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DIGITAL CURRENCY SCHEMES: MORE OR LESS SUSTAINABLE? *LIMITS TO GROWTH* AND ELECTRONIFICATION OF MONEY IN EUROPE

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DIGITAL CURRENCY SCHEMES: MORE OR LESS SUSTAINABLE? *LIMITS TO GROWTH* AND ELECTRONIFICATION OF MONEY IN EUROPE[1]

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Il saggio si propone di esaminare le questioni sollevate dalla elettronificazione e digitalizzazione dei pagamenti al dettaglio secondo un approccio umanistico e gius-economico, attento alla più recente evoluzione del quadro giuridico europeo su sistemi di pagamento, valute virtuali e complementari. Il saggio, diviso in due parti, si occupa nella Parte I del concetto di valore negli scambi monetari prestando attenzione alla relazione concettuale, stabilita da Mangan nella sua produzione artistica, tra l'antica valuta dell'isola di Yap, il rai, in pietra, e la valuta virtuale del bitcoin. I rispettivi percorsi di produzione, consumo, circolazione e rivalutazione delle due monete sono correlati alla relazione tra valute locali/ complementari da un lato e valute globali/virtuali dall'altro, in modo da prestare attenzione a come il valore monetario originariamente "forgiato" attraverso il criterio (chiuso) dell'appartenenza ad una comunità cambi quando "ceduto" ad un mercato (aperto) dominato dalla tecnologia. Nella Parte II, il saggio esamina l'approccio dell'Unione Europea alla moneta e ai sistemi di pagamento, concentrandosi sulle principali caratteristiche dei sistemi "regolari" e quelli virtuali, concludendo che difficilmente il ricorso al bitcoin o ad altre valute virtuali può sciogliere i nodi della governance dei sistemi di pagamento tradizionali e dell'accesso al credito: la sostenibilità e la nuova crescita che le valute virtuali e globali promettono si scontra in concreto con i limiti persistenti degli attori umani.

This paper aims at providing a response to the interrelated issues of electronification and digitization of payments combining a law, economics and humanities approach with a critical eye on the most recent evolution of European Union law on the matter of payment systems and complementary and digital currencies. To this objective, Part I investigates the concept of value in money exchanges through the conceptual relation in Mangan's artwork between the ancient Yapese currency, rai, in the form of stone money, and the contemporary crypto-currency of bitcoins. Their juxtaposed story of production, consumption and circulation, as well as of re-evaluation, will then be extended to the relation between localised/complementary, on the one side, and globalised/digital currencies, on the other side, to highlight how monetary value, originally "carved" via (closed) criteria of community belonging, changes when "sold" to an

[1] This is a blind-peer reviewed paper. Here, it is published a revised version of the conference essay originally presented at 5th Biennal RAMICS International Conference on *Going Digital? New Possibilities of Digital-Community Currency Systems,* Hida - Takayama, Japan as an outcome of Jean Monnet Chair in EU Money Law, with the support of the Erasmus Plus Programme. Indeed, Dr Gimigliano is the holder of Jean Monnet Chair in EU Money Law, while Dr Cattelan is one of the key teaching staff members of the same project.

The paper is made up of two parts: Part I (sections 1 and 2) is authored by Dr Valentino Cattelan, while the Part II (sections 3 and 4) is authored by Dr Gabriella Gimigliano. By contrast, the introduction and the concluding remarks may be referred to both of them.

(open) market dominated by technology. Accordingly, Part II will later shed light over the regulatory approach to money and payments at the European level, focusing on the main features of the "regular" payment system and the bitcoin-like money systems, drawing the conclusions that the currency tokens based on permissionless blockchain can hardly change (and solve) issues of payment systems' governance and credit crunch, as if their sustainability, and the new growth that they promise, would be, in fact, subject to persistent and inescapable limits for human actors.

Sommario:

1. Introduction: *The Limits to Growth*

In 1972, around 50 years ago, governments met in Sweden for the UN Conference on the Human Environment, and in 1983 the UN created the World Commission on Environment and Development (also known as Brundtland Commission), with the definition of sustainable development as «meeting the needs of the present without compromising the ability of the future generations to meet their own needs». Also in 1972, a famous report entitled *The Limits to Growth* was issued by the so-called Club of Rome (composed of current and former heads of state, UN representatives and high-level government officials, business leaders...) with a computer simulation of the not-indefinite economic growth in presence of a finite supply of resources.

More recently, the reduction of inequality appear among the persistent challenges that the 2030 Agenda of the United Nations has clearly indicated in 2015 in the famous list of its seventeen Sustainable Development Goals (SDGs).

Money has a central role in promoting the sustainability of the economic system. Therefore, the recent technical innovation applied to money, payments and settlement process, question us on the ability of overcoming the *Limits to Growth* and fill in the inequality gap, a problem which is currently affecting also the future development of the European Union

This paper aims at facing this issue by combining a law and humanities approach with a critical eye on the most recent evolution of European Union law on the matter of the electronification of money, negotiability, payment systems and complementary and digital currencies.

To this objective, Part I of the paper takes inspiration from the work by Australian artist Nicholas Mangan *Limits to Growth* (itself related to the 1972 Report) in order to explore the connection between law and economy from an inter- and trans-cultural perspective. In this light, Part I investigates the concept of value in money exchanges through the conceptual relation in Mangan's artwork between the ancient Yapese currency, *rai*, in the form of stone money, and the contemporary crypto-currency of *bitcoins*. Their juxtaposed story of production, consumption and circulation, as well as of re-evaluation, will then be extended to the relation between localised/complementary, on the one side, and globalised/digital currencies, on the other side, to highlight how monetary value, originally "carved" via (closed) criteria of community

belonging, *changes* when "sold" to an (open) market dominated by technology.

Part II concerns the European normative framework for payments addressing the main features of a rai-like payment system; in other words, the payment system set out at European Union level and based on the *electronification* of fund transfers and the harmonisation process of technical and regulatory standards. When virtual currencies took to the big stage, the European policymaker took a wait-and-see approach, neither accommodating nor forbidding the newly-born money-like product within the institutional framework. But, apart from future regulatory actions, should we consider virtual currencies as a useful means of overcoming *Limits to Growth*?

2. Part I - The sustainability of money: law, economics and the impact of technology

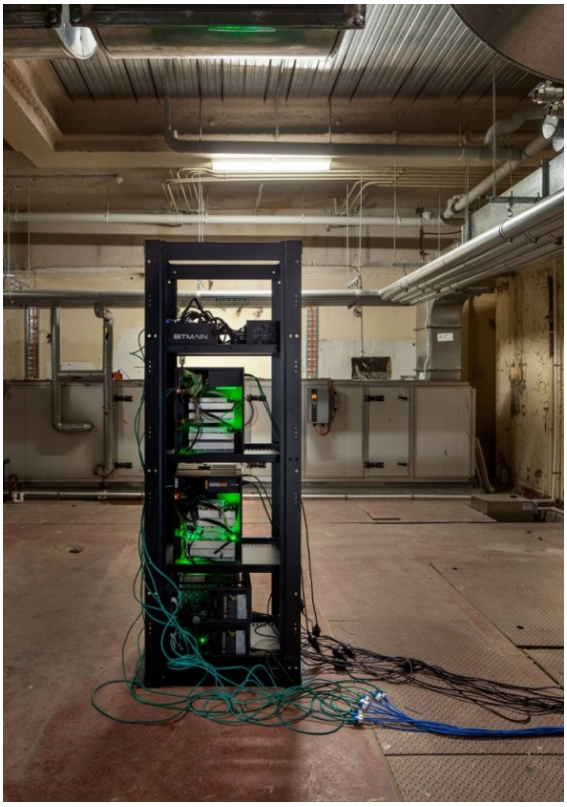
Named after the Report mentioned above, *Limits to Growth* is the first survey exhibition by multidisciplinary Australian artist Nicholas Mangan (born 1979, AU) which took place at the KW Institute for Contemporary Art in Berlin from 2 June to 13 August 2017.

The exhibition[2] brought together five art projects that the artist developed over the last nine years on inter-connected themes such as the on-going impacts of colonialism, consumption cultures and the dynamics of global political economy. In particular, the exhibition itself lent its title from Mangan's most recent artwork *Limits to Growth* (2016-2017), where he forges interdependence between two (apparently distant, but actually much closer one another than expected) monetary currencies: *rai*, the ancient large stone coins from the Micronesian island of Yap, and *bitcoin*, the most popular crypto-currency currently in use in the global market.

[2] Accompanied by a volume published by Sternberg Press; see list of references: BURNS - DAY - GRUIJTHUIJSEN - LUNDH, (eds), *Nicholas Mangan: Limits to Growth*, Berlin, 2016.

