹⁵, in addition to other provisions, provides a far-reaching understanding regarding the rules described in the AMLD 4,⁹⁶ which already dealt with the measures necessary to combat the financing of terrorism and to fight money laundering. The Directive also creates solutions to ensure the transparency of information⁹⁷ from the exchange service providers and providers of digital portfolio custody services.

Pursuant to the Article 1 of the Amendments of the AMLD 4, were included as ‘obligated entities’ the “providers engaged primarily and professionally in exchange services between Virtual Currencies and fiat currencies” and the “wallet providers offering custodial services of credentials necessary to access Virtual Currencies”, supplying adequate legal solutions to the problem generated by the AMLD 4, which did not deliver regulatory force to these entities.

This meant a real breakthrough in AML/CFT regulation, especially of providers engaged primarily and professionally in exchange services between Virtual Currencies⁹⁸ and fiat currencies, as well as the wallet providers. Such entities shall, in accordance with the new regulation, apply the measures of due diligence controls and enhance them as well as to perform the due report to the Financial Intelligence Unit (FIU), making it difficult for anonymous and unregulated access of individuals to Virtual Currencies.⁹⁹

⁹⁴ AMLD 5, cit., Article 1 (2)(d)(18).

⁹⁵ AMLD 5, cit.

⁹⁶ AMLD 4, cit.

⁹⁷ AMLD 5, cit., Recital (2) (4).

⁹⁸ On this topic, regarding the AMLD 5, cit., “*Virtual currencies should not to be confused with electronic money as defined in point (2) of Article 2 of Directive 2009/110/EC of the European Parliament and of the Council , with the larger concept of ‘funds’ as defined in point (25) of Article 4 of Directive (EU) 2015/2366 of the European Parliament and of the Council , nor with monetary value stored on instruments exempted as specified in points (k) and (l) of Article 3 of Directive (EU) 2015/2366, nor with in-games currencies, that can be used exclusively within a specific game environment. Although virtual currencies can frequently be used as a means of payment, they could also be used for other purposes and find broader applications such as means of exchange, investment, store-of-value products or use in online casinos.*”

⁹⁹ Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain – Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, cit., pp. 65-66.

According to the same regulation, a ‘custodian wallet provider’ is an “entity that provides services to safeguard private Cryptographic keys on behalf of its customers, to hold, store and transfer Virtual Currencies”¹⁰⁰. Hence, such concepts remove or reduce the risk of concealment and anonymity in the financial transactions that are continuously carried out through these platforms.

Among other measures linked to the Virtual Currency and fixed by the 5th AML Directive, are: (i) the identification and certification of data of natural and legal persons on the digital platform¹⁰¹; (ii) the establishment of practices to ensure that existing customers are also monitored on a regular basis (recertification)¹⁰²; (iii) the enhancement of exchange of information and the provision of assistance between competent authorities¹⁰³; and (iv) also to promote procedures that permit Financial Intelligence Units (FIUs)¹⁰⁴ “to obtain information allowing them to associate Virtual Currency addresses to the identity of the owner of Virtual Currency”¹⁰⁵, as concrete strategies to fight money laundering and terrorist financing in the digital domain.

4.1.2.3. Regulation EU n° 2015/847 – Funds Transfer Regulation

In general, the Funds Transfer Regulation applies to transactions with the purpose of detecting and investigating money laundering and terrorist financing, where, at least, one of the payment service providers involved in the transfer of funds, is established in the Union. The regulation is applied to both transfer and funds, in any currency, and are principally used to affect a person-to-person transaction.¹⁰⁶

Fundamentally, the Article 4 of this Regulation requires information such as the name of the payer, the payer’s account number and the payer’s address, as well as official personal document numbers, customer identification number, date and place of birth.

¹⁰⁰ AMLD 5, cit., Article 1(d)(19), cit.

¹⁰¹ AMLD 5, cit., Recital 22, cit.

¹⁰² AMLD 5, cit., Recital 24, cit.

¹⁰³ AMLD 5, cit., Recital 46-48, cit.

¹⁰⁴ AMLD 5, cit., Rec 16-18, cit.

¹⁰⁵ AMLD 5, cit., Rec 16-18, cit.

¹⁰⁶ Directive (EU) 2015/847 of the European Parliament and of the Council of 20 May 2015 on information accompanying transfers of funds and repealing Regulation (EC) No. 1781/2006, Article 4. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015R0847>.

The regulation also forecasts that “when receiving transfers of funds, that the information referred is missing or incomplete or has not been filled in using characters or inputs admissible in accordance with the conventions of the messaging or payment and settlement system as referred to in Article 7(1), the payment service provider of the payee shall reject the transfer or ask for the required information on the payer and the payee before or after crediting the payee's payment account or making the funds available to the payee, on a risk-sensitive basis”¹⁰⁷.

Under such hypothesis, the payment service provider of the payee should initially warn, reject future transfers or cut off customer relations. It is likewise important to highlight that the payment service provider of the payee ought to report the failure, and the actions that were taken, to the FIU.¹⁰⁸

However, despite the great regulation advance concerning the AML/CFT, this rule does not apply to transactions involving Virtual Currencies. The Regulation (EU) 2015/847, as already stated, applies only to “funds”, which means currencies issued exclusively by central banks and credit institutions (thus including e-money institutions), but not the virtual ones.¹⁰⁹

4.1.2.4 Regulation EC n° 1889/2005 – Cash Control Regulation

Concerning the Regulation (EC) n° 1889/2005¹¹⁰, succinctly, it is aimed at controlling transactions through financial and credit institutions and ascertain professions by laying down harmonized rules for the control, by the competent authorities, of cash entering or leaving the Union.

¹⁰⁷ Regulation EU n° 2015/847 – Funds Transfer Regulation, cit., Article 4.

¹⁰⁸ Regulation EU n° 2015/847 – Funds Transfer Regulation, cit., Article 4.

¹⁰⁹ In this connection, Robby Houben and Alexander Snyers clarify that “*Here's the rub: cryptocurrencies are none of those, and, hence out of scope. Moreover, crypto intermediaries as a rule will not be payment service providers or intermediate payment service providers in the meaning of the FTR383. This is a second reason why the FTR is not equipped to fight the illicit use of cryptocurrencies, apart from it not being designed with cryptocurrencies in mind, which is apparent from the information to be provided, especially the reference to account numbers.*” (Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee., pp. 68-69, cit.)

¹¹⁰ Regulation (EC) N° 1889/2005 of the European Parliament and of the Council of 26 October 2005 on controls of cash entering or leaving the Community. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32005R1889>.

Likewise, the Regulation (EU) 2015/847, the Regulation (EC) 1889/2005 was not formulated to meet the demand of Virtual Currencies. The regulation is based on physical monetary instruments and physical barriers as well as currency banknotes and coins that are in circulation as a form of exchange, hence, not including any intangible element.

4.1.2.5. Regulatory approach on Initial Coin Offer

As already explained, the Initial Coin Offer (ICO) is the origin of a Virtual Currency, which financial support allows its development. The financing also permits the propagation and the endure of the created asset, its spread and sustainability. The initial funding is made by supporters and enthusiasts, responsible for taking the preliminary risk and receiving the coins, similar to buying shares of a company. An elucidatory example of an ICO occurred in 2014 during the launch of the Crypto-coin named Ether, which was subsidised by supporters who received a few coins in return. This kind of sponsorship happened equally with the Mastercoin financing and many other Crypto-coins.¹¹¹

At this point many questions become pertinent – concerning the financier: Who are the sponsors of the new Cryptocurrency? What is the real identity of the agent? What is the origin of the money that finances the new currency? Regarding the firm it's important to question: Who safeguards the interests of the company? Who are the responsible for the business? For what purpose is the money raised being used? And finally, with respect to the State: Who regulates the creation and development of new currencies? What are the legal structures that protect companies and investors? What are the purposes, origin and financing of the new currencies? Are there any standard regulatory that concerns the ICO offer?

From this perspective, there are many legal issues interrelated to the launching of a new currency, particularly linked to the lack of regulation and legal protection of an ICO. Moreover, it is important to emphasize that in several times they are exposed to fraud, and can be used for money laundering, terrorism, and other illegal purposes. The subscriptions are also totally digital and complex, the valuation of the ICOs is set subjectively and arbitrarily by the developers and there are no guarantees as well as many security risks associated.¹¹²

¹¹¹ Frankenfield, Jake (2018). *Initial Coin Offering (ICO)*, cit. pp.2-3.

¹¹² Frankenfield, Jake (2018). *Initial Coin Offering (ICO)*, cit. pp.3.

Focused on those questions, the European Securities and Markets Authority (ESMA) alerted the investors to the high risks of Initial Coin Offerings. This body has classified ICOs as vastly speculative, with high exposure to risks of all kinds, mainly because they are generated in an unregulated space, vulnerable to fraud or illegal activities, with high risk of losing all the invested capital, absence of exit options, extreme price volatility and inadequate information.¹¹³

Following these developments, the ESMA carried out a research to map the significant positions and initiatives regarding the regulatory approaches on ICOs. This study concerned the EU and EEA Member States, and also Switzerland, Gibraltar, Jersey, Guernsey and Isle of Man and categorized ICOs matters into three regulation approaches, as “evident proactive approach”, “careful consideration” and “undefined approach”¹¹⁴:

i) “Evident proactive approach” – the countries under this category clearly develop the necessary regulation to carry out the most diverse forms of legislative control. Among the countries at this monitoring level are: Malta, Switzerland¹¹⁵, France, Lithuania, Gibraltar, Jersey and Isle of Man. For instance, the Initial Virtual Financial Asset Offerings of Malta are legalized by a new law – the Virtual Financial Assets Act (Cap. 590 of the laws of Malta, the ‘VFAA’), of 1st November 2018, – that regulates the field of Initial Virtual Financial Asset Offerings and Virtual Financial Assets.¹¹⁶

In Switzerland, the ICO Guidelines, as described by FINMA, requires that the companies or individuals who intend to launch an ICO must ensure that they comply with the requirements set out in the relevant financial market laws, especially with the Swiss Anti-money Laundering Act (AMLA). With respect to the FINMA Guidelines for enquiries concerning the regulatory framework for Initial Coin Offerings, it is established that regarding “ICOs where the token is intended to function as a means of payment and can already be transferred, FINMA

¹¹³ ESMA (2018). *Own Initiative Report on Initial Coin Offerings and Crypto-Assets*. Securities and Markets Stakeholder Group. Retrieved from: https://www.esma.europa.eu/sites/default/files/library/esma22-106-1338_smsg_advice_-_report_on_icos_and_crypto-assets.pdf. p. 8.

¹¹⁴ ESMA (2018). *Own Initiative Report on Initial Coin Offerings and Crypto-Assets*. Securities and Markets Stakeholder Group, pp. 8-9, cit.

¹¹⁵ In this sense: “*The issuing of tokens that are analogous to equities or bonds can also result in prospectus requirements under the Swiss Code of Obligations. FINMA has no direct responsibility in this area but expects ICO organisers to themselves clarify these requirements.*” (FINMA. *Publishes ICO guidelines*. Press release. FINAM. Retrieved from: <https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/>).

¹¹⁶ ESMA (2018). *Own Initiative Report on Initial Coin Offerings and Crypto-Assets*. Securities and Markets Stakeholder Group, pp. 8-9, cit.

will require compliance with anti-money laundering regulations. FINMA will not, however, treat such tokens as securities.”¹¹⁷

In France, a project called PACTE was established¹¹⁸ and is currently being analysed by the Parliament, but generally follows a definitive and guiding position of cooperation with the European Union, given its cross-border characteristic.¹¹⁹

ii) Careful consideration – a middle ground between providing a rule and not taking action, is what the ESMA study defined as “appear to take a ‘wait-and-see’ or ‘guarded’

¹¹⁷ FINMA. *Publishes ICO guidelines*. Press release. FINMA, cit.

¹¹⁸ In this regard, the *Projet de Loi N° 1088 - Assemblée Nationale* (PACTE) exposes concepts in a way that no other nation had done, defining the concept of tokens, and the standard rules applied, closing the system of initial coins offers, within comprehensive and extensive precepts, in the following terms: “Émetteurs de jetons (13) « Art. L. 552-1. – Est soumis aux obligations du présent chapitre tout émetteur qui procède à une offre au public de jetons et qui sollicite un visa de l’Autorité des marchés financiers dans les conditions prévues aux articles L. 552-4 et suivants. (14) « Les dispositions du présent chapitre s’appliquent à toute offre de jetons qui n’est pas régie par les livres Ier à IV, le chapitre VIII du titre IV du présent livre ou le chapitre Ier du présent titre. (15) « Art. L. 552-2. – Aux fins du présent chapitre, constitue un jeton tout bien incorporel représentant, sous forme numérique, un ou plusieurs droits, pouvant être émis, inscrits, conservés ou transférés au moyen d’un dispositif d’enregistrement électronique partagé permettant d’identifier, directement ou indirectement, le propriétaire dudit bien. (16) « Art. L. 552-3. – Une offre au public de jetons consiste à proposer au public, sous quelque forme que ce soit, de souscrire à ces jetons. (17) « Ne constitue pas une offre au public de jetons l’offre de jetons ouverte à la souscription par un nombre limité de personnes, fixé par le règlement général de l’Autorité des marchés financiers, agissant pour compte propre. (18) « Art. L. 552-4. – Préalablement à toute offre au public de jetons, les émetteurs peuvent solliciter un visa de l’Autorité des marchés financiers. (19) « Les émetteurs établissent un document destiné à donner toute information utile au public sur l’offre proposée et sur l’émetteur. (20) « Ce document d’information et les communications à caractère promotionnel relatives à l’offre au public présentent un contenu exact, clair et non trompeur et permettent de comprendre les risques afférents à l’offre. (21) « Les modalités de la demande de visa préalable, les pièces nécessaires à l’instruction du dossier et le contenu du document d’information sont précisés par le règlement général de l’Autorité des marchés financiers. (22) « Art. L. 552-5. – L’Autorité des marchés financiers vérifie si l’offre envisagée présente les garanties exigées d’une offre destinée au public et notamment que l’émetteur des jetons : (23) « – est constitué sous la forme d’une personne morale établie ou immatriculée en France; (24) « – met en place tout moyen permettant le suivi et la sauvegarde des actifs recueillis dans le cadre de l’offre. (25) « L’Autorité des marchés financiers examine le document d’information, les projets de communications à caractère promotionnel destinées au public postérieurement à la délivrance du visa et les pièces justificatives des garanties apportées. Elle appose son visa sur le document d’information selon les modalités et dans le délai fixés par son règlement général”. *Projet de Loi n° 1088. Assemblée Nationale. Quinzième Législature. Enregistré à la Présidence de l’Assemblée nationale le 19 juin 2018 relatif à la croissance et la transformation des entreprises. Procédure accélérée. Présenté au nom de M. Édouard Philippe, Premier ministre, par M. Bruno Le Maire, ministre de l’économie et des finances.*” *Projet de Loi relatif à la croissance et la transformation des entreprises, (Procédure accélérée) (Renvoyé à une commission spéciale). N° 1088. Assemblée Nationale. Constitution du 4 Octobre 1958. Quinzième Législature. (2018) Retrieved from: <http://www.assemblee-nationale.fr/15/projets/pl1088.asp>.*

¹¹⁹ Autorité des marchés financiers (AMF) (2018). *L’AMF publie une analyse sur les tendances des Initial Coin Offerings (ICO)*. Communiqués de presse. Retrieved from: <https://www.amf-france.org/Actualites/Communiqués-de-presse/AMF/annee-2018?docId=workspace%3A%2F%2FSpacesStore%2F3cc117ce-60e2-4fb0-9a3b-7c7a47cfb80d>

approach”¹²⁰. The countries that are at this regulatory level are: Austria, Belgium, Bulgaria, Denmark, Estonia, Finland, Germany, Ireland, Luxembourg, Netherlands, Portugal, Spain, United Kingdom, Lichtenstein and Guernsey.

iii) Undefined approach – under this understanding, there is no regulation and no legal framework defined on the regulatory approach on the ICOs matters. Croatia, Czech Republic, Greece, Hungary, Italy, Latvia, Poland, Republic of Cyprus, Romania, Slovakia, Slovenia, Sweden, Norway and Iceland adopt the undefined approach.¹²¹

In light of the above-mentioned overview by the European Securities and Markets Stakeholders Group (SMSG), it is necessary to extract the alarming regulatory question about the ICOs and the high risk of these offers in an extremely speculative market.

This type of business is likewise vulnerable to fraud or illicit activities, with high risk of losing all the invested capital and is inserted in a volatile and misinformed context.

The need of regulation on these issues is extremely urgent and necessary, and the inert States should move to a more defensive position of public order, outlining a minimum regulatory path that can establish sensible parameters for the Initial Coin Offer. If countries fail to do so, this would turn out as detrimental to the world financial system, which will be placed in an uncertain and insecure environment.

The Initial Coin Offer, as a new technology and an innovative way of business, must obey regulations and standards that can ensure that taxes are minimally paid, that ICOs and companies and individuals are properly taxed, and that ICOs are not being used as a safe haven for tax evasion and tax avoidance, nor are they being used as a means for money laundering and terrorist financing.

In addition, what is proposed on this point is not the prohibition of markets related to ICOs, but only that they should follow a basic guideline that allows legal security and support to the financial market, investors, countries and companies incubators, just as France and Switzerland are already doing.

¹²⁰ ESMA (2018). *Own Initiative Report on Initial Coin Offerings and Crypto-Assets*. Securities and Markets Stakeholder Group, cit. p. 8.

¹²¹ ESMA (2018). *Own Initiative Report on Initial Coin Offerings and Crypto-Assets*. Securities and Markets Stakeholder Group, pp. 8-9, cit.

4.1.3. The OECD efforts

The efforts carried by the Organisation for Economic Co-operation and Development (OECD) to address the problems and provide solutions related to digital economy are discussed under the BEPS approach. Together with the G20 countries¹²², the OECD began to work on a plan in 2013, which aimed to ensure that the taxation of profits occurred where activities were developed and where value was created.¹²³

In 2015, with the release of the BEPS Action 1 Report, several emerging technologies were target and many scientific novelties were identified, especially with regard to the Virtual Currencies, the so-called internet of things, the sharing economy and advanced robotics.

According to the OECD, among the most important matters related to the Virtual Currencies are the risks associated to the Bitcoin, especially concerning its main characteristics of obscurity and anonymity, and that are frequently used to evade taxes and accomplish other criminal activities¹²⁴. Considering the significance exploration of Bitcoins for tax evasion, authorities must be aware of its risks on the financial world, and therefore, a regulatory approach is crucial.

From this perspective, many times the trades and transfers of Bitcoins are carried out in an imperceptible way and cannot be followed or tracked, and, hence, are not detected by the tax authorities. However, the main setback is not related to the transaction *per se* but associated to the individuals and/or companies' identification. Although the public key is always linked to all transactions, in many occasions the identities are not connected or sometimes does not correspond to the real person behind the operation, making the antitax fraud

¹²² The G20 is a forum for the governments and governors formed by 19 countries Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Republic of Korea, Republic of South Africa, Russia, Saudi Arabia, Turkey, United Kingdom, United States of America and the European Union.

¹²³ OECD (2018). *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*. OECD/G20 Base Erosion and Profit Shifting Project. OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264293083-en>.

¹²⁴ OECD (2018). *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*. OECD/G20 Base Erosion and Profit Shifting Project. OECD Publishing, Paris, cit.

instruments, such as exchange of information agreements and taxation, at the correct source, fruitless.¹²⁵

The intangibility of the Virtual Currencies generates, as already mentioned, the possibility of anonymity, which makes it difficult to investigate and repress when connected to tax avoidance and tax evasion performances. The current challenge is to ensure that technology and innovation do not harm the financial transactions nor permit an environment where money laundering, terrorism financing and tax evasion or avoidance may take place.

At present, many authors cogitate that Virtual Currencies could be an innovative and hidden form of ‘virtual tax havens’, considering they continuously allow tax avoidance and tax evasion behaviours. Under this new understanding, the Virtual Currencies have two highly important attributes of a traditional tax haven: “there is no jurisdiction in which they operate (they are “held” in cyberspace accounts known as online ‘wallets’)” and the “Cryptocurrency accounts are anonymous. Users can start as many online “wallets” as they want to buy or mine Bitcoins and trade them with-out ever providing any identifying information”.¹²⁶

In this same direction, the OECD Secretary-General, on the Report of March 2018, addressed to the G20 Finance Ministers and Central Bank Governors, expressed that the “Digitalization is offering new opportunities as well as some challenges to tax policy and administration beyond the international tax system. These include the growth of the gig and sharing economy and how this is affecting tax compliance and revenues as a result of the rise of non-standard work”.¹²⁷

Another issue related to the Virtual Currencies is that the Exchange of Information related to tax matters, especially regarding the tax evasion problem, does not possess efficient mechanisms to track all the data of the financial operations carried out, as this information is often not available or is not correctly addressed at the source.

On the other hand, the AMLD 5, as already mentioned, perfectifies the collection of information, forcing Virtual Currency trading platforms and portfolio custody providers to,

¹²⁵ Blundell-Wignall, Adrian (2014). *The Bitcoin Question: Currency versus Trust-less Transfer Technology*, OECD Working Papers on Finance, Insurance and Private Pensions. No. 37. OECD. Retrieved from: <http://dx.doi.org/10.1787/5jz2pwjd9t20-en>.

¹²⁶ Marian, Omri (2013). *Are Cryptocurrencies Super Tax Havens?*. 112 Mich. L. Rev. First Impressions.38, p. 42. Retrieved from: http://repository.law.umich.edu/mlr_fi/vol112/iss1/2.

¹²⁷ OECD (2018). *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*. OECD/G20 Base Erosion and Profit Shifting Project. OECD Publishing, Paris, cit.

in accordance with the regulations, apply the measures of performing the due report to the FIUs, linked to tax evasion, as well as enhance the due diligence procedures, in order to debilitate the anonymous and unregulated access of individuals to Virtual Currencies.¹²⁸

Clearly, the Virtual Currencies are inserted in a context of different jurisdictions, with few regulation and little technological control, and it is still extremely difficult, at the moment, to have the clarity and transparency necessary to combat tax avoidance and tax evasion. Nonetheless the current regulation exertions begins to slip out of the paper for practical application, it still depends on strenuous and speedy efforts to achieve the ideal normative yearning.

The OECD indicates that the Virtual Currency may be a scope for a new study approach, mainly on tax and financial crimes subjects. Among the measures that are in most need, the OECD specified three points that should be embraced: 1) Examine the possibilities to reduce the Virtual Currencies risks mainly regarding the tax compliance burden on taxpayers and spread its benefits on the Virtual Currency's tax control; 2) Provide general assessments of hazards of tax evasion linked to Cryptocurrency and Blockchain technology; and 3) Stipulate potentially legislative solutions. In this sense, the Virtual Currency technology may masquerade the identity of those who are sending or receiving money, consequently presenting further risks to the veracity, and authenticity by providing a hiding mechanism for the tax evasion.¹²⁹

4.2. Tax and Regulatory efforts on selected jurisdictions

Each nation has different visions and positions of the Virtual Currencies and, therefore, each one gradually give diverse national responses to regulate the subject. The risks, the opportunities, the possibility of rapid gains, the speed of information and the uses of Virtual Currencies begin a new revolution that must necessarily pass under the legal framework of each country, mainly on tax matters.

¹²⁸ Marian, Omri (2013). *Are Cryptocurrencies Super Tax Havens?*. 112 Mich. L. Rev. First Impressions 38, cit.

¹²⁹ OECD (2018). *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*. OECD/G20 Base Erosion and Profit Shifting Project. OECD, cit.

In order to better understand the Tax and Regulatory efforts on selected jurisdictions, it's important to analyse the regulatory authorities, the legal status of the Virtual Currency, its normative, the market orientation initiatives and tax regimes.

The division that will be adopted hereinafter will be based mainly on the research conducted by the study of the ECB on the Virtual Currency Schemes, by the Advice to ESMA from the Securities and Markets Stakeholder Group. The Study was based on a report developed by the Global Legal Research Center of The Law Library of Congress, that reviews the legal and policy scenery about the Virtual Currency around the world related to the legal adaptations perpetrated by countries.¹³⁰

The impossibility of maintaining a uniformity and categorization is translated under the clear conceptual and juridical misalignment on Virtual Currencies. In this respect, it is crucial to emphasize that there are no rules and standards to be followed.

Considering the worldwide divergence on the matter, the subsequent chapter proposes to analyse the subject in order to give a comprehensive overview of how selected countries deal with the complexities generated by technology and the virtualization of currencies.

For example, in Australia, Virtual Currencies are considered as property, and hence taxed as capital gains; in Germany, on another interpretation, they are treated as private money, and as a consequence taxed as 'other assets'; in Switzerland, VCs are considered as a foreign currency, and taxed accordingly; in the United States, they are treated as property, and thus, taxed as capital gains; in the United Kingdom, they are assets or private money, taxed as capital gains; in Japan, Virtual Currencies are legal methods of payment, and consequently taxed as capital gains; and in China, they are understood as a virtual commodity, and therefore, are not taxed.¹³¹

¹³⁰ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center. Retrieved from: <https://www.loc.gov/law/help/cryptocurrency/world-survey.php>.

¹³¹ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit.

4.2.1. A landmark ruling: The Skatteverket v David Hedqvist Case

Before describing the regulatory developments and unfolding selected countries interpretations on Virtual Currencies, it is indispensable to comprehend the Landmark ruling achieved in the Case of *The Skatteverket v David Hedqvist*, which dealt with the incidence of the Value Added Tax on Bitcoins.

The Directive 2006/112/EC¹³², in Articles 2(1)(c) and 135(1)(d) to (f) addresses the operations of exchange of the virtual currency and Bitcoin by traditional currencies. The referred Article 2 discusses the subjection to VAT in the succeeding terms: “1. The following transactions shall be subject to VAT: (a) the supply of goods for consideration within the territory of a Member State by a taxable person acting as such; (...) c) the supply of services for consideration within the territory of a Member State by a taxable person acting as such; (...)” In this same Directive, Article 14(1) expresses as follows: “Supply of goods shall mean the transfer of the right to dispose of tangible property as owner”. The Article 24(1) established that “Supply of services shall mean any transaction which does not constitute a supply of goods.”

The Article 135 of Directive 2006/112/EC, in this respect, provides the VAT exemptions underlined at the (1)(d)(e)(f) as follows: “(1) Member States shall exempt the following transactions: (...) (d) transactions, including negotiation, concerning deposit and current accounts, payments, transfers, debts, cheques and other negotiable instruments, but excluding debt collection; (e) 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 which are not normally used as legal tender or coins of numismatic interest; (f) transactions, including negotiation but not management or safekeeping, in shares, interests in companies or associations, debentures and other securities, but excluding documents establishing title to goods, and the rights or securities referred to in Article 15(2);”¹³³

¹³² Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax. OJ L 347, 11.12.2006, p. 1–118. Retrieved from: <http://data.europa.eu/eli/dir/2006/112/oj>.

¹³³ Case 264/14 (2015) *Skatteverket v David Hedqvist*. CJEU. Judgment of the Court. Fifth Chamber of 22 October. Request for a preliminary ruling from the Högsta förvaltningsdomstolen. Reference for a preliminary ruling. Common system of value added tax (VAT). Directive 2006/112/EC. Articles 2(1)(c) and 135(1)(d) to (f). Services for consideration. Transactions to exchange the ‘bitcoin’ virtual currency

At the same time, the Swedish Law depends on its Chapter 1, Paragraph 1 that VAT must be paid “in the case of such sales in the country of the goods or services that is taxable and is made by a taxable person acting in this characteristic”.

Section 9 establishes that “shall be exempt from turnover tax by banking and financing services, such turnover is securities trading or another equivalent activity with the banking and financial services "does not include notarial activity, collection services, administrative services regarding factoring or leasing of storage areas”. Under the same Law, the Paragraph 23(1) provides the following exemptions: “1. banknotes and coins which are legal tender, with the exception of collectibles, namely gold, silver or other metal coins or bank notes which are not normally used as legal tender or by Numismatic interest”.¹³⁴

In the aforementioned Case of *The Skatteverket v David Hedqvist*, David Hedqvist was the defendant and the Skatteverket, the Swedish Tax Authority, the applicant. The case deals with the incidence of VAT in a financial transaction relating to Bitcoin. The main question is: Mr. Hedqvist, through a company, must pay VAT on the exchange of fiat currency to Bitcoin and vice-versa? The so-called “exchange of real currency to virtual currency” is a supply of services effected for consideration? In such case, the article 135(1) should or not exempt VAT taxation on these exchanges?

The conclusions settled followed two possibilities: 1) Are exempt from VAT: transactions such as described on the Article 135(1)(e), including transactions involving exchange of traditional currencies for units of the ‘Bitcoin’ virtual currency, negotiation, concerning currency, bank notes and coins used as legal tender; 2) Are not exempt from VAT: transactions such as described in the Article 135(1)(d) and (f): “(d) transactions, including negotiation, concerning deposit and current accounts, payments, transfers, debts, cheques and other negotiable instruments, but excluding debt collection;” (...) “(f) transactions, including negotiation but not management or safekeeping, in shares, interests in companies or

for traditional currencies. Exemption. Sweden. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62014CA0264>.

¹³⁴ Case 264/14 (2015) *Skatteverket v David Hedqvist*. CJEU. Judgment of the Court. Fifth Chamber of 22 October. Request for a preliminary ruling from the Högsta förvaltningsdomstolen. Reference for a preliminary ruling. Common system of value added tax (VAT). Directive 2006/112/EC. Articles 2(1)(c) and 135(1)(d) to (f). Services for consideration. Transactions to exchange the ‘bitcoin’ virtual currency for traditional currencies. Exemption. Sweden, cit., par. 6(e); 8.

associations, debentures and other securities, but excluding documents establishing title to goods, and the rights or securities referred to in Article 15(2)”¹³⁵

The decision established was in the sense that the exemption from VAT on the transactions involving exchange of traditional currencies for units of the Bitcoin virtual currency, does not exempt the taxation of the capital gains for individuals and corporates that which vary from country to country, as following.

The Landmark case regarding the VAT treatment by the European Court of Justice created a disruptive and paradigmatic understanding regarding Bitcoin, the virtual currencies and the new technologies derived from Blockchain.

Such exception has a major impact on diverse nations and on the several internal regulations involving Europe and its member countries. To exempt from VAT the main activity regarding Virtual Currencies – transactions involving exchange of traditional currencies for units of the Bitcoin virtual currency – represents a true stimulus to new technologies and a real exception in the tax world.

4.2.2. European Union Member States

Nonetheless at the EU level, Virtual Currencies aspects have been already outlined on a generic overview, eventually, each country may adopt different tax and regulatory considerations under its sovereignty, considering the lack of a uniform legislation on the subject. In this sense, each nation offers a diverse interpretation and regulatory approach regarding tax issues on the Virtual Currencies subject.

¹³⁵ Case 264/14 (2015) *Skatteverket v David Hedqvist*. CJEU. Judgment of the Court. Fifth Chamber of 22 October. Request for a preliminary ruling from the Högsta förvaltningsdomstolen. Reference for a preliminary ruling. Common system of value added tax (VAT). Directive 2006/112/EC. Articles 2(1)(c) and 135(1)(d) to (f). Services for consideration. Transactions to exchange the ‘bitcoin’ virtual currency for traditional currencies. Exemption. Sweden, cit., par. 6(f).