Mangan, N., installation view *Limits to Growth,* KW Institute for Contemporary Art, 2017 (photo by Frank Sperling, published online at http://www.kw-berlin.de/en/press/)

The installation *consumes* "money" that is *produced* by a *bitcoin* mining ring installed in the Museum basement to pay for the production of large-format photographs of *rai* stone coins, with an indexical relationship to the energy employed by the *bitcoin* mining taking place below, thus *re-formulating* "value" from an exchange medium to the other. Photographs are also juxtaposed to an underwater video of a *rai* stone lying on the bottom of the Miil Channel off the northwest coast of Yap. The sound of a human breathing through a scuba apparatus is taken from the video, and mixes with that of the *bitcoin* miners and the noise of the building's air-conditioning system. As Mangan underlines in his website presentation of the opus, all these sounds «allude to the presence of closed systems and the notion of the necessity of *circulation* in any currency».



9 terrahash Bitcoin ASIC mining ring. Installation detail
(picture taken from Mangan's personal website)

Limits to Growth gives form to a complex interaction between matter and energy by incorporating together «sculptural objects and environments, film, sound and evolving and contingent systems that act to generate and sustain his work through time»[3]. The opus becomes in this way a generative project that draws on materials and labour in order to explore the evolution of money value, as well as its cultural re-formulation in time and space.

In actual fact, although *rai* were carved large stones and *bitcoin*, on the contrary, are virtual and in a sense immaterial, since minted by computers solving complex algorithms, both currencies share (as *any* currency) a

[3] CLARK, *Artists at work: Nicholas Mangan*, Available online at https://www.afterall.org/online/artists-at-work-nicholas-mangan#.WZLBdGe3q_U

common story of *production* and *consumption* of monetary value within *their own* (closed) exchange system, overlapping with further layers of *circulation* and *re-formulation of value* when located in an (open) exchange environment, in the interaction with other systems of meaning.

Mangan, N., installation view *Limits to Growth,* KW Institute for Contemporary Art, 2017 (photo by Frank Sperling, published online at http://www.kw-berlin.de/en/press/)

2.1 *The Island of Stone Money*: *rai,* bitcoins and how to produce and consume monetary value

The story of *rai* (also called *fei*) stones is popular among economists, and has been mentioned by Keynes, Friedman, Tobin and Makiw[4]. The first source of the story dates back to 1910, with a book by physician and ethnographer William Henry Furness III, of which some excerpts were also reproduced in *The Economic Journal* (1915)[5].

[4] As reported by GOLDBERG, *Famous myths of "fiat money"*, in *Journal of Money, Credit and Banking*, 2005, vol. 37 (5), 957-967.

[5] FURNESS III, *The island of stone money*, in *The Economic Journal*, 1915, vol. 25, 281-283.

In 1903 Furness spent some months on the island of Uap (or Yap), part of the Caroline Islands, in the Pacific Ocean east of the Philippines. He was particularly impressed by the local monetary system, and accordingly gave his book the title *The Island of Stone Money* (1910). Local legend held that around six centuries before an expedition of Yapese fishermen landed accidentally 250 miles away in one of the islands of Palau: they found there limestone rocks (inexistent in Yap) which looked very valuable to them. A first stone was then carved in the shape of a whale (*rai* in their native language), while others, later on, were made circular, since (probably) the round shape was easier to transport (the original name of *rai* did not change).

Being such a rare commodity, so difficult to quarry, carve and transport, the stones had a great value and soon became currency on Yap, following a similar process that gold had in the Mediterranean cultures of antiquity[6]. Their value, in actual fact, was not only material: *rai* was a currency that represented genuine labour, as it was mined and carved on Palau, carried hundreds of miles by outrigger canoes and 10-20 men were needed to move the largest ones (3-4 meters in diameter) on Uap island. Along the time, the monetary value of a specific stone was linked not only to its size and the quality of craftsmanship, but also to its history, being more valuable if many people died during the transportation, or a famous sailor carried it to Yap.

Next to these cultural-related factors of (1) *production* of the value of *rai* stones, also their (2) *consumption* process was deeply inserted in the (closed) exchange system of the Yapese society.[7] Since the stones were usually too heavy to move and high was the risk of damage, their value passed from one person to another simply by agreeing that the ownership was changed (the physical location of the *rai* did not matter) and the transaction was recorded through the oral history of the community. In other terms, the *consumption* of *rai* stones did *not* require any *physical circulation*, but was based on a shared history of ownership, by means of its oral transmission in the closed social space of Yap island. The social recognition of the stones value was so strong that even when a large *rai* accidentally sank to the sea floor, and was never seen again, everyone agreed that it still existed and could be transacted as

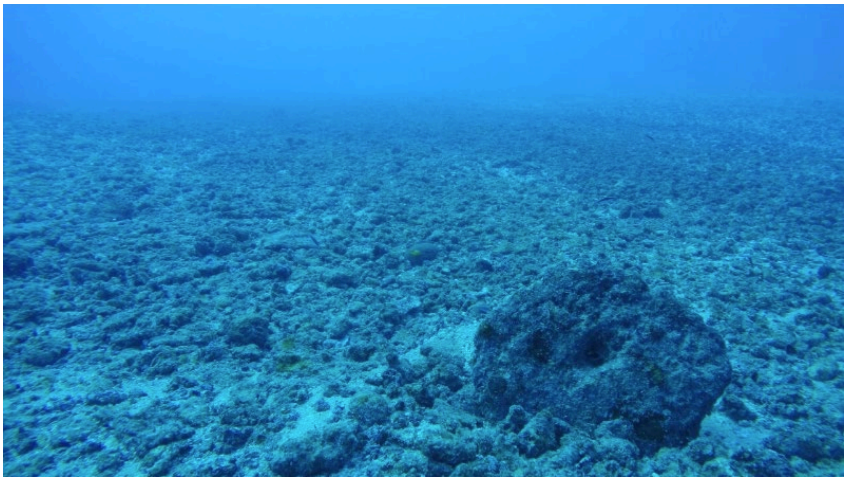
[6] GIMÉNEZ, *Bitcoins and the stone money*, 2014. Available online at http://bitcoinsandeconomy. blogspot.de/2014/04/bitcoins-stone-money.html.

[7] For a brief anthropological depiction of the use of *rai* currency see: FITZPATRICK - PINKOWSKI, *Banking on stone money*, in *Archeology*, 2004, vol. 57 (2), 18 - 23.

genuine currency, even if not physically accessible to any party (while validly owned and transmitted by one member to another of the community).[8]

Chief Magistrate Anghel Gargog in costume wearing basket near two coral money discs, 1962 (Photographer: Roy H. Goss. National Anthropological Archives, Smithsonian Instit., Washington, D.C.;picture taken from Mangan's personal website)

[8] FURNESS III, *The island of stone money, Uap of the Carolines*, Philadelphia: J.P. Lippincott Company, 1910, reports in his book what his faithful old friend, Fatumak, a local native, narrated to him, «that there was in the village near-by a family whose wealth was unquestioned, - acknowledged by every one - and yet no one, not even the family itself, had ever laid eye or hand on this wealth; it consisted of an enormous *fei* [i.e. *rai*], whereof the size is known only by tradition; for the past two or three generations it had been, and at that very time it was lying at the bottom of the sea! Many years ago an ancestor of this family, on an expedition after *fei*, secured this remarkably large and exceedingly valuable stone, which was placed on a raft to be towed homeward. A violent storm arose, and the party, to save their lives, were obliged to cut the raft adrift, and the stone sank out of sight. When they reached home, they all testified that the *fei* was of magnificent proportions and of extraordinary quality, and that it was lost through no fault of the owner. Thereupon it was universally conceded in their simple faith that the mere accident of its loss overboard was too trifling to mention, and that a few hundred feet of water off shore ought not to affect its marketable value, since it was all chipped out in proper form. The purchasing power of that stone remains, therefore, as valid as it were leaning visibly against the side of the owner's house.»



Mangan, *Limits to Growth*, 2016, video still (picture taken from http://www.the8thclimate.org/)

Mangan's artwork *Limits to Growth* makes visible the conceptual interdependence between *rai* and *bitcoins* as media of exchange where (physical) matter (i.e. stone) and (immaterial) energy (i.e. the electricity used to power the ASIC miners) produce monetary value, whose consumption transforms the latter into a representation of the former (in the installation the value of *bitcoin* is used to print indexed large photographs of *rai* stones), in a process of cultural translation that explores the interrelation between shared social norms (where a legal dimension is present) and the recognition of economic power within a given community (the Yapese community and the one of *bitcoin* users, hence the community of contemporary global markets). In addition to this, the story of *rai* stones explored by Mangan may give further insights into processes of cultural encounters in the form of

(3) circulation and

(4) (re-)formulation of (monetary) values (i.e. meaning).