4.2.2.1. Austria

The Austrian regulatory authority – *Bundesministerium der Finanzen* (BMF) – recognizes the importance of the subject involving Virtual Currencies and provides a legislation under an AML regulation, the Financial Markets Anti-Money Laundering Act¹³⁶. The authority indicates the compulsory requirement of a specific licensing for activities concerning Virtual Currencies, deliberated by the agency. Moreover, there are many market-oriented and consumer-related approaches to the FinTech, focused on the stability of the financial sector, avoiding the use of the financial system for illegal acts, forcing the comply with due diligence proceedings and AML Directives.¹³⁷

The BMF classifies Virtual Currencies as an intangible commodity, not covered by the e-money Act. The taxation of Virtual Currencies follows the case-law established by the C-264/14 (*Skatteverket v David Hedqvist*)¹³⁸, in which it excluded the possibility of VAT incidence in transactions involving negotiation, deposit, payments, transfers, debts, checks and negotiable instruments, but excluding debt collection, that are linked to Bitcoin.¹³⁹

The taxable income comprises any revenue earned by a taxpayers in the form of cash or cash value benefits, which are taxable unless expressly enacted as tax free. The Austrian corporate tax income is 25%¹⁴⁰ and personal income tax rates are variable from 0 to 55%.¹⁴¹

¹³⁶ Financial Market Authority (FMA) (2016). *Financial Markets Anti-Money Laundering Act*. FM-GwG – Finanzmarkt-Geldwäschegesetz. Retrieved from: <https://www.fma.gv.at/download.php?d=2701>

¹³⁷ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. p. 30.

¹³⁸ See: Case 264/14 (2015) *Skatteverket v David Hedqvist*. CJEU. Judgment of the Court. Fifth Chamber of 22 October. Request for a preliminary ruling from the Högsta förvaltningsdomstolen. Reference for a preliminary ruling. Common system of value added tax (VAT). Directive 2006/112/EC. Articles 2(1)(c) and 135(1)(d) to (f). Services for consideration. Transactions to exchange the ‘Bitcoin’ virtual currency for traditional currencies. Exemption. Sweden, cit.

¹³⁹ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. pp. 30- 31

¹⁴⁰ Schindler, Clemens Philipp; Gatterer, Martina (2019). *International Comparative Legal Guides*. ICLG. Australia: Corporate tax 2019. Retrieved from: <https://iclg.com/practice-areas/corporate-tax-laws-and-regulations/austria>

¹⁴¹ European Union (2018). *Income taxes abroad – Austria*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/austria/index_en.htm

4.2.2.2. Portugal

The Federal Reserve Bank of Portugal – *Banco de Portugal* – is the official financial Portuguese institution. With respect to the Virtual Currencies, the referred State authority indicates that this asset is not supervised or regulated by any representative authority of the national financial system. Thus, the activity involving Virtual Currencies does not depend on any prior authorization or consent by the government and therefore it does not make the activities illegal or prohibited. There is only a moderate recommendation for market-oriented and consumer-related approaches, concerning the high risk on negotiating those currencies, since these are not accepted as legal tender, there is no legal protection or insurance to safeguard consumers, and there are risks of using the values for illicit purposes.¹⁴²

The VAT treatment in Portugal is not different from the one in the Case C-264/14 (*Skatteverket v David Hedqvist*), already described. In order to reinforce this understanding, the Tax and Customs Authority of Portugal (*Autoridade Tributária e Aduaneira*) published a binding information in the Case n°. 5717/2015, Order of December 27, 2016, of the ‘*Subdiretora Geral do IR*’, in which a taxpayer requested an opinion on the fiscal framework of income obtained with the purchase and sale of Cryptocurrency.

In this regard, the Portuguese Tax Authority (*Autoridade Tributária e Aduaneira*), on the highlighted binding information, explains that Cryptocurrencies are not considered currencies *a priori*, since they are not a legal tender in Portugal. However, they can be exchanged into a real currency, and therefore generate taxable income.

Bearing this in mind, the analysed Case categorizes three possibilities of taxable gains such as: (i) gains obtained with the purchase and sale or exchange of virtual currency; (ii) gains obtained for the services linked to Cryptocurrency; and (iii) gains derived from sales or services related to Cryptocurrencies.

The *mandamus* established that the sale of Virtual Currency is not taxable¹⁴³, unless if it habituality constitutes a professional activity or business, which will be charged in a specific

¹⁴² Banco de Portugal. *Moedas Virtuais*. Retrieved from: <https://www.bportugal.pt/page/moedas-virtuais>

¹⁴³ Crisóstomo, Pedro; Pereira, João Pedro (2018). *Ganhos com Bitcoins não pagam imposto em Portugal*. Retrieved from: <https://www.publico.pt/2018/01/17/tecnologia/noticia/ganhos-com-bitcoins-nao-pagam-imposto-em-portugal-1799707>.

category of taxation.¹⁴⁴ Consequently, the capital gains are not taxable as equity accrual, forecasted by the Category G, article 10 of the ‘IRS’ Code¹⁴⁵, nor as Investment Income, defined by the Category E. Nevertheless, they are indeed taxable as business or professional income when earned in function of the exercise of an activity and according to the origin of the gain, by the category B of the ‘IRS’ Code. When classified under this category, income can be taxed whether they come from sales or any other nature, according to Paragraph 1 of Article 3 of the ‘IRS’ Code.¹⁴⁶

4.2.2.3. Belgium

The Belgium Authority – Financial Services and Markets Authority (FSMA) – does not regulate Virtual Currencies and there are few public positions about this subject. Therefore, they are not considered a legal tender or as electronic money and are not prohibited in Belgium.¹⁴⁷

4.2.2.4. Bulgaria

In Bulgaria, the Bulgarian Central Bank warned the costumers of Virtual Currencies risks, but there is not any rule or prohibition regarding this subject. In this respect, the Bulgarian National Bank clarified that “consumers buying virtual currencies should be aware there is a high risk and that they will lose a large amount, or even all, of the money invested”.¹⁴⁸ In

¹⁴⁴ Autoridade Tributária e Aduaneira (2016). *Tributação das cripto-moedas ou moedas virtuais*. Informação vinculativa. Processo 5717/2015, da Subdiretora Geral do IR. Retrieved from: http://www.taxfile.pt/file_bank/news0318_22_1.pdf.

¹⁴⁵ *Código do Imposto sobre o Rendimento das Pessoas Singulares*.

¹⁴⁶ Decree-Law 442-A. 30 November 1988. IRS Code.

¹⁴⁷ About the public opinion in Belgium, there is a Press Release named “*Be careful with virtual money, such as bitcoin*”. Retrieved from: <http://www.nbb.be/doc/ts/enterprise/press/2014/cp140114en.pdf>.

¹⁴⁸ Bulgaria, Tsoleva (2018). *Central Bank Warns Consumers of Cryptocurrency Risks*. Reuters. Retrieved from: <https://www.reuters.com/article/crypto-currency-bulgaria/bulgaria-central-bank-warns-consumers-ofcryptocurrency-risks-idUSL8N1Q45KW>.

addition, the Bulgarian Revenue Agency started inspections of the Cryptocurrencies Traders on the tax and social security fields and when related to AML/CFT compliance.¹⁴⁹

In terms of taxation, the Virtual Currencies are treated as income from the sale of a financial asset. The individual profits from the exchange or sale of Virtual Currencies are taxed at 10% from the total tax base.¹⁵⁰ Bulgaria also follows the Case C-264/14 (*Skatteverket v David Hedqvist*), concluding that the sale of Virtual Currency is not VAT taxable.

4.2.2.5. Croatia

On December 18th, 2017, the Croatia's Financial Stability Council issued a Press Release¹⁵¹ indicating an initial work on Virtual Currencies matters. Among other issues, the government pointed out the extreme volatility of Crypto-assets, which are strongly associated with different risks. The Council also noted that these products were associated with market volatility, lack of securitization protection, absence of a regulatory body and the possibility of taxation. In the same direction, the *Hrvatska Agencija Za Nadzor Financijskih Usluga* (Hanfa) in February 2018 warned consumers about the risks associated with the currency and its high price fluctuation.¹⁵²

In respect to taxation, Croatia follows the Case C-264/14 (*Skatteverket v David Hedqvist*), such as Portugal, concluding that the sale of Virtual Currency is not VAT taxable, unless if it habituality constitutes a professional activity or business, which will be charged in a specific category of taxation between 12%-18%.¹⁵³

¹⁴⁹ Zmudzinski, Adrian (2019). *Bulgarian Revenue Agency Announces Inspection of Cryptocurrency-Selling Companies*. Cointelegraph. Retrieved from: <https://cointelegraph.com/news/bulgarian-revenue-agency-announces-inspection-of-cryptocurrency-selling-companies>.

¹⁵⁰ Rizzo, Pete (2014). *Bulgarian Bitcoin Tax Guidance May Leave Money-Laundering Loophole*. Retrieved from: <https://www.coindesk.com/bulgarian-bitcoin-tax-guidance-may-leave-money-laundering-loophole/>.

¹⁵¹ Vijeće za financijsku stabilnost (2017). *Financial Stability Council Press release*. 9th Session of the Financial Stability Council. Retrieved from: <http://www.vfs.hr/dokumenti/priopcenja/2017/e-priopcenje-18122017.pdf>

¹⁵² Hanfa (2018). *Informacija o virtualnim valutama i rizicima ulaganja u virtualne valute*. Retrieved from: <https://www.hanfa.hr/vijesti/informacija-o-virtualnim-valutama-i-rizicima-ulaganja-u-virtualne-valute/>.

¹⁵³ European Union (2018). *Income taxes abroad – Cyprus*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/cyprus/index_en.htm.

4.2.2.6. Cyprus

The Cryptocurrencies are not regulated under this jurisdiction, which means they are not a legal tender. According to an announcement called “Attention to the risks associated with virtual currencies”, the Central Bank of Cyprus, in February 2014, warned the costumers about the risks associated to the trading of the virtual currencies.

In this respect, the CBC indicated that any activity carried out without the State authorization is illegal, unless there is a guarantee of legal compliance. The national Bank pronounced also that there are no specific measures for proper regulatory protection.¹⁵⁴

In addition, on 15 May 2018, the CySEC published the Circular n°. 268¹⁵⁵ regarding an overview of new rules about Virtual Currencies matters, named “Introduction of new rules governing derivatives on virtual currencies”. The Circular aimed to create standard rules and obligations for Cyprus Investment Firms (CIFs) for investment services in derivatives on Virtual Currencies, such as specific authorization by the CySEC.¹⁵⁶

At present, there is no specific tax treatment concerning Virtual Currencies gains. Cyprus corporate tax income is 12,5% and personal income tax rates are variable between 0 to 35%.¹⁵⁷

¹⁵⁴ Central Bank of Cyprus (2014). *Attention to the risks associated with virtual currencies*. Press Release. Retrieved from: <https://www.centralbank.cy/en//announcements/07022014>.

¹⁵⁵ On this regard: *"In effect, virtual currencies may constitute an underlying variable in other derivative contracts including CFDs, options and futures (the "Derivative on Virtual Currencies")*. To this end, CySEC hereby clarifies the following: 1. Any activity relating to virtual currencies is not currently regulated by CySEC, unless a virtual currency meets the criteria and falls under the existing regulatory framework, as per CySEC's announcement dated 15 November 2017. 2. However, Derivatives on Virtual Currencies are now capable of qualifying as financial instruments under the Law. A "financial instrument" means those instruments specified in Part III of the First Appendix of the Law. Among the financial instruments listed in Part III of the First Appendix of the Law, Derivatives on Virtual Currencies may fall under the following (...)". Retrieved from: <https://theindustryspread.com/tag/investment-services/>.

¹⁵⁶ Cyprus Securities and Exchange Commission (2018). *Introduction of new rules governing derivatives on virtual currencies*. C 268. Retrieved from: <https://www.cysec.gov.cy/CMSPages/GetFile.aspx?guid=2cd4bb96-9cf7-476d-abce-7f7583406c80>.

¹⁵⁷ European Union (2018). *Income taxes abroad – Cyprus*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/cyprus/index_en.htm.

4.2.2.7. Czech Republic

The Czech National Bank (CNB) is the regulatory authority on Virtual Currencies matters in Czech Republic. In this context, there is no specific regulation on digital currencies, although the controlling authority is currently developing considerations on the subject.

The CNB clarifies that the regulatory authority does not care of being blamed of a “too little, too late” approach, for they just want to prevent a “too much, too soon” approach.¹⁵⁸ Recently, there were some rules modifications to adapt the necessity of a due diligence and compliance comply, which was carried out under the Act N°. 253/2018 (anti-money laundering legislation), attending the Regulation (EU) 2015/847 of the European Parliament and of the Council of 20th May 2015.

In this jurisdiction, Virtual Currencies are not coins, banknotes, or electronic money, and therefore, no authorization and no supervision for individuals trade on Virtual Currencies are required.¹⁵⁹

In the field of taxation, Czech Republic also follows the Case C-264/14, concluding that the sale of Virtual Currency is not VAT taxable. Corporate entities are taxed regarding the capital gains at 19%.¹⁶⁰

4.2.2.8. Denmark

Denmark is a very interesting case. This jurisdiction has no Virtual Currencies law on this subject. In fact, the Danish Financial Supervisory Authority (*Finanstilsynet*), does not even consider bitcoin as a currency, and therefore, does not regulate its use and emphasize that its activity is not protected by existing financial regulations.¹⁶¹ In another side, the Danish

¹⁵⁸ Dědek, Oldřich (2018). *Are central banks prepared for crypto currencies?* Czech National Bank (CNB). Retrieved from: https://www.cnb.cz/en/public/media_service/conferences/speeches/dedek_20180907_singapur.html.

¹⁵⁹ European Central Bank (February 2015). *Virtual currency schemes a further analysis*, cit.

¹⁶⁰ Blockchain and Bitcoin Conference Prague (2019). *Cryptocurrency in the Czech Republic: laws and taxation*. Retrieved from: <https://prague.bc.events/en/news/kriptovalyuta-v-chehii-zakoni-i-nalogooblogenie-95367>.

¹⁶¹ Finanstilsynets (2015). *Press Release. Orientering om ICO'er - Orientation on ICOs*. Retrieved from: <https://finansstilsynet.dk/da/Nyheder-og-Presse/Sektornyt/2017/Orientering-om-ICO>.

financial regulation is accomplished by most of the Directives and procedures of the European Union in its financial regulations, inspired by the international regulatory trends. The Danish financial sector is regulated under numerous acts.¹⁶²

The Danish Central Bank categorized the bitcoin as “not a legal tender” and warned consumers about the possibility of high risks involving the trade of Virtual Currencies. Contrary to what Thomson Reuters published that “the Danish central bank is considering digital-only e-krone”¹⁶³, the DCB affirms that there is no interest in creating an official Virtual Currency, thus indicating that an e-currency would generate competition between the central bank and private banks.¹⁶⁴

In respect of taxation, the Danish Tax Authority (SKAT) made several declarations related to Virtual Currencies, in the sense that just as in other countries, Cryptocurrencies could be exempt from VAT taxation, following the aforementioned Case C-264/14.

The speculative losses related to Bitcoin were also the subject of a decision by the Danish Supervisory Board, in which was established that any losses can be deducted as a cost.¹⁶⁵ In this sense, the Tax Council “could not confirm that the gain on the disposal of bitcoins was irrelevant to the income statement, since the acquisition was considered to have happened with speculative intention”¹⁶⁶, corroborating that costs on the sale of bitcoins acquired for speculative purpose were deductible in taxable income.¹⁶⁷

In this case, when an individual investor is considered, the tax rate for income speculation is 53%, although the tax value losses deductions is only 27%. The current Danish corporate tax rate is 22%¹⁶⁸.

¹⁶² Sackheim S, Michael and Howell A, Nathan (2018). *The virtual Currency Regulation Review*. Retrieved from: https://thelawreviews.co.uk/digital_assets/e61360db-b49e-4d17-83f0-eba976d0804c/The-Virtual-Currency-Regulation-Review---Edition-1.pdf.

¹⁶³ Thomson Reuters (2017). *Answers for Tax Professionals Cryptocurrencies by country*. Retrieved from: <https://blogs.thomsonreuters.com/answeron/world-cryptocurrencies-country/>.

¹⁶⁴ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. pp. 34-35.

¹⁶⁵ Skatteforvaltningens – SKAT (2018). *Gevinst og tab ved afståelse af bitcoins*. SKM2018.104.SR. Retrieved from: <https://skat.dk/skat.aspx?oid=2271294>.

¹⁶⁶ Translate by the author, from the original “*Skatterådet kunne ikke bekræfte, at gevinst ved afståelse af bitcoins var indkomstopgørelsen uvedkommende, idet erhvervelsen ansås for sket med spekulationshensigt*”. Skatteforvaltningens – SKAT (2018). *Gevinst og tab ved afståelse af bitcoins*. SKM2018.104.SR, cit.

¹⁶⁷ Skatteforvaltningens – SKAT (2018). *Gevinst og tab ved afståelse af bitcoins*. SKM2018.104.SR, cit.

¹⁶⁸ Skatteforvaltningens – SKAT (2018). *Gevinst og tab ved afståelse af bitcoins*. SKM2018.104.SR, cit.

4.2.2.9. Estonia

In 2017, the Estonian government enhanced its anti-money laundering legislation, regarding the AMLD 5 and the cooperation through the EU members. In this jurisdiction, Virtual Currencies are not a legal tender, but a “value represented in digital form”¹⁶⁹, and the exchanges must be registered within the Estonian Financial Supervision Authority (*Finantsinspeksioon*).¹⁷⁰

On tax matters, such as other EU members, Estonia follows the Case C-264/14, although, the government classifies Virtual Currencies as a digital asset for tax purposes.¹⁷¹ The Estonian corporate tax income is 20% and personal income tax rates is 20%.¹⁷²

4.2.2.10. Finland

Finland does not have regulation nor any law on Virtual Currencies subjects. In 2004, the Financial Supervisory Authority (*Finanssivalvonta*) and the Central Bank of Finland issued statements about the Virtual Currencies risks, rating the Cryptocurrencies as “risk-filled investment”.¹⁷³

Subsequently, the Finland Central Bank, through a report published in 2017, indicated that Bitcoin was ground-breaking. The statement sustained that “Bitcoin's design as an economic system is revolutionary and therefore would merit an economist's attention and scrutiny even if it had not been functional. Its apparent functionality and usefulness should

¹⁶⁹ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. p. 36.

¹⁷⁰ Minuraha.ee (2015). *Virtuaalraha pakkujad järelevalve alla ei kuulu*. Retrieved from: <https://www.minuraha.ee/virtuaalraha-pakkujad-jarelevalve-alla-ei-kuulu-2/>.

¹⁷¹ The Law Library of Congress, *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. p. 36.

¹⁷² European Union (2018). *Income taxes abroad – Estonia*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/estonia/index_en.htm.

¹⁷³ Finanssivalvonta FIN-FSA (2004). *Finansinspektionen, Finansinspektionens varning: kryptovalutor och ICO:s (Initial Coin Offering) är riskfyllda*. Press Release. Retrieved from: http://www.finanssivalvonta.fi/se/Publicerat/pressmeddelanden/Pages/17_2017.aspx.

further encourage economists to study this marvellous structure.”¹⁷⁴ The Finnish Tax Authority (*Vero Skatt*) has also issued an advisory statement on Virtual Currencies.

With respect to VAT, in agreement to other EU members, Finland adopts the Case C-264/14, although classifies Virtual Currencies as a capital income, treating as dividends rent or others income and taxing it at 30 to 34%.¹⁷⁵

4.2.2.11. France

France is in the forefront of the Virtual Currencies regulatory efforts. One of the most affected jurisdictions regarding the terrorist attack in 2015 in Paris, France is promoting deep exertions in order to create an ideal framework on this matter, mainly on ICOs issues.

In December 2017, the *Autorité des Marchés Financiers* (AMF) and the *Autorité de Contrôle Prudentiel et de résolution* (ACPR), warned about the Virtual Currencies risks.¹⁷⁶ Those governmental bodies acknowledged the benefits involving Blockchain technology for governance and associations, although in partnership with the French legislative are figuring a way to better manage those Virtual Currencies issues.

As previously mentioned, in France a project called PACTE was established, the point of the iceberg on ICOs and Cryptocurrencies matters. In this regard, Bruno Le Maire, the French Minister of the Economy, in compliance with the French system, made a statement

¹⁷⁴ Huberman, Gur and Leshno, Jacob and Moallemi, Ciamac C. (2017). *Monopoly Without a Monopolist: An Economic Analysis of the Bitcoin Payment System*. Bank of Finland Research Discussion Paper No. 27/2017. Retrieved from: SSRN: <https://ssrn.com/abstract=3032375>.

¹⁷⁵ Janita (2018). *How Bitcoin cryptocurrency taxes work in Finland*. Metropolitan.fi. Retrieved from: <https://metropolitan.fi/page/bitcoin-cryptocurrency-tax-in-finland>.

¹⁷⁶ In this respect, the AMF, ACPR and Communiqué de Presse described: “Depuis plusieurs semaines, le Bitcoin a vu sa valorisation croître brutalement. Cette valorisation peut aussi bien s’effondrer de la même manière. L’achat/vente et l’investissement en Bitcoins s’effectuent à ce jour en dehors de tout marché réglementé. Les investisseurs s’exposent par conséquent à des risques de perte très élevés en cas de correction à la baisse et ne bénéficient d’aucune garantie ni protection du capital investi. L’AMF et l’ACPR sont de plus en plus sollicitées à travers leurs centres d’appels par des épargnants à ce sujet.”. Retrieved from: Autorité des Marchés Financiers (2017). *Achats de bitcoins: l’amf et l’acpr mettent en garde les épargnants*. Retrieved from: <https://acpr.banque-france.fr/sites/default/files/medias/documents/20171204-cp-bitcoin.pdf>.

highlighting the importance of regulating the evolution with respect to the tax evasion, money laundering and terrorism financing hazards.¹⁷⁷

The VAT treatment in France is not different from that in Case C-264/14 (*Skatteverket v David Hedqvist*). According to the *Bulletin Officiel des Finances Publiques-Impôts (BOFiP-Impôts)* there are two categories to take into account on personal incomes that derive from Bitcoin: (i) “the purchase-resale of Bitcoin on a regular basis” (BIC) or (ii) Occasional purchase-resale falls (BNC). In any case, all the taxpayers are obliged to declare all the gains including those held or that come from abroad¹⁷⁸, and are consequently taxed as the income tax rates from 0 to 45%.¹⁷⁹

4.2.2.12. Germany

The Federal Financial Supervisory Authority (BaFin) is the Germany regulatory authority on tax matters. The body claims that the commercial treatment of Virtual Currencies may generate the need for authorization, however, in general, transactions do not follow this same approval logic. Under the German interpretations, the virtual currencies are not a legal tender, neither e-money are financial instruments, for the reason that “units of account are comparable to foreign exchange”¹⁸⁰

With regard to taxation, Germany is in line with the Case C-264/14 (*Skatteverket v David Hedqvist*), concluding that the sale of a Virtual Currency is not VAT taxable¹⁸¹, although

¹⁷⁷ In this sense, the French Minister of the Economy sustained: “Cette mission me proposera des orientations sur l'évolution de la réglementation pour mieux en maîtriser le développement et empêcher leur utilisation à des fins d'évasion fiscale, de blanchiment ou de financement d'activités criminelles ou de terrorisme”. *Le point Économie* (2018). *Un ancien de la Banque de France chargé d'une mission sur le bitcoin*. Retrieved from: https://www.lepoint.fr/economie/un-ancien-de-la-banque-de-france-charge-d-une-mission-sur-le-bitcoin-15-01-2018-2186834_28.php.

¹⁷⁸ Cazenave, Frédéric (2014). *Rapatrier ses bitcoins et les déclarer (ou non)*. *Le monde*. Retrieved from: https://www.lemonde.fr/argent/article/2014/04/07/rapatrier-ses-bitcoins-et-les-declarer-ou-non_4396877_1657007.html?xtmc=bitcoin&xtcr=4.

¹⁷⁹ European Union (2018). *Income taxes abroad – France*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/france/index_en.htm.

¹⁸⁰ Federal Financial Supervisory Authority. *Virtual Currency (VC)*. BaFin. Retrieved from: https://www.bafin.de/EN/Aufsicht/FinTech/VirtualCurrency/virtual_currency_node_en.html.

¹⁸¹ About this subject the Ministry of Finance made a report concerning the VAT. This statement did not exempt the Virtual gaming money, meaning in-game currencies, particularly in online games from VAT payments. (Retrieved from: The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center. cit., p. 40).

the jurisdiction classifies Virtual Currencies as a financial instrument, treating the capital gains as income from private sales transactions. In this regard, the Section 22 N°. 2 and Section 23 (1) N°. 2 of the German Income Tax Act (Einkommensteuergesetz; “EStG”) regulates the Fiscal Treatment of Cryptocurrencies in Germany as “*Veräußerungsgeschäfte bei anderen Wirtschaftsgütern, bei denen der Zeitraum zwischen Anschaffung und Veräußerung nicht mehr als ein Jahr beträgt*”¹⁸² – in other words, as “other assets”. The marginal rate incidence can vary from 0% to 45%.¹⁸³

4.2.2.13. Italy

The Italian regulatory authorities are *Banca d’Italia* and the *Commissione Nazionale per le Società e la Borsa* (CONSOB), that discourages and warns against the use of Virtual Currencies. In addition, the *Banca d’Italia* made a statement undertitled as “*Utilizzo Anomalo di Valute Virtuali*”, which alerts obliged entities about the atypical use of Virtual Currencies and the responsibility of these institutions on anti-money laundering compliance.¹⁸⁴

In Italy, virtual currencies are not a legal tender, and there is an impasse on the legal recognition of the DLT. Regarding this issue, it is important to note that the jurisdiction of San Marino is proposing to be the Italian hub and also the European hub in Virtual Currencies.¹⁸⁵

The *Agenzia delle Entrate*, or the Revenue Agency, is in line with the Case C-264/14 (*Skatteverket v David Hedqvist*), concluding that the sale of Virtual Currency is not VAT taxable¹⁸⁶.

¹⁸² Section 23 (1) No. 2 of the German Income Tax Act Einkommensteuergesetz; “EStG”. Retrieved from: <https://www.gesetze-im-internet.de/estg/BJNR010050934.html>.

¹⁸³ European Union (2018). *Income taxes abroad – Germany*. Retrieved from: https://europa.eu/youreurope/citizens/work/taxes/income-taxes-abroad/germany/index_en.htm.

¹⁸⁴ Banca D’Italia. *Unità di Informazione Finanziaria per L’Italia. Utilizzo Anomalo Di Valute Virtuali*. Retrieved from: http://uif.bancaditalia.it/normativa/norm-indicatori-anomalia/Comunicazione_UIF_su_VV.pdf.

¹⁸⁵ Libertas.sm (2018). *San Marino in prima linea nell’innovazione della blockchain*. Retrieved from: <http://www.libertas.sm/notizie/2018/04/23/san-marino-in-prima-linea-nellinnovazione-della-blockchain.html>.

¹⁸⁶ Risoluzione Ministeriale 72/E del 2 settembre 2016, Interpello ai sensi dell’art. 11, legge 27 luglio 2000, n. 212, Trattamento Fiscale Applicabile alle Società che Svolgono Attività di Servizi Relativi a Monete Virtuali. Agenzia Entrate. Retrieved from: <https://www.finaria.it/pdf/bitcoin-tasse-agenzia-entrate.pdf>.

4.2.3. The United Kingdom case

The case of the United Kingdom cannot be analysed with the other countries, because of its peculiarities and considering the succession of the Brexit events, in which diverse juridical and political uncertainties must be taken into account.

The United Kingdom does not possess any regulation nor any law on the Virtual Currencies matter. Nonetheless, the Financial Conduct Authority (FCA) and the Bank of England, which constitute the regulatory authorities, alert about the risks relating to ICOs and investing in Cryptocurrencies.¹⁸⁷

In December 2017, the FCA made the Feedback Statement on Discussion Paper 17/03, concerning the Distributed Ledger Technology. This substantial and interesting regulatory approach is based on eight pillars: operational risks, digital currencies, digital asset trading, smart contracts, regulatory reporting, financial crime, general data protection regulation and regulatory considerations on Initial Coin Offerings. This approach may be the regulatory tendency for the United Kingdom.¹⁸⁸

According to the Her Majesty's Revenue and Customs, the VAT treatment on virtual currencies are: i) "income received from Bitcoin mining activities will generally be outside the scope of VAT on the basis that the activity does not constitute an economic activity"; ii) "income received by miners for other activities, such as for the provision of services in connection with the verification of specific transactions for which specific charges are made, will be exempt from VAT"; iii) "when Bitcoin is exchanged for Sterling or for foreign currencies, such as Euros or Dollars, no VAT will be due on the value of the Bitcoins themselves"; and iv) "VAT will be due in the normal way from suppliers of any goods or services sold in exchange for Bitcoin or other similar Cryptocurrency. The value of the supply

¹⁸⁷ In this regard: "Contracts for differences (CFDs), including financial spread bets, with cryptocurrencies as the underlying investment are increasingly being marketed to consumers. These products are extremely high-risk, speculative products. This warning is to inform consumers about the risks of buying them." Retrieved from: <https://www.fca.org.uk/news/news-stories/consumer-warning-about-risks-investing-cryptocurrency-cfds>.

¹⁸⁸ In this subject see: Financial Conduct Authority (2017). *Distributed Ledger Technology Feedback Statement on Discussion Paper 17/03. Feedback Statement FS17/4 December 2017*. Retrieved from: <https://www.fca.org.uk/publication/feedback/fs17-04.pdf>.

of goods or services on which VAT is due will be the sterling value of the Cryptocurrency at the point the transaction takes place”¹⁸⁹

The trade of Virtual Currencies in the UK requires currency transactions to determine the UK tax consequences. For companies and individuals, profits and losses are taxed as capital gains.¹⁹⁰

4.2.4. Non-European Union Members

The European Union Member Countries are part of a great legal conservative and legislative process. The enormous external pressure spread across the most diverse jurisdictions and the speed of information and innovation hinders the development of a legal consensus within the European system.

The Non-European Union Members, on the other hand, follow a different line and a more sensitive idea to issues associated with technological innovations, hence, their legislative efforts are more easily adapted. The success and failure of the European Union’s attempts on Virtual Currencies subjects serve as a model for the drafting of regulations, guidelines methodologies and criteria for non-EU jurisdictions.

With this in mind, Gibraltar, Isle of Man, Jersey, Liechtenstein, Switzerland and the United States of America, represent some of the most prominent jurisdictions with regulatory efforts in the Virtual Currencies agenda.

¹⁸⁹ HM Revenue and Customs (HMRC) (2014). *Revenue and Customs Brief 9 (2014): Bitcoin and other cryptocurrencies*. Retrieved from: <https://www.gov.uk/government/publications/revenue-and-customs-brief-9-2014-bitcoin-and-other-cryptocurrencies/revenue-and-customs-brief-9-2014-bitcoin-and-other-cryptocurrencies>.

¹⁹⁰ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. p. 58.

4.2.4.1. Gibraltar

Regulatory analysis becomes much easier and much evident when it comes to jurisdictions that have already established clear rules and transparency on the legal aspects set out in virtual currencies matters, such as Gibraltar.

Gibraltar understands that Virtual Currencies are a type of exchange, cannot be considered as a legal tender, are not issued by any jurisdiction, are not e-money and cannot be the representation of fiat money. The Gibraltar DLT Regulation follows a flexible, responsible and specifically designed model for the DLT and Cryptocurrencies. As a result-focused based on principles, it is not a soft regulation. In this sense, the interpretation on the matter provides consumer confidence, protect the Gibraltar's reputation and guarantees a legal certainty.