2.2 *Yap* money and the (new) world: two striking events of value circulation and re-evaluation in a cross-cultural context, and the role of foreign norms affecting closed social systems

There are two remarkable events (apart from their unique way of production and consumption within the Yapese society) that belong to the

story of *rai* stones, and are highly significant for this research project, as inspired within the conceptual frame of Mangan's *Limits to Growth*.

Both events can be described as examples of cross-cultural (3) circulation and (4) re-formulation of value (i.e. re-evaluation) that occur when a closed exchange system enters into contact with others that are validated by different norms in an open exchange environment, affected either by the impact of new technology or the re-assertion of 'local values'.

(i) The first event (1871) witnessed a value re-formulation due to practices of extra-cultural circulation: "foreign norms" of value *production* replaced local ones, hence *consuming* the "value" (i.e. meaning) of "new" *ray* stones which were not recognized comparable to the "original" local ones.

It was the forces of nature rather than self-determination that caused a collision between the new world and the self-contained Yapese culture. It was a typhoon, or so it's said, that threw up a desolate and desperate Captain David O'Keefe onto the island of Yap in 1871. O'Keefe had taken to the seas to establish himself as a trader… [of copra, dried coconut meat, which was valuable export in the Far East], [but] his new world money had no exchange value within their stone currency.

A baffled and frustrated O'Keefe departed Yap to Hong Kong on a passing steamer empty-handed only to return with a Chinese junk ship and a large supply of modern iron hand tools; if the Yapese wouldn't accept his form of coinage then he would insert himself into the cycle of their own currency. However, O'Keefe was not "buying" or "selling" with the stones. Instead he facilitated an infrastructure introducing the wholesale trade in transporting Rai, which he rendered in exchange for marketable goods, such as copra.[9]

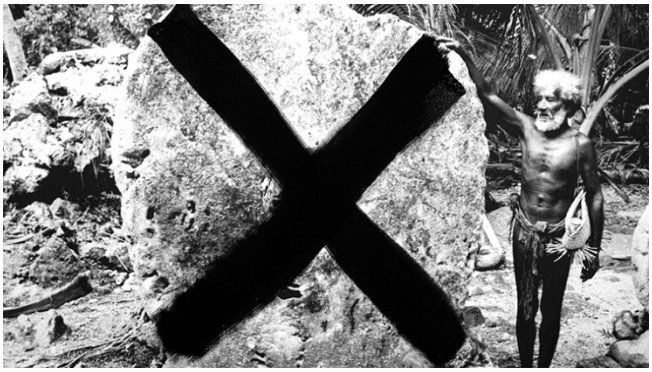
The relative ease of excavation and shipping of "new" *rai* stones (*produced* through "foreign" norms, the iron tools) altered the economy of Yap, a form of inflation set in and *consumed* their value. Coming back to *Limits of Growth*, this is "an important concept that Bitcoins share with stone money of Yap: Bitcoins have a cap on the production of money to avoid inflation"[10].

(ii) The second event (1898), in reverse, occurred in the form of a re-evaluation through intra-cultural circulation of Yap money: "locals norms" of *consumption* were applied to (*re-*) *produce* the value (i.e. meaning) of *ray*

[9] It should be mentioned here that in 1954 the adventure of Captain David O'Keefe on Yap island also became the subject of a film directed by Byron Haskin and starring Burt Lancaster, under the title *His Majesty O'Keefe*. MANGAN, *Limits to Growths. Part 2 - Numismatics: A study of Dead and Dying Currencies and the True Value of Waste*. Description of the installation project at KW museum, available at http://www.nicholasmangan.com/.

[10] GIMÉNEZ, op. cit.

stones to the advantage of "foreign actors." The case, reported by Furness (1910), occurred when the German Government assumed the ownership of the Caroline Islands, after their purchase from Spain, and the new rulers decided to pave them, demanding the Yapese to repair their roads and put them in good order. But the roughly dressed blocks of coral were, however, quite good enough for the bare feet of the natives; and many were the repetitions of the command, which still remained unheeded. At last, by a happy thought, the fine was exacted by sending a man… throughout the disobedient districts, where he simply marked a certain number of the most valuable *fei* [i.e. *rai*] with a cross in black paint to show that the stones were claimed by the government. This instantly worked like a charm; the people, thus dolefully impoverished, turned to and repaired the highways to such good effect from one end of the island to the other, that they are now like park drives. Then the government dispatched its agents and erased the crosses. Presto! The fine was paid, and the happy… [people] resumed possession of their capital stock, and rolled in wealth[11].



Mangan, N., *Limits to Growth* (2016/17), video still
(Photograph: Roy H. Goss, National Anthropological Archives, Smithsonian Institute, Washington, DC)

One may comment on this case and the immediate reaction could be "How silly. How can be people so illogical?" Indeed, after raising this question in a paper having the same title of Furness' book *The Island of Stone Money*, Milton Friedman turns to the understanding of (and the sympathy for) the "innocent people of Yap"[12] by equating the monetary role of the stone money

[11] FURNESS, op. cit.

[12] FRIEDMAN, *The Island of Stone Money*, *Working Papers in Economics*, E-91-3. Standford University: The Hoover Institution, 1991, 1- 5.

to the U.S. reserves of gold held in Fort Knox for foreign governments, when in 1932-33 the Bank of France feared that the U.S. would not stick to the gold standard and consequently asked the Federal Reserve Bank of New York to covert U.S. dollar assets that it had there into (material) gold.

To avoid the necessity of shipping the gold across the ocean, it requested the Federal Reserve Bank simply to store the gold on the Bank of France's account. In response, officials of the Federal Reserve Bank went to their gold vault, put in separate drawers the correct amount of gold ingots, and put a label or mark on those drawers indicating that they were the property of the French - for all it matters they could have done so by marking them "with a cross in black paint" just as the Germans did to the stones[13].

Friedman significantly concludes his paper with the following observations.

The Yap Islanders regarded stones quarried and shaped on a distant island and brought to their own as the concrete manifestation of wealth. For a century and more, the "civilized" world regarded as a concrete manifestation of its wealth metal dug from deep in the ground, refined at great labor, and transported great distances to be buried again in elaborate vaults deep in the ground. Is the one practice really more rational than the other?

What both examples - and numerous additional ones that could be listed - illustrate is how important "myth," unquestioned belief, is in monetary matters. Our own money, the money we have grown up with, the system under which it is controlled, these appear "real" and "rational" to us. The money of other countries often seems to us like paper or worthless metal, even when the purchasing power of individual units is high[14].

3. Part II - The European framework for payments and the exogenous variable of virtual currencies

From a normative standpoint, the European Union is fertile and interesting terrain for the experimental innovation of means of payment and settlement[15].

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[13] FRIEDMAN, *The Island of Stone Money*, *Working Papers in Economics*, cit., 3-4.

[14] FRIEDMAN, *The Island of Stone Money*, *Working Papers in Economics*, cit., 4-5.

[15] The European Union (EU) is an international organization, to whom the Member States have transferred elements of their sovereignty; it enjoys its own jurisdiction. It is actually based on the Treaty on European Union (TEU) and the Treaty on the Functioning of European Union (TFEU), which establish the powers of the Union, its objectives, institutional organization, and the legislative process (namely which European institutions are involved and in what way). This means that the EU is also a community of law: the Union and its institutions are entitled to make laws or rules according to the principle of conferral, pursuant to Article 5.1 TEU, «*the*

Indeed, over time, the Union has set up a harmonising framework for payments with a view to building up an «*area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of the Treaties*» (art. 26.2, *Treaty on Functioning of the European Union* or TFEU), namely, an internal market for payments. The result has been the establishment of an EU-based payment system treated as a law-based infrastructure connecting all European payment service users, both consumers and traders, regardless of the currency used. However, the currency whose exchange may work as a discharging value are only fiat currencies, namely, the currency issued by nation-States or international organisations on their behalf.

This payment system, examined in the following sections, is a centralised payment system, based on the intermediation of credit institutions and non-banking financial institutions: it is first and foremost a cultural product and, for this reason, may be compared to the *rai* payment system used on Yap Island.