The DLT regulation is expressed by the Legal Notice n°. of 2017 – Financial Services (Investment and Fiduciary Services) Act – Financial Services (Distributed Ledger Technology Providers) Regulations 2017, published on 12 October 2017. This regulation follows nine regulatory principles as described: 1. Honesty and integrity: For this purpose, the Gibraltar Financial Services Commission (GFSC) must glimpse honesty, integrity, reputation, competence, skill, experience, financial position on the DLT Provider; 2. Pay due regard to the needs and interests of its clients and mitigate the DLT technology risks; 3. Maintain the adequacy of economic resources and preservation of the books, records and audits; 4. Observe risk management practices; 5. Defend customers money and assets; 6. Operative corporate governance; 7. Highly preserve the safety access protocols; 8. Identify and report economic crime risks; and, finally 9. Be resilient and have contingency arrangements.¹⁹¹

In Gibraltar, Virtual Currencies are not a legal tender, and the DLT providers must register on the Gibraltar Financial Services Commission (GFSC) on a three months authorization process, which involves a non-refundable initial application assessment fee of

¹⁹¹ Gibraltar Gazette (2017). *Financial Services Act Financial Services - Distributed Ledger Technology Providers - Legal Notice No 4401*. Retrieved from: <https://www.triay.com/wp-content/uploads/2017/10/Financial-Services-Distributed-Ledger-Technology-Providers-Regulations-2017.pdf>.

£2,000¹⁹², and comprises three phases of Pre-Application Engagement, Initial Application Assessment and a Full Application and Presentation.¹⁹³

Against this background, Gibraltar as a low taxation ‘heaven’ does not tax capital gains or dividend tax on Virtual Currencies, and also does not have a Value Added Tax. Exchanges are taxed based on a corporate income tax rate of 10%.¹⁹⁴

The enforcement of the law is guaranteed by the Financial Services (Penalty Fees) Regulations, 1993, which provides punishment from £10,000.00, in case of DLT regulation noncompliance.¹⁹⁵

4.2.4.2. Isle of Man

The Isle of Man was one of the first jurisdictions to adopt a regulation relating to the Virtual Currencies. Amending its Proceeds of Crime Act 2008 in 2015, the Isle of Man government included Cryptocurrencies and other similar currencies in the concept of a means of payment for goods. In view of this, the Amendment regulates that “Cryptocurrencies or similar concepts where the concept is accepted by persons as a means of payment for goods or services, a unit of account, a store of value or a commodity”.¹⁹⁶

The Isle of Man reveals a greater awareness of the existing types of currencies such as the Digital Currencies, which “refers to any electronic representation of a fiat currency and this can include representations of virtual currency”, virtual currency, which “is a narrower asset and is a digital representation of value which can be traded digitally. The nature of a virtual currency means that it does not need to be centrally controlled or administered. Virtual currency can be either convertible or non-convertible”, convertible virtual currency, “which includes

¹⁹² The application fee can vary, according to the complexity of the application following the balance payable on submitting full application Complexity Cat 1:£10,000; Complexity Cat 2: £20,000; Complexity Cat 3: £30,000. The annual fee can also follow this same category of payment. Supplementary fees are applied.

¹⁹³ Gibraltar Financial Services Commission. *Distributed Ledger Technology Regulatory Framework (DLT framework)*. Retrieved from: <http://www.gfsc.gi/dlt>

¹⁹⁴ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. p. 62.

¹⁹⁵ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit. pp. 62-63.

¹⁹⁶ Department of Home Affairs (2015). *Proceeds of Crime (Business in the Regulated Sector) Order 2015, 2015/0073, Sched., art. 1(1)(mm)*. Statutory Document. Retrieved from: <https://www.gov.im/media/470633/proceedsofcrime-businessintheregulatedsector-order2015-final.pdf>.

Cryptocurrency, can be converted into a fiat currency, either directly, or through an exchange”, Non-convertible virtual currency, which, “once purchased, cannot be transferred to another person and cannot be redeemed for fiat currency, either directly or through an exchange” and, finally, fiat currency, understood as “‘real currency’, ‘real money’ or ‘national currency’”.¹⁹⁷

Under this jurisdiction legislation, the anti-money laundering and counter terrorism financing rules are also adapted for Virtual Currencies. According to the Section 4 of the Isle of Man AML/CFT Handbook, even if the customer is acting on behalf of another person, the customer due diligence requires the identification of the client, the source of funds, the identification of the beneficial ownership, the control of the legal persons involved, the verification of politically exposed persons (PEP) individuals, the identification of higher risk customers and the appropriate scrutiny of transactions.¹⁹⁸

The Isle of Man, as a Crown Dependency of the United Kingdom and considered as a low taxation ‘heaven’, does not tax capital gains or dividend tax on Virtual Currencies, and also does not have a Value Added Tax. The standard rate for all resident and non-resident companies is 0%, therefore, they are not taxed.¹⁹⁹

4.2.4.3. Jersey

The jurisdiction of Jersey is also a Crown dependency of the United Kingdom and a low taxation ‘heaven’.

Jersey foments and supports innovation and new business creation, with the government support to promote economic, employment and financial growth. In July 2015, responding an Inquiry addressed to the Chief Minister’s department, it was published that “the creation of a business-friendly framework that encourages innovation, jobs and growth in both

¹⁹⁷ Financial Services Authority (2016). *Virtual Currency Business Sector Specific AML/CFT Guidance Notes October 2016*. Retrieved from: <https://www.iomfsa.im/media/1606/virtualcurrencyguidance.pdf>, p. 4.

¹⁹⁸ Isle of Man Financial Services (2018). *Authority Anti-Money Laundering and countering the Financing of Terrorism handbook*. Retrieved from: <https://www.iomfsa.im/media/1475/amlcft handbookfinalversiond.pdf>.

¹⁹⁹ Isle of Man Government. *Corporate Tax Rates*. Retrieved from: <https://www.gov.im/categories/tax-vat-and-your-money/income-tax-and-national-insurance/business-and-corporations/corporate-tax-rates/>.

the financial services and digital sector is a priority for the Government of Jersey. Virtual Currency systems can be significant building blocks of a modern digital economy.”²⁰⁰

Therefore, the Jersey government is focused on innovation and technology, but also adopts measures to apply AML and CFT compliance in the virtual economy. On this regard, the Proceeds of Crime (Jersey Law) of 1999 enlarged the financial services business concept to cover the Virtual Currencies. On the Schedule 2, the rule defines Virtual Currencies as Business regulated by the Commission under regulatory laws. Under this normative, Virtual Currency means “any currency which (whilst not itself being issued by, or legal tender in, any jurisdiction) (a) digitally represents value; (b) is a unit of account; (c) functions as a medium of exchange; and (d) is capable of being digitally exchanged for money in any form”.²⁰¹

In November 2017, on a press statement, the Jersey Financial Services Commission (JFSC) alerted the costumers about the risks involving the Cryptocurrencies and ICOs. The JFSC warned that Virtual Currencies have a complex and uncertain nature, an inadequate information, a high price volatility, an unregulated space and can be associated to the risk of fraud, money laundering and/or other illicit activities. In addition, the Virtual Currencies market have a high risk of losing all of the investment made.²⁰²

On the tax subject, Virtual Currencies can be observed under some prisms. According to the website of the Government of Jersey – Information and Public Services for the Island of Jersey – the mining of Cryptocurrencies on insignificant or irregular scale cannot be taxed. In the Jersey tax law and technical information’s words “the act of mining alone will not make you liable for income tax. Any costs associated with mining will not generally be deductible as expenses of trading”.²⁰³

Under the Jersey’s current Virtual Currency regulations are taxed as income business exchange of Cryptocurrencies to fiat currencies and incorporated and non-

²⁰⁰ State of Jersey (2015). *Regulation of Virtual Currency. Views sought on virtual currency regulation*. Retrieved from: <https://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/C%20Regulation%20of%20Virtual%20Currency%20Final%20Consultation%20Paper%2020150708%20GP.pdf>.

²⁰¹ States of Jersey (1990). *Proceeds of Crime (Jersey) Law 1999*. Revised Edition 08.780 of 1 January 2019. Retrieved from: https://www.jerseylaw.je/laws/revised/Pages/08.780.aspx#_Toc468266188.

²⁰² Jersey Financial Services Commission (2017). *Press statement: JFSC warning on Initial Coin Offerings*. Retrieved from: <https://www.jerseyfsc.org/media/1612/jfsc-warning-initial-coin-offerings.pdf>.

²⁰³ Jersey Government (2019). *Cryptocurrency tax treatment*. Retrieved from: <https://www.gov.je/TaxesMoney/IncomeTax/Technical/Guidelines/Pages/CryptocurrenciesTreatment.aspx>.

incorporated entities exchange, where the features of trading are met. Regarding the incorporated or non-incorporated business, the profits and losses are taxed under the regular taxation rules²⁰⁴ and infrequent transactions and other cases are not taxable.

Virtual currencies are also accepted as a payment way, and therefore taxed under the Goods and Services Tax (GST)²⁰⁵. The treatment of Bitcoin and similar Cryptocurrencies imposes the immediately conversion for GST proposes and is also regulated on the Goods and Services Tax Law of 2007.²⁰⁶

4.2.4.4. Liechtenstein

In Liechtenstein, the regulatory authority on Virtual Currency related issues is the Financial Market Authority (FMA). On 10 September 2017, the governmental body made the costumers aware of the risks and opportunities involving the Virtual Currencies and ICOs. In this regard, the FMA underlined that “there are numerous technological risks such as bugs in the software or hacking attacks. Investors should also note that tokens may often be illiquid or subject to high volatility. All of this means that tokens are high risk investments”.²⁰⁷

In respect to the legal context and licensing requirement, Liechtenstein incorporated the Virtual Currencies on the *Gesetz* of 11. December 2008, regarding the need to comply to the due diligence for Prevention of Money Laundering, Organized Crime and Financing of Terrorism (Due Diligence Act; SPG). For this nation, Virtual Currencies are a digital monetary unit and can be used to pay goods and services as well as be accepted as a legal tender.²⁰⁸

²⁰⁴ Jersey Government (2019). *Cryptocurrency tax treatment*, cit.

²⁰⁵ In this subject, the Jersey Government, on the web site gov.je made an example to better understand the use of the Virtual Currency as a form of payment: “if goods are sold by a GST registered entity where the cost is paid in Bitcoin, the value (for GST purposes) will be the sterling value following conversation at the rate that the seller has applied to the transaction.”.

²⁰⁶ Jersey Government (2019). *GST law, regulations and directions*. Retrieved from: <https://www.gov.je/TaxesMoney/GST/Businesses/LawRegulationDirection/Pages/GSTdirections.aspx#anchor-0>

²⁰⁷ Finanzmarktaufsicht Liechtenstein – FMA (2017). *Fact Sheet on Initial Coin Offerings*. Retrieved from: <https://www.fma-li.li/files/fma/fma-factsheet-ico.pdf>.

²⁰⁸ In this respect, the *Gesetz* vom 11. Dezember 2008 defines: “*Als virtuelle Währungen sind digitale Geldeinheiten zu verstehen, welche gegen gesetzliche Zahlungsmittel getauscht, zum Bezug von Waren oder Dienstleistungen oder zur Wertaufbewahrung verwendet werden können und somit die Funktion von gesetzlichen Zahlungsmitteln übernehmen.*”.

On the Virtual Currencies tax subject, Liechtenstein has an advantageous tax system in which the transactions involving Bitcoin to fiat exchanges are free of VAT taxation, therefore eventual profits from Virtual Currencies sources are consequently exempt from tax as well. The corporate income tax rate is of 12,5%. The deduction is variable and defined annually, of approximately 4%.²⁰⁹

4.2.4.5. Switzerland

Switzerland is one of the leaders in Virtual Currencies matters. As an important supporter of a conducive environment to stimulate technology, the country envisions a great future and interesting exploration of the Blockchain technology. In this sense, the jurisdiction possess a development regulation centre on the Virtual Currencies and Fintech starts-up hub in Zug, called the 'Crypto valley'.

In Switzerland, the regulatory authority is the Swiss Financial Market Supervisory Authority (FINMA). Virtual Currencies are accepted as payment and therefore are a legal tender. The exchanges of a Virtual Currency for fiat money are always subject of due diligence and falls under Art. 2, Para. 3 of the AMLA.²¹⁰ As already noted, in Switzerland, the ICO Guidelines requires that the companies or individuals who intend to launch an ICO must previously ensure that they comply with the requirements set out in the relevant financial market laws²¹¹, especially in compliance with the Anti-money Laundering Act (AMLA).

According to the FINMA Press Release on the subject, compliance is of crucial imperativeness to prevent any costumer vulnerabilities, and therefore, this regulatory body

²⁰⁹ Wanger, Ralph; Johann, Laura (2019). *Blockchain laws and regulations 2019: Liechtenstein*. Retrieved from: <https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/liechtenstein#chaptercontent4>.

²¹⁰ FINMA (2018). *Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings*. FINMA ICO Guidelines. Retrieved from: <https://www.finma.ch/en/~media/finma/dokumente/dokumentencenter/myfinma/1bewilligung/fintech/wegleitung-ico.pdf?la=en>.

²¹¹ FINMA. *FINMA publishes ICO guidelines*. Press release. Retrieved from: <https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/>.

already closed several unauthorized companies who negotiated fake Crypto-coins named e-coins.²¹²

On the Virtual Currencies tax subject, Switzerland has an advantageous tax system for the transactions involving Bitcoin to fiat exchanges, which are VAT taxation free. Despite generating a favourable environment, Switzerland provides four possibilities of taxation treatment, which may be under a wealth tax, an income tax, as professional Cryptocurrencies trading, or as capital gains tax. The Wealth tax, also called as equity or capital tax, is the levy paid to the Cantons of Switzerland. It is a tax due on the sum of all personal assets, including Virtual Currencies of the residents in these areas. The way in which this tax is calculated varies from place to place.

As already explained, Virtual Currencies are taxed as foreign currencies as established for transactions involving foreign exchanges. The Virtual Currencies as legal tender, in Switzerland, can serve as a means of payment of employees, which are declared as taxable income, as well as a form of payment of goods and services to self-employed and in this case will be taxed as a source of salary. The professional negotiation of Virtual Currencies is taxed and must be declared. The capital gains from Virtual Currencies sources are exempt from tax.²¹³

4.2.4.6. United States

In the United States, the Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC) are the main governmental and regulatory bodies on this subject. Even though some states may accept Virtual Currency as a means of payment for products and services, in this country, Virtual Currencies are not considered a legal tender. The Financial Crimes Enforcement Network (FinCEN) considers Virtual Currencies as “exchanges as money transmitters” or “other value that substitutes for currency”. On the other

²¹² FINMA (2017). *FINMA Closes Down Coin Providers and Issues Warning About Fake Cryptocurrencies*. Press Release. Sept. 19, 2017. Retrieved from: <https://www.finma.ch/en/news/2017/09/20170919-mm-coin-anbieter/>.

²¹³ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit, p. 77.

hand, the virtual currencies are considered as property for the US Internal Revenue Service (IRS). Hence, digital currency is treated as money, property and stock commodity.²¹⁴

The legal regime for Virtual Currencies is also very complex in the US, because of the federal and state legal system adopted and the absence of a unified concept and status regarding Virtual Currencies.

At the federal level, Bitcoin transactions should be registered within the Financial Crimes Enforcement Network (FinCEN), in order to implement efficient risk-based AML rules and procedures, as well as uphold, develop policies, procedures and controls to assess and validate the clients identification, creating and retainment of archives, and also reply law enforcement requests, thus preventing ML/FT²¹⁵.

At the states level, for those companies, is mandatory to obtain licenses.²¹⁶

In other sectors, the United States regulators do not regulate the Virtual Currencies. This means that states act independently on this topic²¹⁷.

On the Virtual Currencies tax subject, the Internal Revenue Service is the Tax Authority in the United States of America. This fiscal administration in 2014 released a Virtual Currency guidance, defining the transactions that possess this kind of technology as obliged to US federal tax incidence.²¹⁸ This is the only document released from the authority on Virtual Currencies matters, thus generating uncertainty and doubts concerning its taxation and activities associated with, revealing serious flaws and gaps for endless discussions and legal insecurity.

²¹⁴ The Law Library of Congress (2018). *Regulation of Cryptocurrency Around the World*. Global Legal Research Center, cit.

²¹⁵ Sackheim, Michael S; Munsell, James C; Levy, Michael A; *at al* (2019). *The Virtual Currency Regulation Review - Edition 1. United States*. Retrieved from: <https://thelawreviews.co.uk/edition/the-virtual-currency-regulation-review-edition-1/1176673/united-states>.