As happened (or is said to have happened) on Yap island, any monetary system may operate for too long as a closed system: by chance or by design, technological development comes to challenge the existing payment system. Within the EU, the novelty is represented by virtual currencies, set up as a disintermediated payment system - namely, an infrastructure based on DLT-technology - and a monetary value other than the fiat currencies, for example bitcoin. The EU is experiencing a cultural change, which may or may not prevail over the present payment system. In the end, the main point is whether virtual currencies can fill any gaps European payment service users suffer from.

Part II is organised as follows: in the remaining paragraphs of section 3, the paper focuses on two main features of the European payment system, namely electronification (3.1.) and harmonisation (3.2.). In section 4, the paper turns to the European policy reaction to the spread of virtual currencies addressing the main policy and regulatory concerns. In the end, the virtual currencies seem to represent a last frontier of the electronification of retail payments, which may - to some extent - improve the financial inclusion process encouraged by the European policymaker, but they are short of convincing answers to the ambiguities of payment systems' governance and credit crunch issues, arising from the competition experience as two leading bottlenecks of the payment services market.

Union shall act only within the limits of the competences conferred upon it by the Member States in the Treaties to attain the objectives set out therein».

3.1. The "electronification" process

The "electronification" of retail payments is seen as a policy tool for overcoming the fragmentation of the national market: indeed, it may facilitate cross-border payments and commercial transactions in general, where commercial transactions may concern goods, services or capital.

The EU-based legal framework for the "electronification" of payments, adhering to the policy priorities set out at the international level since the second half of the 80s, has promoted a continuous, efficient, and safe flow of information, where this flow (regarding the sum of money) amounts to a payment transaction or, from the provider's standpoint, as a payment service. Where does the information flow to? In a payment system or in mutually interoperable payment systems, where the payment system is a contract-based network it is defined as a «*funds transfer system with formal and standardised arrangements and common rules for the processing, clearing and/or settlement of payment transactions*» (art. 7, n. 4, PSD2)[16].

Towards the beginning of 2000, within - and beyond - the Eurozone[17], the Union has been developing a regulatory process in readiness for the "electronification" of payments, being the «migration towards the provision of payment services on a fully electronic and highly automated basis» with a view to use the information and telecommunication technology to make the entire payment process fully automated, since the inception, when the payment order is issued (European Central Bank, 2003).

In the past, the electronification process was always characterised by a neutrality approach. The principle of technical neutrality, applied to the European legal framework for money and payments since the beginning, has made no clear-cut choice on the way card payments, direct debits or credit transfer operations are operated. In fact, no harmonising rule has laid down technical standards. In contrast, the main policy concern was not to set out rules stifling the technical innovation progress, thus bettering the level of efficiency. However, this is clearly set out in the 2015 Payment Service Directive: the preamble (21) of which states that the "*definition of payment*

[16] Therefore, each payment system consists of a matchmaker providing the common technical and regulatory standards, enabling the payment service providers to communicate with each other, and there are often settlement services and payment service providers providing the payment services. At the base of this payment network are the payment service users, debtors and creditors.

[17] The countries of the European Union sharing the same currency - the euro - form the Eurozone, but the Eurozone does not represent an international organization as the European Union does.

services should be technologically neutral and should allow for the development of new types of payment services, while ensuring equivalent operating conditions for both existing and new payment service providers".

3.2. The harmonisation process and the level playing field

The "electronification" of payments, mentioned above, is rooted in and supported by a broad EU-based normative framework, applying to all the countries in the Union and is mostly based on a full harmonisation approach[18], covering payment service providers and conditions for access to the relevant market, as well as the payment service contract and alternative dispute resolution mechanisms, (payment) data protection rules, etc. Anything not "digital" falls beyond the future of payment within the European Union, despite still belonging to the civil law tradition and practice of several EU countries. Indeed, since the 2007 Payment Service Directive (and still today with the 2015 Payment Service Directive that has replaced the former one), the "regulated field" has not covered all paper cheques, governed by the 1931 Geneva Convention and any comparable paper-based commercial instruments, including all bills of exchange, promissory notes and other such instruments falling within merchant law that cannot be fully digitalized (i.e., from the beginning, when the payment order is issued to the end, when the payment order is settled).

Generally speaking, the harmonisation process covers both negative and positive harmonisation and aims to remove the legal obstacles to the proper functioning of the internal market. In turn, the internal market has been involved since the Spark Plan came into being as the main regulatory and economic device for European growth. Indeed the common market is

[18] However, harmonisation varies in degree according to the allocation of jurisdiction between the Member States and the Union itself. The European Union does not always enjoy exclusive regulatory authority, depending on the area concerned: the construction of an internal market for payments is one of the regulatory powers shared between the Union and the Member States. Therefore, the Union has the power to undertake initiatives (e.g., drafting a directive or regulation) provided this initiative complies with two leading principles, namely the principles of subsidiarity and proportionality.

The principle of subsidiarity provides that «*in areas which do not fall within its exclusive competence, the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level*» (art. 5. 3 TEU); in turn, the principle of proportionality establishes that «*the content and form of Union action shall not exceed what is necessary to achieve the objectives of the Treaties*» (art. 5.4 TEU).

described in the plan in the following terms: «The objective of a common European market must be to create a vast zone of common economic policy, constituting a powerful unit of production, and making possible continuous growth, an increase in stability, and accelerated raising of the standard of living and the development of harmonious relations between the States which it unites»[19]. In other words, the harmonisation process is instrumental to the proper functioning of the internal/common market, which, in turn, is deemed to be the driving force of growth, so, for transitive property, harmonisation turns out to be necessary to trigger *growth*.

However, the market for payment services in Europe stands as a natural oligopolistic market, highly fragmented along its national borders. For this reason, the European harmonisation process has tried to build up an internal market, trading off the competitiveness and contendibility of the product market on the one hand and financial inclusion on the other[20].

While subparagraphs 3.2.1., 3.2.2. and 3.2.3, focus on how the harmonisation process has tried to smooth the path for a more contendible market, 3.2.4. addresses the second axis of the harmonisation process, namely, the priority of financial inclusion policy.

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[19] Mortelmans argues that there is no material distinction between the concept of *internal market*, *common market* and *single market*. MORTELMANS, *The common market, the internal market and the single market*, in *Common Market Law Review*, 1998 (35), 101 - 136.

[20] The positive harmonisation proess is predicated on regulatory action taken at Union level. In the area of payment transactions, it involves the European Commission, the European Parliament and the Council, as well as one or more of the European Supervisory Authorities. It is consists of non-binding (or soft) rules and compulsory legislation (such as directives and regulations) and ultimately complies with the principle of neutrality in relation to technological business models.

The process of harmonising the electronification of payments began early, around the turn of the 80s, with the Commission issuing communications and recommendations on electronic payments and electronic money, setting out non-binding rules. The process continued in the second half of the 90s, establishing hard law rules through directives and regulations.

There was an initial normative phase in which the Union mostly approved directives to achieve a minimum level of harmonisation: this meant that individual EU countries had great leeway in the transposition of directives within their national legal systems, as the European directives set a bare minimum level of regulation, leaving national governments free to enforce tougher rules. Later on, in the second phase, the Union progressed from a minimum harmonization to a full harmonisation approach, approving directives leaving small or no room for movement to the Member States in the implementation process, in addition to approving European regulations, which are *per se* directly applicable in the Member States. An overview in GIMIGLIANO, *The lights and shadows of the EU law on payment transactions*, in GIMIGLIANO, G. (ed), *Money, Payment systems and the European Union. The regulatory challenges of governance*, Newcastle-upon-Tyne, 2016, 24 - 38.

3.2.1. Transparency rules for payment service contracts

Since the first Commission's recommendations[21], the European policymaker has focused on transparency as a legal device for improving competition among the payment service providers established in the Union.

The transparency rules have always covered both regulatory and economic contracting conditions. Indeed, the European policymaker assumes that, by giving the payment service users proper information, they will be able to make well-informed commercial choices by cherry picking, in the internal market, the payment service provider or the payment service contract best suited to their needs. This may indirectly improve competition not only at national level but also at EU level.

Since the first soft rules, the transparency rules cover the whole electronification process for payments. In fact, in the 80s, the Commission focused on electronic payment instruments, both e-money and account-based products, providing for duties of information before and after a contract is made, in addition to a set of uniform terms and conditions to be set in line with the preliminary information given. When PSD1 was approved in 2007, the transparency rules exhibited slight normative differences compared with the corresponding soft rules, and so did the 2015 Payment Service Directive[22].

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[21] See, among others: Commission Recommendation of 8 December 1987, OJEC n. L 365/72 of 24.12.1987, on a European Code of Conduct relating to electronic payment; Commission Recommendation of 17 November 1988, OJEC n. L 317/55, of 24.11. 1988, concerning payment systems, and in particular the relationship between card-holder and card issuer.