²¹⁶ Likhuta, Vlad; Kaplan, Anatoliy; Gadomsky, Dima; Korol, Kyrylo; Heletkanych, Oleh; Havryliak, Orest; Otter, Tetiana (2017). *Bitcoin Regulation: Global Impact, National Lawmaking*. Retrieved from: https://forklog.consulting/bitcoin_regulation_en.pdf.

²¹⁷ Stankovic, Stefan (2019). *US Cryptocurrency Regulation: Policies, Regimes & More*. Retrieved from: <https://unblock.net/us-cryptocurrency-regulation>.

²¹⁸ Internal Revenue Service (2014). *IRS Virtual Currency Guidance: Virtual Currency Is Treated as Property for U.S. Federal Tax Purposes; General Rules for Property Transactions Apply*. Retrieved from: <https://www.irs.gov/newsroom/irs-virtual-currency-guidance>.

4.2.5. The need for a framework uniformization

As described, each nation has a different vision and position of Virtual Currencies. The responses and the token concept are gradually growing up. The EU regulatory framework is already been outlined, although it is not uniform.

Directives are not enough to give an effective response to the regulation of Virtual Currency and its content, in spite of a relevant and indispensable approach to the subject, which is not sufficient to meet the needs of an interconnected world in face of the new technological revolution presented.

In the field of tax regulations, there is an immense effort by some institutions and countries, especially at the EU level, to produce regulatory efforts on the management and use of Virtual Currencies. Even though many countries struggle to apply existing legislation to the subject, a uniform standard is needed to provide a feasible stability.

As also defined, countries such as the United Kingdom, as well as Gibraltar, Isle of Man, Jersey, Liechtenstein, Switzerland and the United States follow an absolutely different pattern and, in many cases, diverge from the standards already adopted in Europe.

Considering the absence of a conceptual alignment in the tax treatment, domestic legislations and in the financial market, there is a great asymmetry, and, as a result, a profound weakness and fragility of the system.

The regulation of Virtual Currencies must undergo a conceptual purification, as well as a worldwide alignment on the form of legitimation of this new currency and a new way of seeing the world. In light of this, Virtual Currencies must pass through at least three different approaches: a regulatory one, a jurisdictional one and a conceptual one, which has already been outlined since the rise of this new model and can be improved by the major regulatory institutions.

The world of Virtual Currencies, Bitcoin and Blockchain follows an unregulated social pattern, allowing and unbridled advance and paradigmatic advances, but at the cost of generating big insecurities and asymmetries.

In this sense, the major and important role of regulatory institutions such as the OECD, the European Central Bank, the ESMA, the FATF, the FinCEN, the CFTC, the SEC, the BMF, the Bank of Portugal, the Bulgarian National Bank, the CBC, the CNB, the BaFin,

the *Banca d'Italia* and the FCA is to promote efforts that create a uniform concept regarding the Virtual Currencies, under an aligned taxation treatment and regulatory framework.

PART V – EFFICIENCY AND SUSTAINABILITY ON BLOCKCHAIN AND VIRTUAL CURRENCIES

Efficiency and sustainability are important components in the economic framework. In this scenario, the Principle of Efficiency must be observed as a fundamental parameter of the organization of the market, otherwise the most basic rules of the economy and law will be violated.²¹⁹

Efficiency is achieved when there is no higher level of production of a particular good or service which, through the reallocation of resources to that output, can reach the manufacture of another more valuable good or service at that moment.²²⁰ This equilibrium point tends to be accomplished naturally and spontaneously by the market, through the incidence of externalities, social welfare, incentives and discouragements to production, transaction costs, sustainability and scarcity of goods. So how can all these issues affect the creation of a global, digital, and diverse currency?

Blockchain and the Virtual Currencies are definitely an all-encompassing example of how a model can create popularity and be spread throughout the world. Nonetheless, many elements should be analysed to measure their effectiveness. Other aspects can be investigated such as recent developments, the virtual currencies innovations, the Blockchain uses for e-identities, digital property rights, electronic voting, smart contracts, supply chain management, on the public and tax administration field.

The study of the efficiency in Virtual Currencies and Bitcoins address the issue of high energy use, which is intrinsically related to the subject. In fact, during the process of mining digital coins, too much energy is spent, moving a structure of millions and raising the cost of its production nearby the cost of commercialization.

²¹⁹ Lobo, Carlos Baptista (2007). *Sectores em rede: regulação para a concorrência*. Lisboa. FDUL. Tese de Doutoramento, p.19.

²²⁰ Araújo, Fernando (2007). *Introdução à Economia*. 3ª ed. Coimbra, Almedina, p. 22.

Recently, in several journalistic and media sources, data have been presented that are in line with the context advocated in the present study, that Bitcoin mining is energetically unsustainable, because of the great difficulty of calculating the exact amount of energy involved in producing this currency.

Especially from an energy point of view, a work recently developed by the *Digiconomist*²²¹ pointed out that the mining/creation of a Bitcoin unit is a very expensive process.

As the research emphasises, the energy consumption is heightened because the algorithms are only correctly reached by the trial-error method, thus having to perform a large number of processes until the conclusion of a transaction validation. The energy inefficiency is further aggravated, since anyone can become a miner and bet their energies on something that, as exposed, does not even have a central structure and a guarantor or structure that safekeeps the values attributed to the currency existence.

It should be noticed that results indicated that Bitcoin mining network already accounts for 0.14% of the world's total energy consumption, which is estimated to be around 30.23 TWh (terawatt per hour).²²² At the international level, Crypto-coins would already be the 64th largest consumer of energy in the world, ahead of countries such as Ireland, consuming almost US\$ 500 million in electrical and operational costs.²²³

Although the generation of digital coins is costly and energy-intensive, it can also offer some alternatives involving technology and innovation to somehow compensate for the consumption of resources, such as electric power. An example of this is a southern Florida distillery that uses the heat from Bitcoin mining equipment to accelerate beverage aging. Another example are Amazon's data Centers, which provide heat for a biosphere project.

The high energy cost for the mining of Bitcoin is a very alarming fact, nonetheless, some alternatives try to give the context an energetic reutilization to provide a future for this technology.

²²¹ Digiconomist. *Bitcoin Energy Consumption Index*. Retrieved from: <https://digiconomist.net/bitcoin-energy-consumption>.

²²² Ribeiro, João (2017). *A bitcoin é o 64º maior consumidor de electricidade do mundo*. Shifter.pt. Retrieved from: <https://shifter.sapo.pt/topico/bitcoin/>.

²²³ The *Bitcoin Energy Consumption Index* (BECI) estimates that the Bitcoin's total annual energy consumption at 16 TWh (terawatt-hour). This is equivalent to 3.5% of all energy consumed annually in Brazil (460 TWh, according to the Energy Research Company) or up to three times the energy consumption for the same period in Paraguay.

In this perspective, the creation of a new monetary system should aim to promote efficiency of scarce natural resources, as to provide for the subsistence of the future generations, in order to eliminate externalities and maximize sustainable development and energy efficiency.

Certainly, innovation generates the need to develop new methods and new techniques to reinforce its use and to guarantee a superior efficiency over the prior arrangement.

Without a doubt, the technology surrounding Blockchain and Virtual Currencies is as strong as its capacity to adapt to a new model because the obsolescence of the previous system will be determined by the efficiency and capacity of innovation of the new model. The growth, adaptation, and accessibility to these technologies challenges the old paradigms and offer ancient systems a new tool for all those who are open to innovation and progress.

5.1. Recent developments

The development of new tools such as the Blockchain and DLT reinforces the safety and efficiency of the old mainframe. Towards that end, the evolution and improvement of the systems and the awareness of new technologies, contribute to the transparency, speed, immutability, economy and efficiency for numerous necessities of public administration such as tax authorities and e-identities, as well as private purposes.

5.1.1. An effective response: Blockchain and DLT

The challenges of a new era and a new financial revolution lead the world to several changes and new methods to solve issues that have arisen. In this context, the Blockchain and/or DLT may be also the key answer to the public sector. More than 200 DLT-based projects around 50 countries in the world are already moving towards this direction.²²⁴

The e-identities, personal records, assets inventory, citizenship, border control, tax transparency, financial, tax compliance and tax administration and the use of smart contracts on public administration, are just some instances for the Blockchain use. Many other opportunities for tax management are created by the use of Blockchain and the DLT, which can

²²⁴ OECD (2019). *Blockchain at the OECD*. OECD Going Digital Policy Note, OECD, Paris, cit.

provide immediate rules enforcement in auditing, tax compliance, standardized electronic forms for filling tax returns (e-filing), e-invoices and cross-check of the information.²²⁵

Innovative technology leverages systems have been built to shape the future. The emergence of Blockchain and the opportunities of its use go far beyond its exploration as a Virtual Currency, however, if its use meets the creation of a new currency, it may also serve countless other sectors that involve the need for a more secure and reinforced framework.

Innovation brings to the worlds future the need for protection of systems, data, people and institutions, and also determines the use of resources in a more efficient way. This is the concept behind the challenges beyond the new global world's Blockchain paradigm, which indicates that, the use of technology itself, has the ability to solve the oldest and most sensitive problems of nations.

The urgency for innovation, the speed of technology, the need to reinforce security and service efficiency makes room for the Blockchain as a tool for countries regulation, monitoring and the protection of the sovereignty, values and systems.

Behind the concept of Virtual Currencies, the DLT has a high potential of simplicity and efficiency, when invested in financial and governmental structures. This mainframe should be used as a response to the failures within the systems, aiming a maximum efficiency at the lowest possible cost.

To avoid the existence of an unfair use of some Virtual Currencies, the DLT guarantees an operational simplification, by eliminating the legal cost of operations. It can also provide a regulatory efficiency improvement, allowing the monitoring of financial processes on time, providing a risk and settlement time reduction, more transparency in sourcing liquidity for assets, and solve the new issues linked to the Virtual Currency.

The efficiency that generates the driving force of the Virtual Currency is also the apparatus that can be used by government institutions to provide transparency, effectiveness and speed to the entire financial and tax regulatory system, while still delivering a highly permeable and accessible device to countries.

²²⁵ Hadzhieva, Eli (2019). *Impact of Digitalisation on International Tax Matters, Study for the Committee on Financial Crimes, Tax Evasion and Tax Avoidance, Policy Department for Economic, Scientific and Quality of Life Policies*. European Parliament, Luxembourg, pp. 87-88. Retrieved from: [http://www.europarl.europa.eu/RegData/etudes/STUD/2019/626078/IPOL_STU\(2019\)626078_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2019/626078/IPOL_STU(2019)626078_EN.pdf).

This allows accurate, no-loss, and enables a better tax authority control, besides reducing transaction charges. These tools must be discussed in order to allow an investigation of the challenges under the Blockchain prism.

Aware of the innovations and the use of technology in favour of government activities, the Directorate-General of Communications Networks of the European Commission began the project named the EU Blockchain Observatory & Forum, which focuses on the development and promotion of studies and innovations of the Blockchain and the technologies that support the structure, such as the DLT. Among the attributions of the Forum are the identification and monitoring, as well as publicize, question, study and debate the innovations and technology trends linked to the Blockchain, and make recommendations on efficient uses for the EU, individuals and companies.²²⁶

In this sense, Blockchain, as an auspicious technology provides transformation and solid answers that will contribute to efficient, scientific, transparent and solid solutions in real-time to governmental activities. Therefore, it may be also seen as a better way to promote tax efficiency for tax administrations, as it is democratic, accountable and inclusive.

Blockchain reduces the possibility of fraud, the operational costs, augments the financial inclusion, heightens the interaction of individuals with tax authorities, promotes economic growth, protects data and enhances security, amplifies the possibility of tracking the money, reduces risk of fiscal fraud, supports anti-money laundering policies and the fight against terrorism, aids the identification of individuals and companies and also enhances compliance with due diligence procedures.

Blockchain technology also improve exchanges of information mechanisms such as the AEOI/CRS and FATCA, which are ameliorated by crafting a more sound and scientific system through the appropriate use of technology. E-identities and Smart Contracts can provide solutions to current and future problems related to Virtual Currencies.²²⁷

Moreover, it is expected by the World Economic Forum (WEF) that in 2023-2025 a vast Blockchain-based agrarian technology and other innovative initiatives could be used to

²²⁶ European Commission. *EU Blockchain Observatory and Forum*. Retrieved from: <https://www.eublockchainforum.eu/>.

²²⁷ UK Government Chief Scientific Adviser. Government Officer for Science. *Distributed Ledger Technology: beyond block chain*. Retrieved from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf.

solve and give efficiency to the most diverse activities. Until the expected date, the WEF provides for the use of Blockchain for tax collection and to control cross-border transactions, as well as eliminating imperfections and third parties interference by using the smart contracts, that fully automate the procedure. Blockchain technology may also be used to provide auditor information in a trustable network to enhance data collection, as to identify where the value is generated to determine the transfer pricing rules applicable.²²⁸

5.1.1.1. E-identities

One of the main issues with regard to the Blockchain complexities refers to diligently identifying who is effectively carrying out the Virtual Currency transactions, and the e-identity provides a prominent and an initial solution for this problem.

E-identity or electronic identity is the way in which an individual proves the veracity of his virtual identity, by ensuring that the physical user is actually the one performing the transaction or accessing a particular service. In this context, the existing trust in the digital space is the element that must be protected under two prisms: “prove to me that you are who you say you are” and “prove to me that you have the necessary permissions of what you ask”. These considerations deliver answers to the system regarding authentication and authorization.²²⁹

²²⁸ Hadzhieva, Eli (2019). *Impact of Digitalisation on International Tax Matters, Study for the Committee on Financial Crimes, Tax Evasion and Tax Avoidance, Policy Department for Economic, Scientific and Quality of Life Policies*. European Parliament, Luxembourg, cit.

²²⁹ UK Government Chief Scientific Adviser. Government Officer for Science. *Distributed Ledger Technology: beyond block chain*. Retrieved from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf.

The use of Blockchain for the development of government services has gained even more importance in dealing with the need for evolution in the identification of people and control of transactions in the global network. The model was initially created to control and give security to the monetary system (Virtual Currencies, namely the Bitcoins) and has initiated a technological race for the protection of the people, the governments and the financial transactions themselves. The sensitive subject for both public and private bias, regarding the identification, is gaining importance and status in response to the need of guarantying physical identity to the virtual world.

The European Union, vigilant to the necessity of building a reliable digital environment that allows interaction between public authorities, citizens and business, set the Regulation (EU) n° 910/2014 of the European Parliament and of the Council of 23 July 2014²³⁰, on electronic identification and trust services for electronic transactions in the internal market.

Among the utilities attributed by the so-called eIDAS²³¹ are the possibility of guaranteeing transparency, security and cross-border interoperability, cooperation and transnational recognition between Members in electronic transactions.

Following the European Union efforts, Estonia, Switzerland, India, Finland, Japan, the United Kingdom, Sweden, Dubai, USA and several other countries already track the trend of digital identification, by using the Blockchain concept to ensure transparency and security of their systems.²³²

To build a world without barriers, where electronic identities can faithfully guarantee the integrity of data, the correct performance of tasks is the highest goal of every nation. The harmonization of all information and identification of the requirements of individuals and companies would guarantee an accuracy and precision that never existed. The virtual world requires speed of uniformization of concepts and attitudes that are at present incompatible with the physical reality and the weight of the world institutions, as well as jurisdictional, legal and sovereign incompatibilities.

²³⁰ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2014.257.01.0073.01.ENG.

²³¹ Electronic Identification, Authentication and trust Services.

²³² Third, Allan; Quick, Kevin; Bachler, Michelle and Domingue John (2018). *Government services and digital identity*. Retrieved from: https://www.eublockchainforum.eu/sites/default/files/research-paper/20180801_government_services_and_digital_identity.pdf.

For the implementation of the referred system, the known barriers are the initial standardization on the topic of electronic identification, attention to tenacity and adaptability, legal harmonization, the establishment of effective channels of communication and the guarantee of data protection and privacy. Other yet unknown barriers should be addressed and immunized ensuring greater transparency and uniformity protection from the virtual world to the physical one and vice versa.²³³

The association of digital identities to all financial systems, through the purchase, sale or negotiation by any type of company or individual should be a subsequent step in the process of transparency and efficiency of the systems linked to Virtual Currencies. The decentralization of trusted digital identities in a DLT network, such as Blockchain, and the sharing of information in a universal hub can produce efficient instruments to fight ML/TF, as well tax fraud²³⁴.

5.1.1.2. Smart Contracts

Smart contracts are Blockchain based contracts that simplify, verify or enforce the negotiation and are automatically executed. By means of an intelligent contract, created through a small computer program (code lines), the conditions specified therein, as well as that of a common contract, may be executed without the need of persons or a third party (self-executing contracts or workflows).²³⁵

In other words, a smart contract is an automated “if/then” programming that executes itself when a certain activity occurs. The workflow process is created to verify, facilitate, implement and perform the negotiation, transaction or agreement, containing pre-

²³³ Third, Allan; Quick, Kevin; Bachler, Michelle and Domingue John (2018). *Government services and digital identity*, cit. p. 12.

²³⁴ In other words, e-identity provides effective answers to current and long-standing compliance and regulatory issues related to money laundering, terrorist financing and tax fraud.

²³⁵ WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law of Vienna University of Business and Economics (WU, Wirtschaftsuniversität Wien) (2017). *Blockchain 101 for Governments a note prepared by the Digital Economy Taxation Foundation*. Retrieved from: https://www.wu.ac.at/fileadmin/wu/d/i/taxlaw/institute/WU_Global_Tax_Policy_Center/Tax___Technology/DET_Blockchain_101_for_Governments.pdf.

established rules under which the parties agree to transact with, running on a network node, in a simple decentralized way, without third party interferences.²³⁶

According to the example that will be explained, the smart contract can be used in several areas, adapting the use of Blockchain technology to the numerous needs of public administration such as tax administration and e-identity.

The main characteristics of the smart contracts are: self-verification, self-execution, tamper resistant, absence of intermediaries, autonomy, accuracy, fast performance, cost effectiveness, trustless, interruption free, effectiveness enforcement, legal binding and secure.

Other examples to illustrate the use of smart contracts may be demonstrated involving simple day-to-day transactions, such as the sale of a vehicle, where B and S decided to transact a vehicle, where B is the buyer and S is the seller. As they deal with two parties with resisted and opposing rights, there is no way to trust each other. Usually what is done in this case is the establishment of a paper contract determining that B will pay X for the car and that S will pass the ownership of the vehicle to B. In this transaction, several parties participate, such as the lawyer, the bank, the government authority licensing vehicle, the notary insurance company, the broker. Within this negotiation, besides the direct costs associated to the purchase and sale, are also associated several other costs, due to the intermediaries involved. Therefore, traditional contracts bring inefficiency to the system and a chain of further payments in a simple transaction.

On the other hand, the same buying and selling carried out by B and S can be analysed under the prism of smart contracts: in this same situation, where B and S decided to transact a vehicle, through a smart contract, the seller, by his Blockchain address, identifies himself on the system with a public key, here called as (9982) and who define the terms of the sale. The seller, at this moment, leaves the car in a garage, restricted by a smart key, linked to a smart contract. The car has one public key, a Blockchain address, here called as (9983). B finds the announced car on the internet, identifies himself on the system with a public key, here called as (5555), signs the contract, realize the transfer from his Blockchain address (paying X for the car), to the S' Blockchain address (9982).

The smart contract is established in this moment, with the following “if – then” command: <contract> if X is sent to the Blockchain address (9982), then proceed the transfer

²³⁶ Voshmgir, Shermin (2018). *What is a Smart Contract?* BlockchainHub. Retrieved from: <https://blockchainhub.net/smart-contracts/>.

of the car through the Blockchain address (5555) and the smart lock access to the public key 5555 </contract>. The smart contract is checked by the system, which verifies if S is the owner of the car and if the money is available. If all the transaction is valid, then the operation is completed, S gets access to the money and B is registered as the owner of the car and gets the key of the smart lock. All the process follows an automatic and pre-established flow, without third parties participation. Therefore, the smart contract potential is an autonomous and revolutionary way to eliminate third party and turn the process accurate, fast, low cost, trustless and also efficient. Thus, its use by banks, insurance companies, energy, e-government, and others can be the solution for very complex issues that arrives with the technology and the digitalization of life.²³⁷

5.1.1.3. Blockchain in Tax Administration

The changes made by technological progress and the use of the Blockchain have disruptive and organizational transformations concerning governments, the way taxes are collected and processed. There are several benefits addressed in this chapter such as the transparency and efficiency, that coupled with all the security of information that circulate on blocks and are in line with the need to control the digital economies and Virtual Currency.

The Blockchain also allows the control, the monitoring of transactions and payments on time, by the competent tax authorities. Every paradigmatic change brings challenges and the need for adjustments at all levels, such as legal and social adaptation to the most diverse structures.

The need of an adaptation has already been highlighted by the most diverse countries that consider the use of technology in their favour, especially in transactions involving Bitcoin as well other volatile, uncertain and deregulated Virtual Currencies.

²³⁷ Voshmgir, Shermin (2018). *What is a Smart Contract?* BlockchainHub. Retrieved from: <https://blockchainhub.net/smart-contracts/>.

²³⁷ WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law of Vienna University of Business and Economics (WU, Wirtschaftsuniversität Wien) (2017). *Blockchain 101 for Governments a note prepared by the Digital Economy Taxation Foundation*, cit.

Technology and its possibility of miscellaneous use is hard to ignore. Especially in the tax field, Blockchain related to Virtual Currencies should be considered as an apparatus of greater efficiency for payment of taxes, transfer pricing and VAT incidence.²³⁸

As an example, the Blockchain can be used as a means of automating the payroll tax, by eliminating the interferences of third parties to collect tax. In this case, the employer could add these costs to the salary, the company and the employees data, within the Blockchain system. In such sense, a smart contract could objectively address the data, the payment and the tribute, in an automated way, guaranteeing accuracy and efficiency to the process of collecting tax.²³⁹

Tax governance through Blockchain provides solutions to fiscal failures, prevention of corruption, opacity and asymmetries of information in declarations and diverse legislation. The use of the technology discussed also allows the use of smart contracts to combat tax fraud. Under the corporate prism, it provides correct, direct and objective identification of effective beneficiaries, the transmission and auditing of accounting balances on demand to the tax authorities²⁴⁰ (smart audits)²⁴¹ and a real-time compliance and reporting procedure.

Some uses of Blockchain on transfer pricing are described by the “Blockchain technology and its potential in taxes”²⁴² and addresses that its use can facilitate the monitoring of the transactions and entities of all parties involved. To avoid fraud and data nonconformities, transactions using Blockchain are forwarded in an encrypted form. Tax payments may be executed by means of conditions previously specified in the smart contracts.

The use of the Blockchain to ensure transparency and efficiency in the collection of VAT is also another possibility for the use of this ground-breaking technology, for it reduces the business administration burden and accounting costs are saved. Transactions are declared

²³⁸ Bulk, Gijsbert (2018). *How blockchain could transform the world of indirect tax*. Retrieved from: https://www.ey.com/en_gl/trust/how-blockchain-could-transform-the-world-of-indirect-tax.

²³⁹ WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law of Vienna University of Business and Economics (WU, Wirtschaftsuniversität Wien) (2017). *Blockchain 101 for Governments a note prepared by the Digital Economy Taxation Foundation*, cit.

²³⁹ Bulk, Gijsbert (2018). *How blockchain could transform the world of indirect tax*, cit.

²⁴⁰ WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law of Vienna University of Business and Economics (WU, Wirtschaftsuniversität Wien) (2017). *Blockchain 101 for Governments a note prepared by the Digital Economy Taxation Foundation*, cit.

²⁴¹ Bulk, Gijsbert (2018). *How blockchain could transform the world of indirect tax*, cit.

²⁴² Frankowski, Ernest and Barański, Piotr; Bronowska, Marcjanna (2017). *Blockchain technology and its potential in taxes*. Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/pl/Documents/Reports/pl_Blockchain-technology-and-its-potential-in-taxes-2017-EN.PDF.

and transmitted at the time of the performance of the transaction (real-time compliance and reporting), which could be carried out through smart contracts in a transparent way, thus avoiding the risk of fraud, errors and corruption. Audits could also be performed automatically by smart contracts.

5.1.1.3.1. Blockchain in international tax due diligence and compliance

The globalized world unequivocally increases the cross-border activities and consequently the interaction between different jurisdictions. Legislative asymmetries and opacity, especially with regard to tax law, have also amplified. Facing these issues, worldwide tax administrations have sought plausible tools to ensure that taxes are accurately collected. The cooperation between jurisdictions was enhanced in 2009 in order to avoid tax evasion, to provide transparency to the tax system, to allow compliance with tax obligations, and to guarantee effective fiscal supervision in order to become an international standard.

One of the conditions for the survival of states and efficient taxation by states is the existence of transparency and exchange of information provides an environment of cooperation among jurisdictions regarding the pluri-localized tax facts. The Blockchain technology and its three main characteristics of decentralization, transparency and immutability, permits their use also with respect to the international tax due diligence and compliance, by providing a transparent, secure and irreversible exchange of information.

The encryption methods, the security of the blocks transactions mainframe and data record could be used to increase transparency, traceability of values and transactions as well as keep data organized and secure. Blockchain technology also facilitates access to markets, improves transactions efficiency, ensures an organized and decentralized system and provides a cross-check to enhance the FATCA and CRS/AEoI systems.

5.1.1.3.1.1. Blockchain and FATCA

In 2010, the Foreign Account Tax Compliance Act (FATCA) was launched by the US Congress, provided by the Chapter 1471–1474 of the Internal Revenue Code of 1986,

enacted by Section 501 (a) of the Hiring Incentives to Restore Employments Act in 2010²⁴³. This instrument is an important and enhanced way to combat the tax evasion growth relating especially to US persons. Unleashed by the UBS scandal, the FATCA was created in reaction to many reports and investigations carried out by the Senate.

The main target of this tool are the US persons that holds account – non-compliant individuals – and companies that uses foreign accounts as offshores.²⁴⁴ Generally, under the FATCA, the Foreign Financial Institutions (FFI) and Non-Financial foreign Entities (NFFE) must comply with the due diligence rules by providing information and tax withholding obligations, regarding all the US persons accounts outside the United States.²⁴⁵

The amount of information and data coming from all US persons accounts holders outside the USA is endless and the accuracy of the IRS's technological and personal systems to the FATCA has always been a major weakness.²⁴⁶ The advancement of technology has further boosted the complexity of data analysis by creating new tax evasion mechanisms, such as through Virtual Currencies transactions that require a reinforcement of technology to maintain tax order and due tax collection.

The use of Blockchain, as discussed in previous chapters, may facilitate the identification of individuals, bank accounts and data through the use of e-identity, smart contracts, and other technological tools enabling the automation of reporting systems such as the FATCA, thus creating a simplified standard and generating a more reliable, transparent and objective system.

The use of Blockchain technology to regulate and control cross-border financial activities is initially the most effective means to manage eventual financial events involving

²⁴³ Byrnes, William; Munro, Robert (2017). *Background and Current Status of FATCA*. LexisNexis® Guide to FATCA & CRS Compliance (5th ed., 2017); Texas A&M University School of Law Legal Studies Research Paper No. 17-31, cit.

²⁴⁴ Byrnes, William; Munro, Robert (2017). *Background and Current Status of FATCA*. LexisNexis® Guide to FATCA & CRS Compliance (5th ed., 2017); Texas A&M University School of Law Legal Studies Research Paper No. 17-31, cit.

²⁴⁴ Dourado, Ana Paula (2017). *Governança Fiscal Global*. Coimbra: Almedina.

²⁴⁵ IRS. *Foreign Account Tax Compliance Act*. Retrieved from: <https://www.irs.gov/businesses/corporations/foreign-account-tax-compliance-act-fatca>.

²⁴⁶ Byrnes, William; Munro, Robert (2017). *Background and Current Status of FATCA*. LexisNexis® Guide to FATCA & CRS Compliance (5th ed., 2017); Texas A&M University School of Law Legal Studies Research Paper No. 17-31, cit.

²⁴⁶ Dourado, Ana Paula (2017). *Governança Fiscal Global*. Coimbra: Almedina.

Virtual Currencies and, *a posteriori*, a follow up on all other international tax due diligence and compliance, for intermediate of what is now called RegTech.

5.1.1.3.1.2. Blockchain and AEOI/CRS

Considering the effective approach on tax compliance carried out by the United States, the European Union has also established a species of FATCA regarding the develop of a single global standard for exchange of automatic information, on tax matters, named the Automatic Exchange of Information (AEOI), accepted by the G20 members on February 2014.²⁴⁷ In July 2014, the OECD established the Model Competent Authority Agreement and the Common Reporting Standard (CRS) that defines the global standard for executing automatic exchange information on tax matters.

Supported by the Directive 2017/107/UE, the AEOI is defined as a regular and organized transmission and report of prefixed information, without prior request, fundamental to avoid tax fraud and tax evasion between countries.²⁴⁸ The reporting information and due diligence rules collected by the Member States of the Financial Institutions, must be communicated on an automatic exchange basis and are subject to certain periods and criteria.

The report must contain some predefined topics such as name, address, tax identification number, place of birth, the name and the identifying number of the Reporting Financial Institution, the account balance or value, the total gross amount of interest or other income and also identify the currency in which the transaction has been carried out.²⁴⁹

In view of this considerations, exchange of information follows certain standards such as those contained in the 2017/107/ EU Directive and should be referred regularly to the competent authorities. The distinct automation, regularity, and all of the objective factors surrounding the Automatic Exchange of Information opens up a large loophole and a broad path

²⁴⁷ OECD (2016). *Automatic Exchange of Financial Account Information Background Information Brief Updated: January 2016*. Retrieved from: <http://www.oecd.org/ctp/exchange-of-tax-information/Automatic-Exchange-Financial-Account-Information-Brief.pdf>.

²⁴⁸ Council Directive 2014/107/EU of 9 December 2014 amending Directive 2011/16/EU as regards mandatory automatic exchange of information in the field of taxation. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0107>.

²⁴⁹ Council Directive 2014/107/EU of 9 December 2014 amending Directive 2011/16/EU as regards mandatory automatic exchange of information in the field of taxation, cit.

for the use of technology such as those linked to Blockchain and DLT, which may be also used to manage the FATCA matters.

Those instruments linked to the RegTech may simplify the standard based on a more autonomous, intelligent, reliable, clear, transparent and objective system. The Artificial intelligence can be the triumph of this system, connected to an e-identity to also comply to the due diligence required by the law. The smart contracts can trigger the information exchange referred on the Directives.

Conclusions

As it turns out, through these brief explanatory lines, history reveals several aspects and facets of worldwide integration and consequently of technological growth. Finance and technology, prior to the nineteenth century, were combined in order to produce the first period of financial globalization that lasted until the outbreak of World War I, which generated an international tendency to bring out interaction between countries through technology. While the industrial revolution enabled the advance of the economy on a global scale, the post-war period allowed an exponential evolution in communications and information technology.²⁵⁰

Internet was another factor that unquestionably contributed to an accelerated process of global integration and consequent enhancement of communication and commerce. It was precisely in this historical context that the Virtual Currency took place by conveying the unbridled technological evolution. In this regard, Virtual Currency has greatly improved the way people know money by revealing a new format to the world, breaking down existing economic and social paradigms and tracking the overall development of technologies such as computing and the World Wide Web.

The genial idea from Satoshi Nakamoto has broken all the paradigms and has irredeemably changed the history of the world, creating a decentralized, anonymous, not legitimized by any government or other legal entity, independent, trustless and immutable system²⁵¹ that has permitted its great success, fast evolution, rapid value gain, and social and financial acceptance.

Behind this all-encompassing and innovative concept, the Virtual Currency needs and extremely urgent, effective, sustainable and efficient regulation. Therefore, the inert States should move to a more defensive position of public order, outlining a minimum regulatory path that can establish reasonable parameters on Virtual Currencies and ICOs matters.

²⁵⁰ Arner, Douglas W. and Barberis, Janos Nathan and Buckley, Ross P. (2015). *The Evolution of Fintech: A New Post-Crisis Paradigm?* University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62, cit.