[22] Drawing a rough comparison between the soft harmonising rules and the 2007 Payment Service Directive, the main regulatory difference lies in the information to it is necessary to "provide" and the information to be "made available" by the payment service provider. This distinction is clearly stated in the preamble (27) aiming to reaching a trade-off between cost-efficiency and practical aspects of the payment service contracts, on the one side, and the needs of the payment service users, on the other. Indeed, concerning framework contracts, like payment account contracts, the information provided means the information «*actively communicated by the payment service provider at the appropriate time as required by this Directive without further prompting by the payment service user, or the information should be made available to the payment service user, taking into account any request he may have for further information»;* by contrast, the information is made available when «*the payment service user should take some active steps in order to obtain the information, such as requesting it explicitly from the payment service provider*», for example, logging into bank account mail box or inserting a card into printer for account statements. With regard to this regulatory approach, there is no change in the 2015 Payment Service Directive, which has set out tailor-made

Despite regulatory continuity, the 2014 Payment Accounts Directive addressed the matter of the internal market for payments being still highly fragmented along the national borders. More specifically, the transparency rules covered both normative and economic conditions but were lacking a uniform nomenclature of contract fees. Indeed, the banking industry had failed to reach an agreement on the standardisation of payment-service fee terminology, and this ended up discouraging the payment service consumers from cherry picking among the Member States, as the European policymaker had always wished[23].

The Payment Account Directive has consistently set out a bottom-up standardisation process starting from the Member States and going up to the European Banking Authority, with a view to provide the consumers with uniform statements of fee and payment account information documents, both featured by the «*same format, order of items and headings*»[24] throughout the Member States.

3.2.2. Non-bank payment service providers

The harmonisation process has tried to level the playing field for payment service providers. Indeed, it has established the professional provision of payment services as a regulated business and has set up a close list of payment service providers. In addition to post offices, the list includes credit institutions, payment institutions (PIs) and electronic money institutions (EMIs) as non-bank payment service providers, respectively, specialised in the provision of payment services and in the issuance of e-money in compliance with the 2009 E-Money directive and, possibly also authorised to operate payment services[25].

Like the credit institutions and investment firms, the PIs and the EMIs may enjoy the freedom of establishment and the freedom of services in

transparency rules for the newly-established payment services, namely, the account information services and the payment initiation services.

[23] See, preamble (5) ff., dir. 2014/92/EU, OJEU n. L 257/214, of 28.8.2014.

[24] See, preamble (20), dir. 2014/92/EU, OJEU n. L 257/214, of 28.8.2014. In addition, the 2014 Payment Accounts Directive has compelled the Member States to set free-of-charge comparison websites in order to provide consumers with clear, concise and impartial information on payment service fees. Please, compare the preambles (22) and (23) as well as art. 7, 2014 Payment Accounts Directive.

[25] Besides, the close list of payment service providers comprises also the European Central Bank and the national central banks as well as the States, the regional and local authorities, «*when not acting in their capacity as public authorities*».

compliance with the principle of the single licence and home country control. To this end, the European framework provides for lighter financial requirements for payment institutions, strictly linked to a risk-based approach. In other words, own funds and initial capital requirements are established on the basis of the level of risk being run by the payment service(s) that has to be covered by the authorisation[26].

With a view to encouraging business operators to enter the market for payment services, the PSDs[27] have drawn the distinction between pure and hybrid payment institutions. Indeed, the main concern was to prompt business entities, like fintech firms, big retailers, or Internet service providers, to enter the payments market: these entities operate outside the financial market but may possess the critical mass or the technical skills to provide electronic payment services. To the extent that they are authorised as hybrid payment institutions, they may operate alongside commercial and financial businesses directly without establishing a subsidiary.

The 'payment service value chain' was 'opened up' with the 2015 Payment Service Directive, in order to encourage competition in the field of payment systems. Indeed, while the 2007 directive allowed payment service providers to outsource some of the steps in payment transaction processing, the 2015 directive has permitted payment service users to share their data - the data associated with payment transactions - with payment service providers other than those operating their payment account, servicing the account information service providers and payment initiation service providers. They respectively provide for «*an online service to provide consolidated information on one or more payment accounts held by the payment service user with either another payment service provider or with more than one payment service provider*" (the account information service) and a "*service to initiate a payment order at the request of the payment service user with respect to a payment account held at another payment service provider»* (the payment initiation service). From the entrepreneurs' standpoint, both of them are treated as regulated business activities that allow payment service providers other than payment account service providers to hold users' data without stipulating a contract with the payment account servicing provider concerned. It is sufficient for the payment service user to enter into a contract with them.

[26] Title II, 2007 and 2015 Payment Service Directives.

[27] PSDs is the acronym covering both the 2007 Payment Service Directive and the 2015 Payment Service Directive.

3.2.3. Interoperable and compatible payment systems

To the extent that the electronification process has transformed payment into a flow of digital data, payment transactions may be more efficiently carried out via compatible and interoperable payment systems, where a "payment system" is a contract-based business organisation acting as the matchmaker between the two sides of the market (i.e., the payment service providers of the payer and of the payee), whose main scope is matching, processing and settling payment orders. More specifically, in the 2007 Payment Service Directive, the payment system is treated as a «*funds transfer system with formal and standardised arrangements and common rules for the processing, clearing and/or settlement of payment transactions*» (art. 4, n. 6) [28].

For the European policymaker, the main point was retail payments. In fact, in the internal market, making a series of bilateral agreements between payment service providers would have made the cross-border transfer of funds extremely expensive. It was therefore important that payment could flow easily – as a string of data – through the payment systems (or the payment platforms). This is why, since the mid-80s Commission recommendations, the European policymaker has pushed forward the idea of compatible and interoperable payment systems that can easily communicate with each other.

However, while the policy priority of the European policymaker was to remove all the legal, economic, and technical burdens on the proper functioning of the internal market for payments, the payment systems as business organisations (or associations of undertakings) claim that, due to the two-sided market structure and the positive network externalities exhibited by the payment services, they may operate as long as a vertical integration process is brought about, where the integration process goes from the top (the matchmaker) to the end-users (the payees and the payers) and implies a cost-allocation mechanism among the network participants. The first group is subject to the "non-discrimination"[29] rule as well as the "honour all cards"[30]

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[28] This definition appears to be consistent with both the definition of payment system set out in the 1998 Settlement Finality Directive and in the 2015 Payment Service Directive.

[29] The "non-discrimination rule" prohibits merchants from adding charges to cardholders who pay using one of the methods provided by the payment system-platform. In addition, the no-discrimination rule prohibits merchants from giving consumers discounts for paying by other means of payment, such as cash, for example. See: Commission decision of 9th August 2001, OJEC n. L293/24 of 10.11.2001.

[30] The "honour-all-cards" rule is a «*twofold obligation imposed by issuers and payment card schemes for payees to accept all the cards of the same brand, irrespective of the different costs of these cards (the 'Honour all Products' element) and irrespective of the individual*

rule; by contrast, the intra-system competition is deeply influenced by multilateral interchange fee[31], the exclusionary clauses as membership fees[32]. Between the European policymaker and the market actors (i.e., the payment systems) there is the antitrust action, carried on by the network of national antitrust authorities, led by the Commission as *primus inter pares*, firstly according to Commission Regulation n. 17 of 1965 and, later on, Commission Regulation n. 1 of 2003.

In the market for payment services, the antitrust regulatory experience goes back to the 1995 Commission communication on the application of competition rules to cross-border credit transfers and has been based, throughout the years, on the Commission's decisions and European courts' rulings, like *Visa*, *Mastercard* or *Cartes Bancaires* case law, just to mention a few. An in-depth analysis of antitrust results falls beyond the scope of this paper, but, to cut a long story short, the European lawmaker has decided to step into the antitrust arena, making some regulatory choices taking legislative initiatives:

- With regard to access to the payment systems, it has been established that «*Member States shall ensure that the rules on access of authorised or registered payment service providers that are legal persons to payment systems are objective, non-discriminatory and proportionate and that they do not inhibit access more than is necessary to safeguard against specific risks such as settlement risk, operational risk and business risk and to protect the financial and operational stability of the payment system. Payment systems shall not impose on payment service providers, on payment service users or on other payment systems any of the following requirements: (a) restrictive rule on effective participation in other payment systems; (b) rule which discriminates between authorised payment service providers or between registered payment service providers in relation to the rights, obligations and entitlements of participants; (c) restriction on the basis of institutional status»* (art. 35, 2015 Payment Service Directive);

issuing bank which has issued the card (the 'Honour all Issuers' element)» (Preamble 37, Reg. 751/2015/EU).