²⁵¹ According to Hileman, Garrick; Rauchs, Michel (2017). *Global Blockchain Benchmarking Study*. University of Cambridge, cit.: “A blockchain is a new type of database that enables multiple parties to share the database and to be able to modify that in a safe and secure way even if they don’t trust each other.”

On the European context, the AMLD 5 brought a great revolution in the field of regulation of Virtual Currencies demonstrating the prodigious concern of the European Union in observing a minimum diligence linked to the financial transactions involving new platforms. This regulatory framework arises in response to the fragility of the digital system and the opportunities involving mainly anonymity, asymmetric information, the risk of money laundering, the fight against terrorism and tax evasion.

The nowadays well-defined and expansive concept of Virtual Currencies denotes a breakthrough and an intention to develop regulation on this subject. Although it is still uncertain if the AMLD 5 constitutes a sufficient regulation to ensure the necessary and efficient security to the new financial transactions and to the upcoming ones, it can be concluded that the concept established in the Directive meets the current concept of Cryptocurrencies, which embraces decentralisation, digital representation of value, not being connected to a legally established currency and electronic transferability, storability and tradability.

Nonetheless, according to the “Cryptocurrencies and Blockchain – Legal context and implications for financial crime, money laundering and tax evasion”²⁵², the failure of the normative lies initially in the concept of acceptance of the currency “by natural or legal persons as a means of exchange”.

In this sense, the AMLD 5 does not answer the question “What if a Cryptocurrency is not accepted as a means of exchange now, but there is an intrinsic limitation preventing it from becoming the means of exchange in the future?”. This issue is not encompassed by the concept of Virtual Currencies and can become a problem in the future.²⁵³ In addition, as highlighted in the previous chapter, the Directive does not address borderline situations, nor does it regulate all transactions involving Virtual Currencies.

In an upshot, it can be inferred from the above explanation that the definition conceptualized by the Directive is, at least at present, sufficient to legally protect electronic currencies in the fight against terrorism, money laundering and tax evasion, taking into account, however, that it does not offer immediate instruments to fight casuistic situations that may arise.

²⁵² Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, cit.

²⁵³ Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, cit.

Going through the wallet providers and Virtual Currency exchanges, the lead actors involved on the Virtual Currencies market are basically the users, miners, trading platforms, coin inventors, offers, and not all of them are covered by the concept of custodian wallet providers and Virtual Currency exchanges. It means that the inclusion of the “providers engaged primarily and professionally in exchange services between Virtual Currencies and fiat currencies” and the “wallet providers offering custodial services of credentials necessary to access Virtual Currencies” is also insufficient to ensure security to the System.

In this regard, the users, the miners²⁵⁴ and the ICOs inventors are the responsible for the greater number of unidentifiability, anonymous transactions with inauthentic identities, that with a mix use of systems payments and jurisdictions, can bring a huge failure for the financial system and are not directly covered by the AMLD 5.²⁵⁵

In conclusion, the AMLD 5, despite innovating and shielding large institutions that may be subject to repression, such as the “providers engaged primarily and professionally in exchange services between Virtual Currencies and fiat currencies” and the “wallet providers offering custodial services of credentials necessary to access Virtual Currencies”, ended up leaving for another opportunity the tutelage of many other pulverized agents, therefore weakening some of its content through several blind spots which undermine the due diligence required by Virtual Currencies.

Besides the issues regarding the regulation of Virtual Currencies and the energy question of its production, the technology provides many tools to solve the old, current and future problems. The DLT and Blockchain, when invested in financial and governmental structures, have a high potential for simplicity and efficiency. It can also provide regulatory efficiency improvements, allowing the monitoring of financial processes on time and provides a risk and settlement time reduction, as well as transparency in sourcing liquidity for assets, which can solve the new issues linked to the Virtual Currencies.

²⁵⁴ In this sense: “At present, the fact that the mining business is susceptible for illegitimate use, appears to be underestimated. Going forward, increasing attention should be devoted to the risks that accompany it, especially in light of the number of cryptocurrencies that is minable (i.e. based on a PoW consensus mechanism). The exclusion of miners from AMLD5’s scope, currently leaves a blind spot in the EU’s fight against money laundering, terrorist financing and tax evasion.” Houben, Robby and Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, cit.

²⁵⁵ Houben, Robby; Snyers, Alexander (2018). *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. Study Requested by the TAX3 committee, cit.

In this sense, Blockchain reduces the possibility of frauds, operating costs, financial inclusion, the interaction of individuals with tax authorities, reduces opacity and asymmetries of information, promotes economic growth, protects data and enhances security. It can also create the possibility of tracking the money, reducing tax evasion risks, in addition to supporting anti-money laundering policies and to fight terrorism. It may also provide aid for the identification of individuals and companies, compliance with due diligence procedures and exchanges of information, makes the system more scientific and sounder by the appropriate use of technology.

The governance uses of the E-identity, Smart Contracts and Tax administration on the public sector, as the exploration of Regtech on the private sector, can give a solution to current and future problems related to the financial institutions and Virtual Currencies.²⁵⁶

Therefore, this framework can be used as a response to the failures created by the innovations, aiming at maximum efficiency and the lowest cost. The urgency for innovation, the need to reinforce security and service efficiency makes room for Blockchain technology as an apparatus for countries in regulation, monitoring, and protection of sovereignty, values and systems.

Undoubtedly, innovation produces the necessity to mature new approaches and procedures to strengthen its consumption and to assure a higher efficiency over the erstwhile establishment. The obsolescence of the previous system will be dogged by the efficiency and the technology adjacent to the Blockchain and Virtual Currencies is as strong as its aptitude to adjust over time. The growth, adaptation, and openness to these technologies challenges the old paradigms and deliver ancient systems a novel tool for all those who are open to innovation and progress.

Despite the long road ahead of necessary stabilization and adjustment of its concepts to the society and the world, it is feasible that digital currencies are most likely the future of present monetary standards. Embedded and developed technologies for the propulsion of digital currencies, such as Blockchain, are the key element for advancement and pattern shift of the old financial parade. Therefore, in a brief analysis, Bitcoin is only the beginning, while Blockchain and technology-oriented financial mainframe are, without a doubt, the beyond.

²⁵⁶ UK Government Chief Scientific Adviser. Government Officer for Science. *Distributed Ledger Technology: beyond block chain.* Retrieved from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf.

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Appendices

Appendix A²⁵⁷

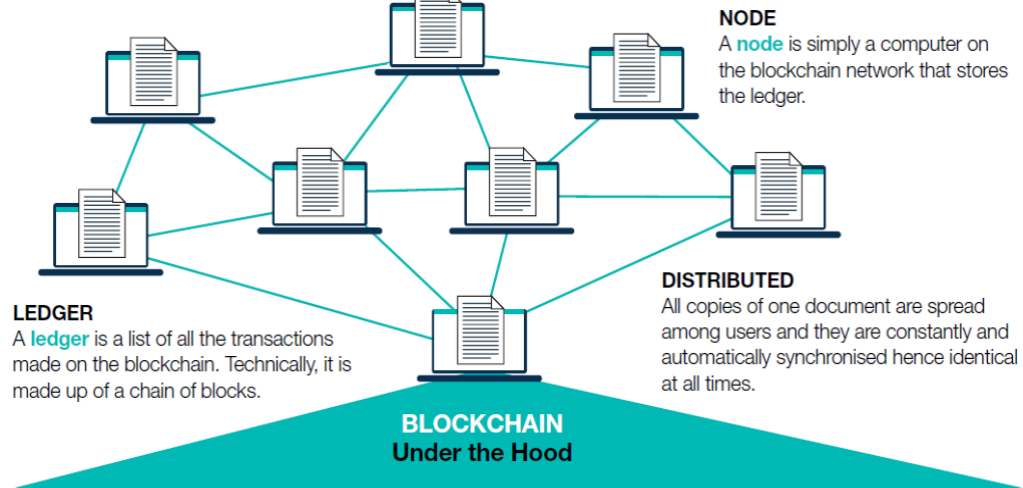
DATE	NUMBER OF USERS	% WORLD POPULATION	INFORMATION SOURCE
December, 1995	16 millions	0.4 %	IDC
December, 1996	36 millions	0.9 %	IDC
December, 1997	70 millions	1.7 %	IDC
December, 1998	147 millions	3.6 %	C.I. Almanac
December, 1999	248 millions	4.1 %	Nua Ltd.
March, 2000	304 millions	5.0 %	Nua Ltd.
July, 2000	359 millions	5.9 %	Nua Ltd.
December, 2000	361 millions	5.8 %	Internet World Stats
March, 2001	458 millions	7.6 %	Nua Ltd.
June, 2001	479 millions	7.9 %	Nua Ltd.
August, 2001	513 millions	8.6 %	Nua Ltd.
April, 2002	558 millions	8.6 %	Internet World Stats
July, 2002	569 millions	9.1 %	Internet World Stats
September, 2002	587 millions	9.4 %	Internet World Stats
March, 2003	608 millions	9.7 %	Internet World Stats
September, 2003	677 millions	10.6 %	Internet World Stats
October, 2003	682 millions	10.7 %	Internet World Stats
December, 2003	719 millions	11.1 %	Internet World Stats
February, 2004	745 millions	11.5 %	Internet World Stats
May, 2004	757 millions	11.7 %	Internet World Stats
October, 2004	812 millions	12.7 %	Internet World Stats
December, 2004	817 millions	12.7 %	Internet World Stats
March, 2005	888 millions	13.9 %	Internet World Stats
June, 2005	938 millions	14.6 %	Internet World Stats
September, 2005	957 millions	14.9 %	Internet World Stats
November, 2005	972 millions	15.2 %	Internet World Stats
December, 2005	1,018 millions	15.7 %	Internet World Stats
March, 2006	1,023 millions	15.7 %	Internet World Stats
June, 2006	1,043 millions	16.0 %	Internet World Stats
Sept, 2006	1,086 millions	16.7 %	Internet World Stats
Dec, 2006	1,093 millions	16.7 %	Internet World Stats

²⁵⁷ Source: Internet world status (2019). *Internet Growth Statistics*. Internet Technology Reports. Retrieved from: <https://www.internetworldstats.com/emarketing.htm>.

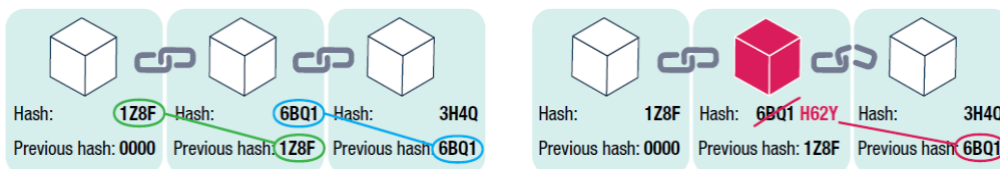
Mar, 2009	1,596 millions	23.8 %	Internet World Stats
June, 2009	1,669 millions	24.7 %	Internet World Stats
Sept, 2009	1,734 millions	25.6 %	Internet World Stats
Dec, 2009	1,802 millions	26.6 %	Internet World Stats
June, 2010	1,966 millions	28.7 %	Internet World Stats
Sept, 2010	1,971 millions	28.8 %	Internet World Stats
Mar, 2011	2,095 millions	30.2 %	Internet World Stats
Jun, 2011	2,110 millions	30.4 %	Internet World Stats
Sept, 2011	2,180 millions	31.5 %	Internet World Stats
Dec, 2011	2,267 millions	32.7 %	Internet World Stats
Mar, 2012	2,336 millions	33.3 %	Internet World Stats
June, 2012	2,405 millions	34.3 %	Internet World Stats
Sept, 2012	2,439 millions	34.8 %	Internet World Stats
Dec, 2012	2,497 millions	35.7 %	I.T.U.
Dec, 2013	2,802 millions	39.0 %	Internet World Stats
June, 2014	3,035 millions	42.3 %	Internet World Stats
Dec, 2014	3,079 millions	42.4 %	Internet World Stats
June, 2015	3,270 millions	45.0 %	Internet World Stats
Dec, 2015	3,366 millions	46.4 %	Internet World Stats
Jun. 2016	3,631 millions	49.5 %	Internet World Stats
Dec. 2016	3,696 millions	49.5 %	Internet World Stats
June. 2017	3,885 millions	51.7 %	Internet World Stats
Dec 2017	4,156 millions	54.4 %	Internet World Stats
Jun 2018	4,208 millions	55.1 %	Internet World Stats
Dec 2018	4,313 millions	55.6 %	Internet World Stats
Mar 2019	4,383 millions	56.8 %	Internet World Stats

Appendix B

The blockchain in practice



A **block** is comprised of a group of transactions from the same time period, like a page from a record book



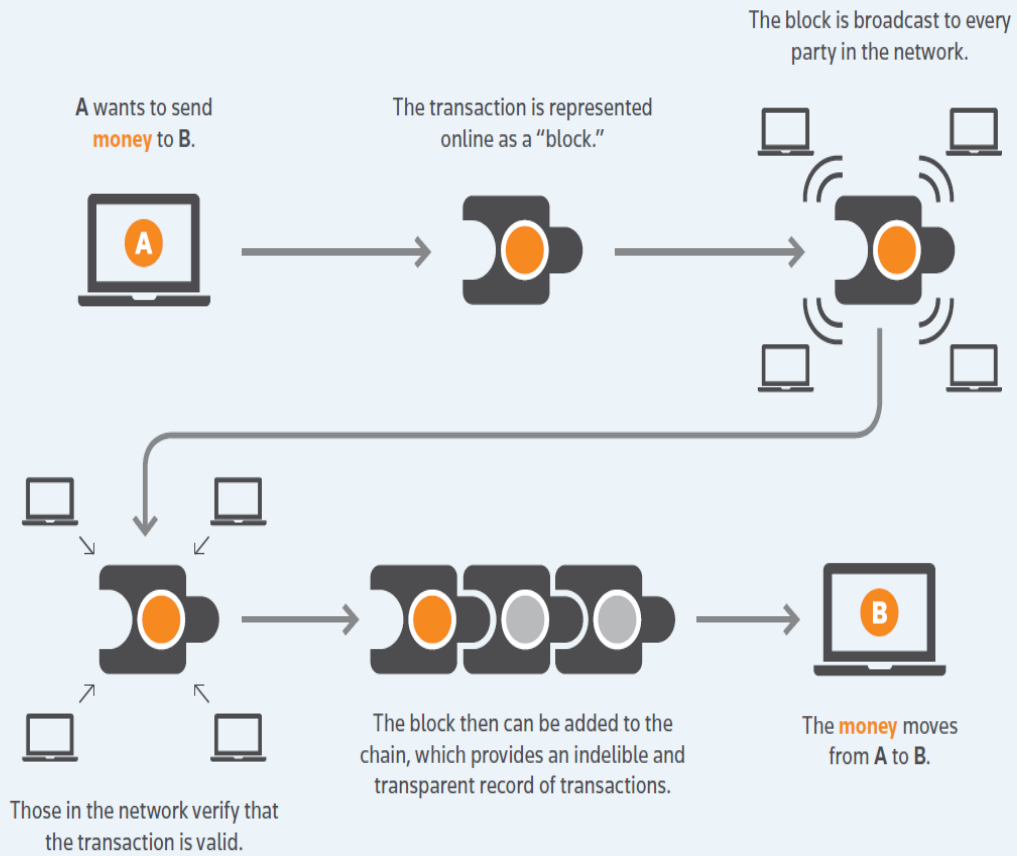
Inside each block:

Hash
Previous Block's Hash
Transaction Data
Timestamp

Along with its own hash, each block stores the hash of the block before it.

A **hash** is a unique string of letters and numbers created from text using a mathematical formula. Blocks are therefore "chained" together making the ledger (almost) **immutable** or unable to be changed. To add a block, it may first need to be mined and then approved by a number of nodes through a consensus mechanism.

A VISUAL REPRESENTATION OF BLOCKCHAIN



Source: Financial Times

²⁵⁸ Source: OECD (2018). *The OECD Blockchain Primer*, OECD Publishing, Paris, cit.