[31] The "multilateral interchange fee" means a «*fee paid for each transaction directly or indirectly (i.e. through a third party) between the issuer and the acquirer involved in a card-based payment transaction. The net compensation or other agreed remuneration is considered to be part of the interchange fee»* (art. 2, n. 10, Reg. 751/2015/EU).

[32] The exclusionary clauses may influence intra-system competition; in other words, competition among incumbents and newcomers based on membership fees and the qualities of the payment services provided by the payment system(s) concerned.

- Concerning multilateral interchange fees, Regulation 751/2015/EU provides that all debit and credit card-based payments are subject to a maximum interchange fee rate, which may be lowered for domestic payments;
- As for the "honour all cards" rule, Regulation 751/2015/EU has established that «*Payment card schemes and payment service providers shall not apply any rule that obliges payees accepting a cardbased payment instrument issued by one issuer also to accept other card-based payment instruments issued within the framework of the same payment card scheme*»;
- In the end, art. 62 of the 2015 Payment Service Directive (formerly art. 52, 2007 Payment Service Directive) concerning the non-discrimination rule, has established that, generally speaking, the «*payment service provider shall not prevent the payee from requesting from the payer a charge, offering him a reduction or otherwise steering him towards the use of a given payment instrument*».

Apart from any further consideration, one might reasonably assume that the European policymaker has taken the regulatory initiative in this field because the antitrust experience was raising some degree of legal uncertainty, but the result is still highly debated. In the end, both European legislation and antitrust experience have addressed the payment system as the conceptual device for the construction of the European framework for payments.

3.2.4. Harmonisation and financial inclusion

The second axis of the European harmonisation process for payments is financial inclusion. At the beginning, this meant allowing payment service users to enjoy the full benefits of the internal market for goods, services and persons. More recently, however, this has become the right to access the payment system on a non-discriminatory basis, holding at least a payment account with basic features.

The first step was taken in the late 70s and mid-80s, when the harmonisation process was exclusively based on the Treaty's negative provisions and led by the preliminary rulings of the Court of Justice[33].

[33] We can draw a distinction between positive and negative harmonization processes. Positive harmonization broadly aligns the rules and regulations of the various members of the Union, providing common Community-based rules, so they are established through the ordinary legislation process (art. 114 TFEU). On the other hand, the negative harmonization process is grounded on the proceedings of the European Court of Justice, which is also responsible for ascertaining whether national administrative or legislative provisions comply with the

At that time, the free movement of payments was still considered ancillary to the free movement of capital and, in turn, the latter had not yet been fully liberalised. Within this normative context, the joint "Luisi and Carbone"[34] cases posed the following situation: two nationals of a Member State (Italy) moved to another Member State to enjoy tourist services or medical treatments and brought with them a quantity of physical banknotes in the foreign currency for use abroad, exceeding the maximum permitted by the home exchange law. Both Mrs Luisi and Mr Carbone were charged under national law, which imposed a penalty on them.

The Court of Justice, asked to release a preliminary ruling on the interpretation of art. 106 of the Treaty of Rome, held that «*(…) any payments connected with the movement of goods or services are to be liberalised to the extent to which the movement of goods and services has been liberalised between the Member States*", in other words, the money consideration paid for exchanging goods or services (the so-called *current payments*) had been fully liberalised since the end of the transitional period. In addition, the Court held that the «*physical transfer of bank notes may not therefore be classified as a movement of capital where the transfer in question corresponds to an obligation to pay arising from a transaction involving the movement of goods or services. Consequently, payments in connection with tourism or travel for the purposes of business, education or medical treatment cannot be classified as movements of capital, even where they are affected by means of physical transfer of bank notes»*[35].

After the Maastricht Treaty, the free movement of capital and payments was fully liberalised, and the latter was no longer considered as ancillary to the former. It was in these years, as I have already outlined in the paragraphs above, that the ongoing positive harmonisation process began. However, financial inclusion has only recently become a clear-cut policy priority. In fact, the 2014 Payment Accounts Directive clearly established the non-discrimination principle, providing that «*Member States shall ensure that credit institutions do not discriminate against consumers legally resident in the Union by reason of their nationality or place of residence or by reason of any other ground as referred to in Article 21 of the Charter, when those*

European Treaty rules or, conversely, may hinder fulfillment of the principles of the European Treaties, especially the free movement of persons, goods, services, capital and payments. On the legal techniques of harmonisation, see: KURCZ, *Harmonisation by means of directives-a never-ending story?*, in *European Business Law Review*, 2001 (Nove. Dec), 287 - 307.

[34] Joined cases 286/82 and 26/83.

[35] Luisi and Carbone joined case, § 21 - 23.

consumers apply for or access a payment account within the Union. The conditions applicable to holding a payment account with basic features shall be in no way discriminatory»[36]. They are entitled to hold a payment account or, at least a payment account with basic features: indeed, the 2014 Payment Accounts Directive establishes that this type of payment account is provided by a number of credit institutions in each Member State for European consumers, microenterprises and asylum seekers, «*irrespective of the consumers' financial circumstances, such as their employment status, level of income, credit history or personal bankruptcy»*[37]. In addition, the holders of payment accounts with basic features may place, withdraw, and transfer funds by means of direct debits, credit transfers and card payments. In this sense, they are fully comparable to regular payment accounts[38].

Consistently with the financial inclusion policy priority, the 2018 Geoblocking Regulation «*seeks to address direct, as well as indirect discrimination. Thus, it also seeks to cover unjustified differences of treatment on the basis of other distinguishing criteria which lead to the same result as the application of criteria directly based on customers' nationality or place of residence, regardless of whether the customer concerned is present, permanently or on a temporary basis, in another Member State, or place of establishment*»[39].

4. Digital Currencies as a new monetary system

The analysis of the legislation provided in the preceding sections has shown the main regulatory features of the European payment system as a whole, addressing how the *electronification* process of funds transfer has led the regulatory harmonisation process at European level.

In the end, a European payment system has been established, firmly rooted in common regulatory, technical and information standards, based on the role of the *middleman* performed by payment service providers, clearing houses, central banks and, above all, payment system-platforms. In fact, the single payment system-platform has become a conceptual, technical and normative unit.

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[36] Art. 15, 2014 Payment Accounts Directive.
[37] Preamble (35), 2014 Payment Accounts Directive.
[38] See: art. 17, 2014 Payment Accounts Directive.
[39] Preamble (6), Reg. 2018/302/EU, OJEU n. 60/I, of 2.3.2018.

However, sooner or later, the European payment system was to encounter something completely new, as happened with the ancient *rai*-based system. This is the case of the virtual currencies (VCs) system and, among these, bitcoins as a leading virtual currency scheme.

Generally speaking, virtual currencies work as a payment system, in other words, as a value transfer system where the flow of monetary assets is denominated in a private currency, the bitcoin, acting as a unit of account.

The bitcoin is based on the blockchain system, which works as «a protocol for sending, receiving and recording value on a public ledger», featured by immutability or «resistance to tamper», because its state is externally verifiable and all data is immutable[40]. As a «value container»[41], the blockchain may contain a fiat currency, a privately-issued currency, a financial instrument, and other assets. Indeed, there might be a blockchain without a monetary token, but there is no virtual currency without blockchain technology.

Bitcoins are the prototype of bi-directional (i), permissionless (ii) and decentralised (iii) virtual currency schemes, gaining momentum since the 2009-2011 financial crisis as a form of reaction to the official financial system. Indeed, they respectively: (i) enjoy a close link between the virtual world and the real economy, and this may actually influence the monetary function of fiat currencies and the role of central banks, as well as the efficiency and affordability of the "regular" payment system[42]; (ii) allow anyone to participate in the process of determining what blocks are added to the chain, for which reason they are also treated as public ledgers[43]; and lastly, (iii) the current state of the chain and the bitcoin platform allows all the nodes (i.e., all participants) to take part in the validation process of the bitcoin blockchain, with all of them having a copy of all the transactions ever made[44]. Of the three features of the bitcoin-blockchain, decentralisation is without doubt the most

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[40] PILKINGTON, *Blockchain technology: principles and applications*, in OLLEROS - ZHEGU (eds), *Research handbook on digital transformation*, Cheltenham, UK, 2016.

[41] PILKINGTON, op. cit.

[42] An overview of the different types of virtual schemes, please, check: ECB, *Virtual currency schemes*, Frankfurt am Main, October 2012.

[43] Sometimes it is drawn the difference between private and public ledgers, some others between permissioned and permissionless ledgers, but in the end they are respectively comparable one with the others. See: PILKINGTON, *Blockchain technology: principles and applications*, op. cit.

[44] PILKINGTON, op. cit.; BARON - O'MAHONY - MANHEIN - DION-SCHWARZ, *Examining the potential for non-state actor development*, 2015, Rand Corporation Report, 5-21, available at http://www.jstor.org/stable/10.72249/j.ctt19rmd78.8

challenging because it is argued that it is the level of decentralisation that makes the difference compared with the "traditional" payment systems, making reference either to the property title regarding the physical and virtual nodes or to the lack of coordination among the actions of the different actors that, in turn, have different internal roles in the validation process of the bitcoin transfers[45].

A brief comparison between the regular payment system and bitcoin block-chain value transfer (sub 4.1.) may help us figure out which type of regulatory changes should be made and whether the latter would prevail over the former (sub 4.2. and 4.3.).

4.1. The regular payment system vs the bitcoin value transfer system

In regular payment systems, commercial banks are committed to ascertaining whether the payer is entitled to transfer the sum of money concerned, while here the "multispending problem" is dealt with via a cryptographic method, namely, «by a mathematical proof that the payer is the effective owner of that unit of money»[46]. This mechanism works through a digital signature and a complex validation process. According to the former element, each participant uses a double key, namely a private and public key, transmitting the public key to the network, but keeping the private key secret, which in turn makes it possible to couple the owner to the amount of money transferred. As stated in the economics literature, this mechanism is « conceptually similar to having an address with a locked mailbox; anyone can deliver mail, but only someone can take letters out and send them to a new address, thereby transferring or spending them»[47]. Conversely, the latter element - namely, the validation process - is carried out through a *decentralised consensus protocol* or blockchain, i.e., a «chain of transactional records that a subset of network participants (also known as miners) enriches by solving difficult computational problems»[48]. While the consensus concerns

[45] PILKINGTON, op. cit.; WALCH, *Deconstructing "Decentalization". Exploring the core claim of crypto systems*, in BRUMMER, *Cryptoassets. Legal, Regulatory, and monetary perspectives*, Oxford: OUP, 2019, 39 - 68.

[46] PILKINGTON, op. cit.

[47] BARON - O'MAHONY - MANHEIN - DION-SCHWARZ, *Examining the potential for non-state actor development*, 12 ff.

[48] PILKINGTON, op. cit.

whether or not to include the new block in the blockchain[49], miners, natural or legal persons, are the nodes of the network, and they «fiercely (and anonymously) compete on the network to solve the mathematical problem in the most efficient way, thereby adding the next block to the blockchain»[50].

Bitcoin-like virtual currency schemes use a bottom-up and decentralised validation process giving a different content to the payment finality process. Whereas in the regular payment system the transfer of funds is carried out by the commercial banks and the clearing and settlement houses, all the participants in the virtual currency network may (in theory) become validators and, as such, not only may they take an active role in the monetary exchange process, but they also participate in the money issuance process, replacing the traditional functions of the central banks and the private banking system. In fact, it has been emphasised that the validation process is closely linked to the issuance process: the first node solving the mathematical problem is rewarded by new bitcoins automatically generated by the system. In turn, users reward the validators on a voluntary basis when the validation process is carried out[51].

There are a couple of further trust-based issues to address, drawing a comparison between the regular European payment system and the VC-value transfer system.

Payment service users must rely on the proper execution of their payment orders as well as the protection of their funds and data. The national and European authorities, together with the central banks, are in charge of performing financial supervision and oversight functions in order to preserve trust in the stability of payment service providers and the affordable and efficient functioning of the payment system as a whole.

On the other hand, as the regular payment system has been replaced by the VC-system, there is no issue of trust in the financial intermediaries and the financial authorities. Indeed, thanks to the hash function, the blockchain is always characterised by immutability, which is «what confers its intrinsic value to crypto-currencies, thanks to a revolutionary feature, namely 'the ability to declare a truth, globally and without a centre of authority, regardless of what anyone else does to change this truth'»[52]. In fact, the hash is an output,

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[49] More details in: BONAIUTI, *Economic issues on m-payments and bitcoin*, in Gimigliano (ed), Bitcoin and mobile payments. constructing a European Union Framework, Palgrave Studies in Financial Services Technology, London, 2016, 27 - 51.

[50] PILKINGTON, op. cit.

[51] Bonaiuti argued that «even if this fee is completely on a voluntary basis, probably transactions without fees are never validated». See: BONAIUTI, *Economic issues on m-payments and bitcoin*, 41.

[52] PILKINGTON, op. cit.

namely the result of a transformation of the original information (input): «each block contains a list of transactions, as well as the *hash*, or digital signature, of the previous block created (hence the term *block chain*) for the ledger, since each block is chained to the previous one»[53]. Hence, it is assumed that the validation process cannot be reversed[54].

In the end, the bitcoin system (and virtual currencies alike) raises a further issue of trust, namely, trust in the stability of its purchasing power.

In the regular payment system, the central banks are committed to preserving monetary stability by implementing monetary policy. Indeed, the Treaty on the Functioning of the European Union establishes that the «*primary objective of the European System of Central Banks (hereinafter referred to as 'the ESCB') shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union*» (art. 127).

By contrast, virtual currency schemes like bitcoins enjoy market-based value, and this greatly impairs their function as a reserve of value. In order to make the virtual currencies less volatile, financial service providers and technology companies are working on stablecoins, using the following stabilisation mechanism: they ensure the value of the virtual assets by either «(i) holding money (in one currency or a basket of different currencies), (ii) securities and commodities such as gold, (iii) crypto-assets or even (v) user's expectations about future purchasing power»[55].

Only the coming years may tell us whether the VC-based value transfer system might totally or partially replace the regular European payment system. Anyway, what will happen in the future is likely to be influenced by the on-going policy-making choice. Firstly, it might be influenced by the regulatory reaction of the European institutions, and - secondly - it might be led by its aptitude for coping with existing regulatory drawbacks or market bottlenecks.

In the following sections, this paper first gives an overview of European regulatory reactions with a view to ascertaining whether the European policymaker has prohibited, regulated or *ignored*, the new monetary phenomenon (*sub* 4.2.): it is worthy of note that on Yap Island, the Germans

[53] BARON - O'MAHONY - MANHEIN - DION-SCHWARZ, *Examining the potential for non-state actor development*, cit., 12

[54] PILKINGTON, op. cit.

[55] ECB, *Stablecoins - no coins, but are they stable?*, *In Focus*, Issue n. 3, November 2019.

tried to prevent Yap inhabitants from using rai by drawing a cross on the largest stones. In turn, in 4.3., this paper wonders whether the VC-value transfer system can cope with some of the most prominent regulatory drawbacks of the current payment system.

4.2. The European policymaker's reaction to the spread of virtual currencies

As explained in Part I of this paper, the German government tried to control the disobedient districts on Yap Island by sending a man in charge of marking a certain number of the most valuable rai with a black cross. Learning from the e-money regulatory experience, the European policymaker has decided to take a wait-and-see approach to bitcoin-like virtual currency schemes. Indeed, although they might jeopardise the monetary function of the central bank as well as the role of fiat currency as a unit of account, this time, the ECB acknowledges that virtual currencies still represent a tiny share of the market[56].

Generally speaking, there are two main strands of regulatory reaction at European level; these handle threats to the regular operation of the financial system and contract freedom in the payee-payer obligation relationship.

With a view to protecting the soundness of the financial system, the 2018 Anti-Money Laundering Directive[57] focuses on the money-laundering risk raised by the anonymity of bitcoin-like virtual currencies. Indeed, the main point concerns the anonymity of virtual currency schemes like bitcoins, where there is no way of coupling the public key with the private one. This may make them a useful device for money laundering activities. Therefore, both the providers professionally engaged in the exchange services between virtual currencies and fiat currencies as well as the custodian wallet providers[58] must be registered and fulfil the notification requirements laid down in the 2015 AML directive[59].

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[56] ECB, *Virtual currency schemes - a further analysis*, Frankfurt am Main, 2015, 32 f.

[57] Directive 2018/843/EU of 30 May 2018, published in OJEU n. L 156/43 of 19.6.2018.

[58] With regard to the business of custodian wallet providers, please, see: BONAIUTI, *Economic issues on m-payments and bitcoin*, 38 f. It goes without saying that the VC ecosystem is much broader.

[59] It is worthy of note that the 2018 AML directive provides a definition of virtual currency - for the first time in the European legal framework - considering it as a «*digital representation of value that is not issued nor 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*

By contrast, creditors and debtors of monetary obligations may freely pick out the currency they prefer, but the European Banking Authority (EBA) has warned virtual currency holders about the risks they are assuming, addressing operational, legal, and financial risks[60], beginning with the deceptive nature of the word "currency". Indeed, EBA has considered virtual currencies as a «digital representation of value that is neither issued by a central bank or a public authority nor necessarily attached to a FC [*fiat currency*], but it is used by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically»[61]. In addition, EBA has drawn the difference between the virtual currencies and banking deposits, stressing that the virtual currency holders do not enjoy the deposit guarantee scheme protection in case of VC issuers' default. In the end, EBA has emphasized the normative difference between funds and virtual currencies and how only the former - namely, coins and banknotes, scriptural money and e-money as set out in the 2009 European directive - are covered by the rules and regulation on payment services laid down in the 2015 Payment Service Directive.

4.3. What regulatory advances?

The bitcoin-like value transfer system represents the latest state of the *electronification* of payments[62], marked by a higher level of money privatisation. However, the Yap experience seems to teach us that the monetary change is not *per se* something positive[63].

Indeed, it seems sensible to believe that the VC system may better off the financial inclusion levelling down the money remittance fees, especially those towards Third Countries, but it would be advisable to ascertain whether bitcoin-like virtual currency schemes may address some of the regulatory drawbacks or market bottlenecks raised by the *regular* payment system. To

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which can be transferred, stored and traded electronically» (art. 3, n. 18). Despite this normative definition, laid down for the application of the AML rules and regulations, there is great legal uncertainty on the juridical nature of the bitcoin-like virtual currencies. An overview of the academic positions: VARDI, *Bit by bit: assessing the legal nature of virtual currencies*, in GIMIGLIANO (ed), *Bitcoin and mobile payments. Constructing a European Union Framework*, Palgrave Studies in Financial Services Technology, London, 2016, 55 - 71.

[60] EBA, *Warning to consumers on virtual currencies*, 12 December 2013; EBA, *Opinion on "virtual currencies"*, 4 July 2014; EBA, Report with advice for the European commission on crypto-assets, 9 January 2019.

[61] EBA, *Opinion on "virtual currencies"*, cit., 11.

[62] See: PILKINGTON, op. cit.

[63] *Supra*, Part I.

this end, this section will focus on two of them: the credit crunch, closely connected to overdraft regulatory conditions, and the governance of payment systems as four-party payment platforms.

Concerning the first aspect, «If a customer draws on an account which has inadequate funds, it is regarded as being a request to the bank for an overdraft»[64] and since the 2000 Cruickshank Report, overdraft is addressed as a grey area of competition. It has underscored how the price of overdraft is not driving the choice of current account. More recently, the analysis of the European legal framework from a competition law standpoint shows how the bottleneck of this market is the credit access and the overdraft conditions. From the investigation of the Commission and the Court of Justice case law comes out that the current or payment accounts have a tying effect because they are at the crossroads between the access to credit and the operation of payment operations.

This is why, since the 2007 Payment Service Directive, the European policymaker has allowed payment institutions not only to operate payment transactions but also to extend credit through their own funds, with a view to improving market conditions. Indeed, «*payment institutions may grant credit relating to payment services (…) if all of the following conditions are met: (a) the credit shall be ancillary and granted exclusively in connection with the execution of a payment transaction; (b) notwithstanding national rules on providing credit by credit cards, the credit granted with a payment (…) shall be repaid within a short period which shall in no case exceed 12 months; (c) such credit shall not be granted from the funds received or held for the purpose of executing a payment transaction; (d) the own funds of the payment institution shall at all times and to the satisfaction of the supervisory authorities be appropriate in view of the overall amount of credit granted*»[65].

Turning to the bitcoin-like virtual currency schemes, these are unlikely to improve the state of the overdraft market. Insofar as they are based on a logic of «digital metallism»[66], where promises of «materiality, privacy, and community»[67] are underwritten and backed by an algorithm, they are far from enjoying the degree of flexibility required to meet users' credit needs.

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[64] WADSLEY - PENN, *Banking Law*, vol. I, London, 2000.

[65] Art. 18, § 4, 2015 Payment Service Directive.

[66] MURRAY ET ALT., *"When perhaps the real problem is money itself!": the practical materiality of Bitcoin*, in *Social Semiotics*, March 2013, available at: https://www.tandfonline.com/doi/abs/10.1080/10350330.2013.777594

[67] MURRAY ET ALT., *"When perhaps the real problem is money itself!": the practical materiality of Bitcoin*, in *Social Semiotics*, March 2013, available at: https://www.tandfonline.com/doi/abs/10.1080/10350330.2013.777594

Coming to the governance of payment systems as two-sided and four-party platforms: it is a matter of intra-system competition. The case in point is *Cartes Bancaires* , where the Court of Justice overturned the ruling of the General Court (and, in turn, the European Commission's decision) on some pricing measures, established the CB Members scheme, setting «certain fees to be paid by CB Group members depending on their card issuing/acquisition of merchants ratio». While the CB Group addressed them as a regulatory device to solve a free-riding problem on the issuing side, the Commission held that they were a form of by object restriction because the «purpose of the measures was to keep the price of payment cards artificially high to the advantage of the major banks of the CB Group and to the detriment of new entrants»[68]. This case may demonstrate the delicate trade-off between the newcomers' and the incumbents' interests in intra-system competition In addition, it reveals how art. 35, 2015 Payment Service Directive (former art. 28, 2007 Payment Service Directive), mentioned above[69], is far from providing a workable solution to the governance bottleneck. So the question is: might bitcoin blockchain be able to cope with this regulatory issue?

One might assume that the asserted decentralised nature of permissionless blockchain may cope with this regulatory bottleneck. However, Angela Walch has convincingly stressed the risk of the so-called streetlight effect, «paying attention only to matters that have been illuminated, and not to ones remaining in the dark. The name of the effect comes from the parable of a man who looked for his lost glasses only in places illuminated by a streetlight, not because he thought he had lost them there, but because that is where he could see. Here, the fact that the node networks of the Bitcoin and Ethereum systems are extensive and global is relatively well known and nodes are easily countable (in the gleam of the streetlight), while the roles of software developers, miners, and even nodes in governance are complex and poorly understood (in the shadows), so these actors who strongly influence the success or the failure of a blockchain system remain unremarked»[70]. As far as the concentration of decision-making power remains in the dark, there is no room for competition law in cases of market distortion.

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[68] CALZADO - SCORDAMAGLIA TOUSIS, *Groupement Cartes Bancaires v. Commission: shedding light on what is not a "by object" restriction of competition*, in *Journal of European Competition Law & Practice*, 2015 (18), 1 - 3.

[69] See above: § 3.2.3.

[70] WALCH, *Deconstructing "Decentalization". Exploring the core claim of crypto systems*, 59 ff.

5. Concluding remarks

The "privatisation" of money represents a long-standing process; it is based on technological innovation, changing from time to time. In the case of the story of *rai* stones, the impact of the technology through the intervention of a "private actor" (captain O'Keefe) had a negative effect on the local economy of Yap - though 'multiplying' the (nominal) availability of money (Part I). In turn, Part II has addressed an evolution rather than a revolution, from the paper-based negotiable instruments, to the electronic transfers of funds and the blockchain-based virtual currencies, featured by different degree of decentralisation.

In this light, apart from the feeling of pretty euphoria for the new frontiers of the *electronification* process, the recent financial and sovereign debt crisis on the one side and the sustainable development goals, on the other side, remind us that paper, virtual or digital money «itself cannot have inherent value as a substance. Whatever it represents must be the basis of a social agreement»[71] and any social agreement mirrors a constitutional project about money in which the money holders trust[72].

The link that this paper has made between the story of the ancient *rai* stones in relation to contemporary *bitcoins* (as represented in the art installation by Mangan) and the process of electronification (as regulated by the European Union) may provide useful interpretive tools to consider how much "technological value" cannot substitute the "substantive value" of social agreement and so the role of the community to determine how money affects growth. In other terms, how the *Limits to Growth* are necessarily connected to social policies aimed at locating the value of money in a market functioning through the participation of all the economic actors.

In this direction, the issues of negotiability and financial inclusion also remind us that "bona fides", that is to say "mutual trust" in monetary exchanges, is never created by technology but grounded on shared social value. And that, to guarantee, preserve and supervise the dynamics of this shared social value in a global economy (where stones, coin or paper money are substituted by digital money) represents a challenge that regulators have still to face in its entirety.

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[71] MELLOR, *The future of money. From financial crisis to public resources*, London, 2010.
[72] DESAN, *Making money: coin, curency, and the coming of capitalism*, Oxford, 2014.